



Advancing the Use of the Digital System Model Taxonomy

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19th Annual NDIA Systems Engineering Conference
Springfield, VA | October 26, 2016



Background

- **Background**
 - Steady erosion of advanced technical superiority, capability and capacity
 - Growth in system complexity and unacceptable risks
 - Cost overruns, reduced buying power and delayed deliveries of capability to the warfighter
- **Better Buying Power 3.0**
 - Dominant capabilities through innovation, technical excellence & quality
 - Improve efficiency, productivity and military capabilities
- **SECDEF Third Offset Strategy**
 - Extend US competitive technological and operational advantage
 - Focus on becoming more efficient in development and fielding of new capabilities
 - Accelerate timelines and out-innovate our adversaries

Engineering Enterprise must address new threats to our national security and strengthen the technological superiority of our military



Digital Engineering Overview



- **Current State**

- Linear acquisition process that lacks agility and resiliency
- Our workforce uses stove-piped infrastructure, environments, and data sources in isolation to support various activities throughout the life-cycle
- Communication, collaboration, and decisions are through static disconnected documents and subject to interpretation
- Current practices can't keep pace with innovation and technology advancements

- **Future State**

- Digital Engineering ecosystem moves the engineering discipline towards an integrated model-based approach that leverages advancements in digital and technological innovation

Transforms the way the Department of Defense innovates and operates



Digital Engineering Strategic Goals



- ① Develop and maintain a **culture** and **workforce** that adopts and supports Digital Engineering across the lifecycle
- ② Formalize development and use of models for providing an enduring **authoritative source of truth**
- ③ Foster the **integration of models and data sources** across functional disciplines to inform enterprise and program decision making
- ④ Establish supporting **infrastructure & environments** to perform engineering activities, collaborate, & communicate across stakeholders
- ⑤ Leverage advanced tools, computing power, and advanced capabilities to improve system capabilities, automate workflow processes (as applicable) and generate digital artifacts and deliverables using models





Leveraging Multiple Activities to Advance Digital Engineering Within DoD



Infusion in Policy & Guidance

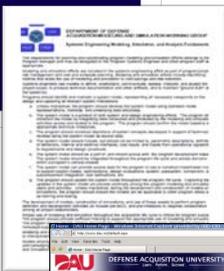
<http://www.acq.osd.mil/se/pg/guidance.html>



DoDI 5000.02, Enclosure 3, Section 9: Modeling and Simulation



Defense Acquisition Guidebook Chapter 4



DoD Digital Engineering Fundamentals

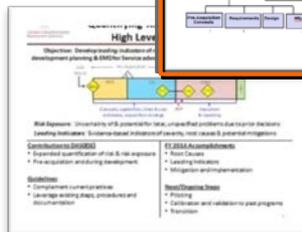
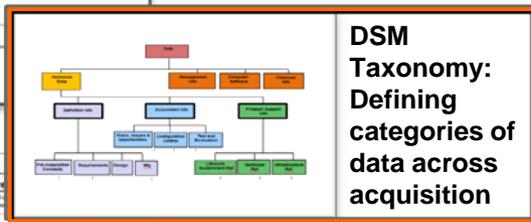


Defense Acquisition University

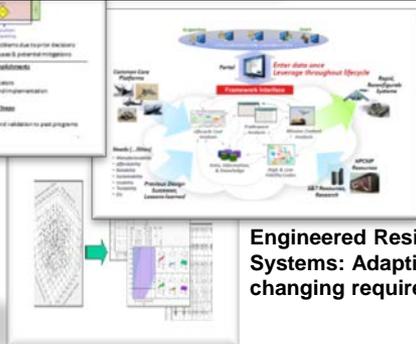
DoD Initiatives



DoD Digital Engineering Working Group (DEWG)



SERC: Model Centric Collaborative Environment



HPCMP CREATE: Physics Based Modeling

Engineered Resilient Systems: Adapting to changing requirements

Other Partnerships

USAF Own the Technical Baseline



NDIA: Essential Elements of the System Model



DMDII
DIGITAL MANUFACTURING AND DESIGN INNOVATION INSTITUTE

Additive Manufacturing



Inter-Agency Working Group



NASA: Sounding Rocket Program

Advancing the state of practice for Digital Engineering within DoD



Current Taxonomy

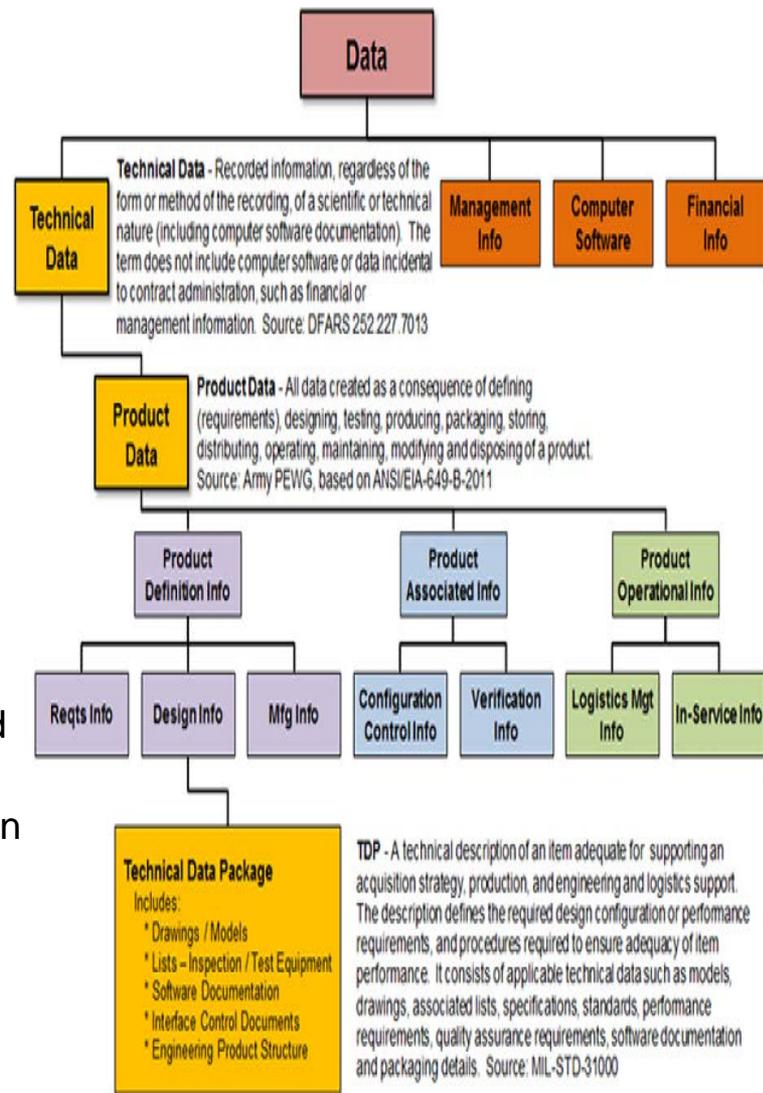


• DSM Objectives

- Update existing DAG Chapter 4 (now DAG Chapter 3) taxonomy
- Provide stakeholders a structure for the types of data that should be considered across the life cycle.
- Used as a basis to drive the community towards a Digital Engineering

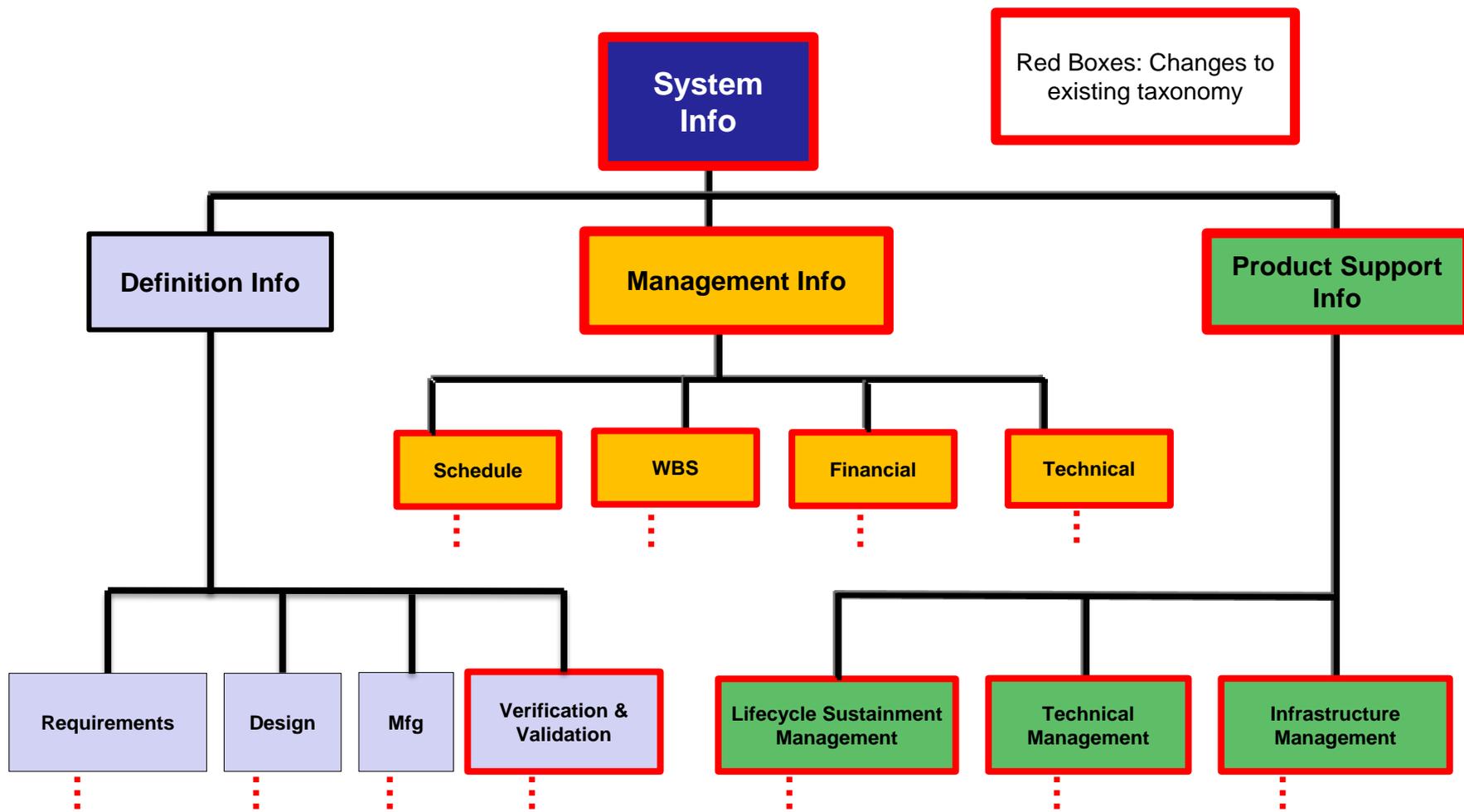
• Key Changes

- Takes a data perspective vs. document perspective
- Includes hardware, software, management, cost and schedule information as part of system information
 - DFARS does not include these as a part of the technical data definition
- Includes Technical, Program, Financial, Schedule, and WBS as part of Management Info
- Includes Validation with Verification as part of Definition Info
- Incorporates the WBS to align with CAPE efforts
- Incorporates the Integrated Product Support Elements to align with L&MR efforts
- Defines the next (4th) level of the taxonomy





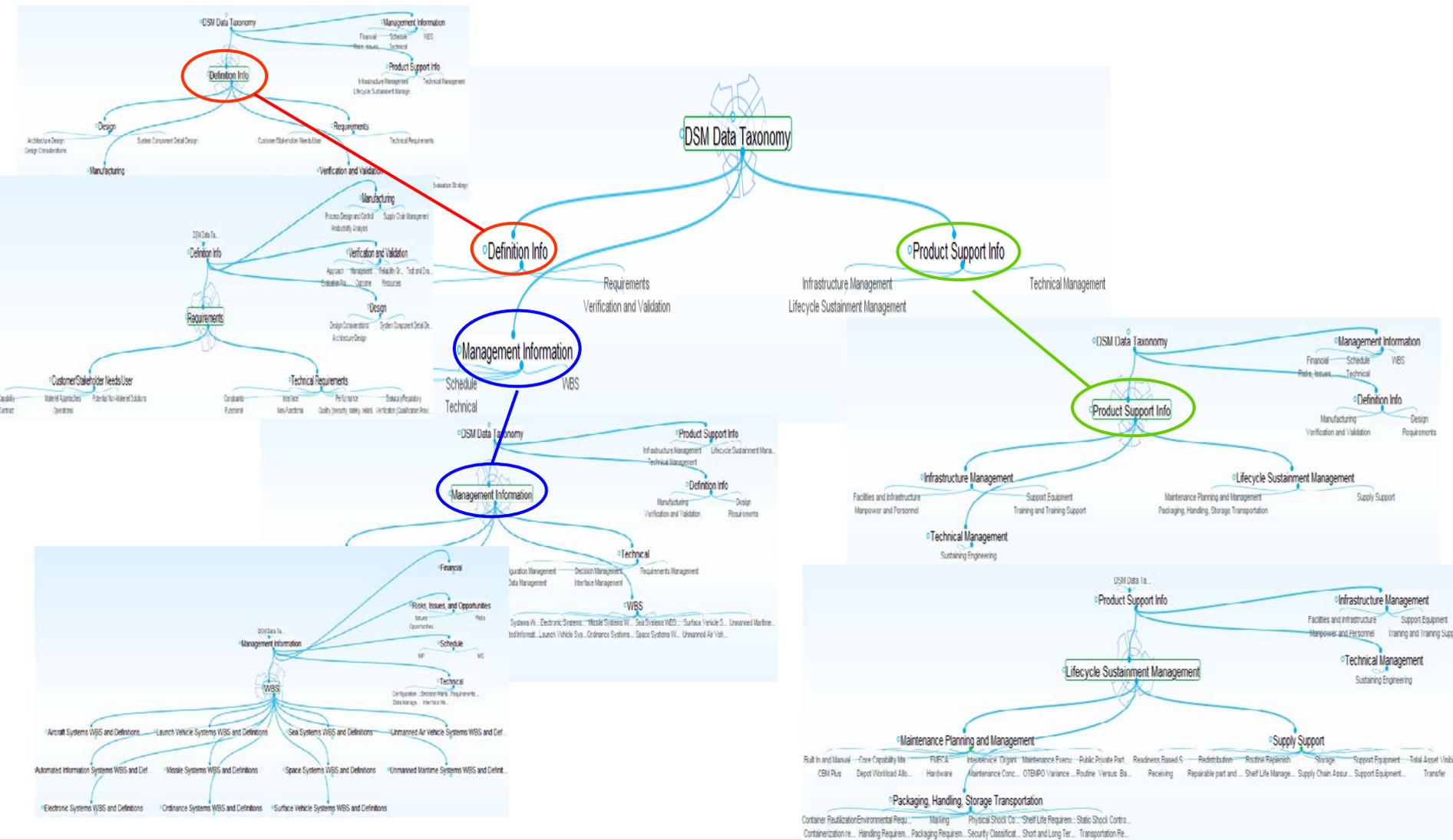
Proposed DSM Taxonomy



The Digital System Model Taxonomy expands on level 4 of the data taxonomy in Chapter 3 of the Defense Acquisition Guidebook

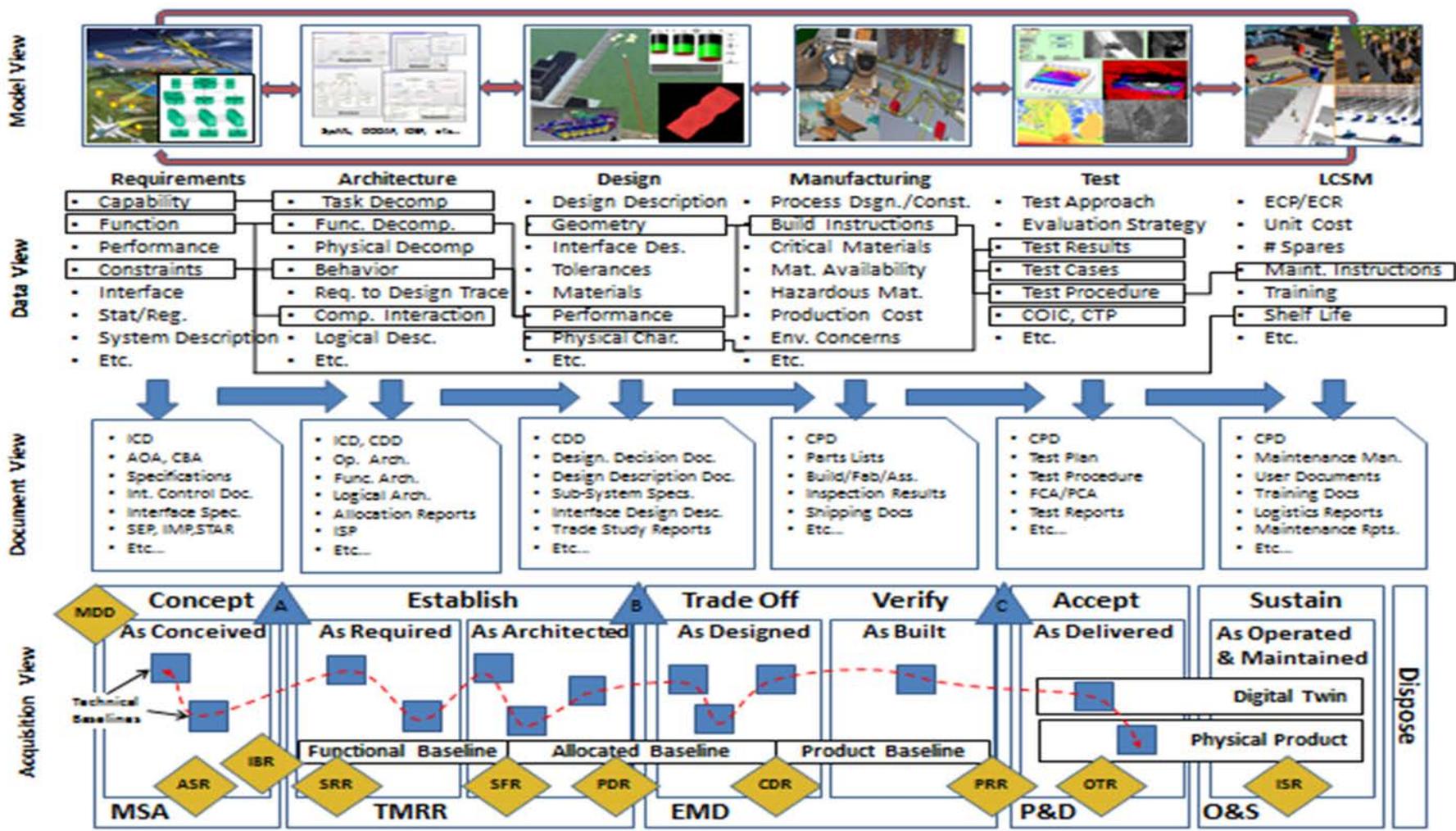


Proposed DSM Taxonomy





Transition to Digital Engineering

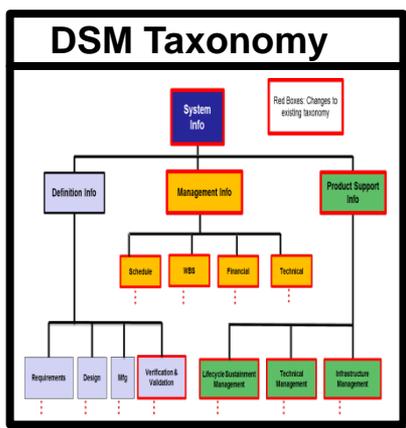


Version 2.4

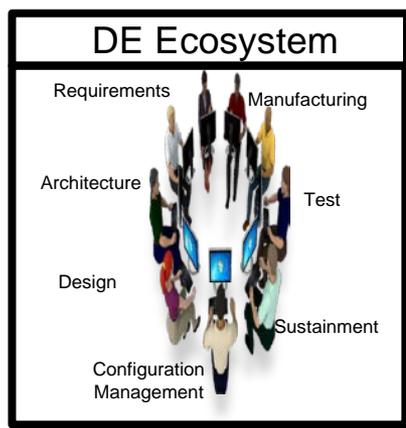


DSM Intended Use

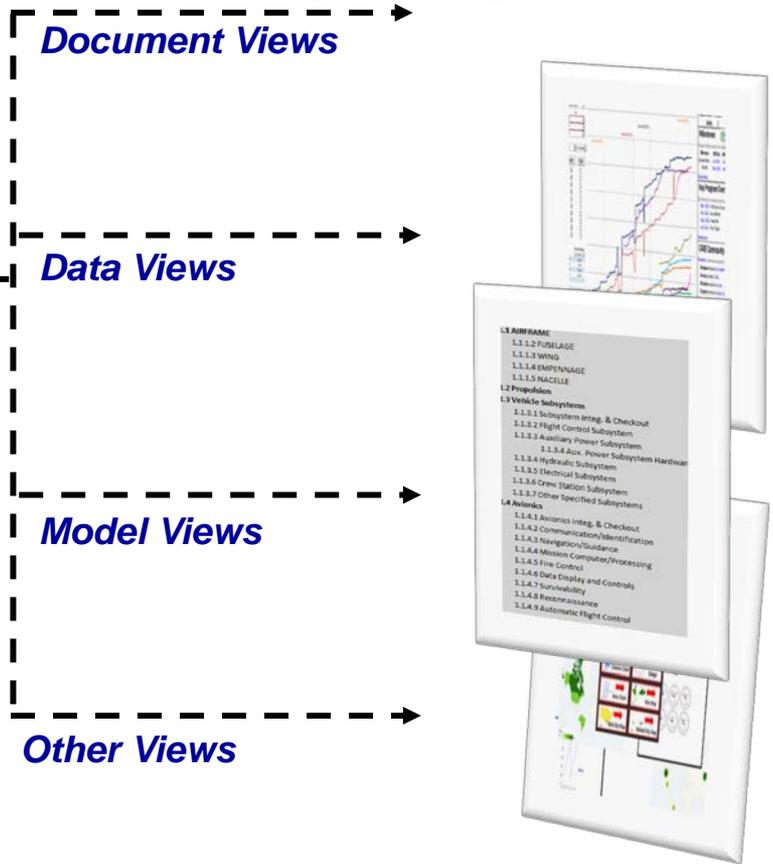
Defines the broad categories



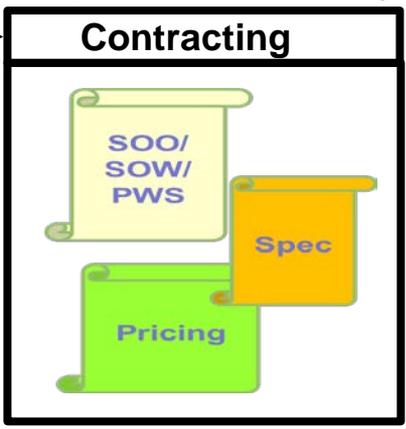
Provides the program's DE ecosystem



Provides multiple views to support decisions



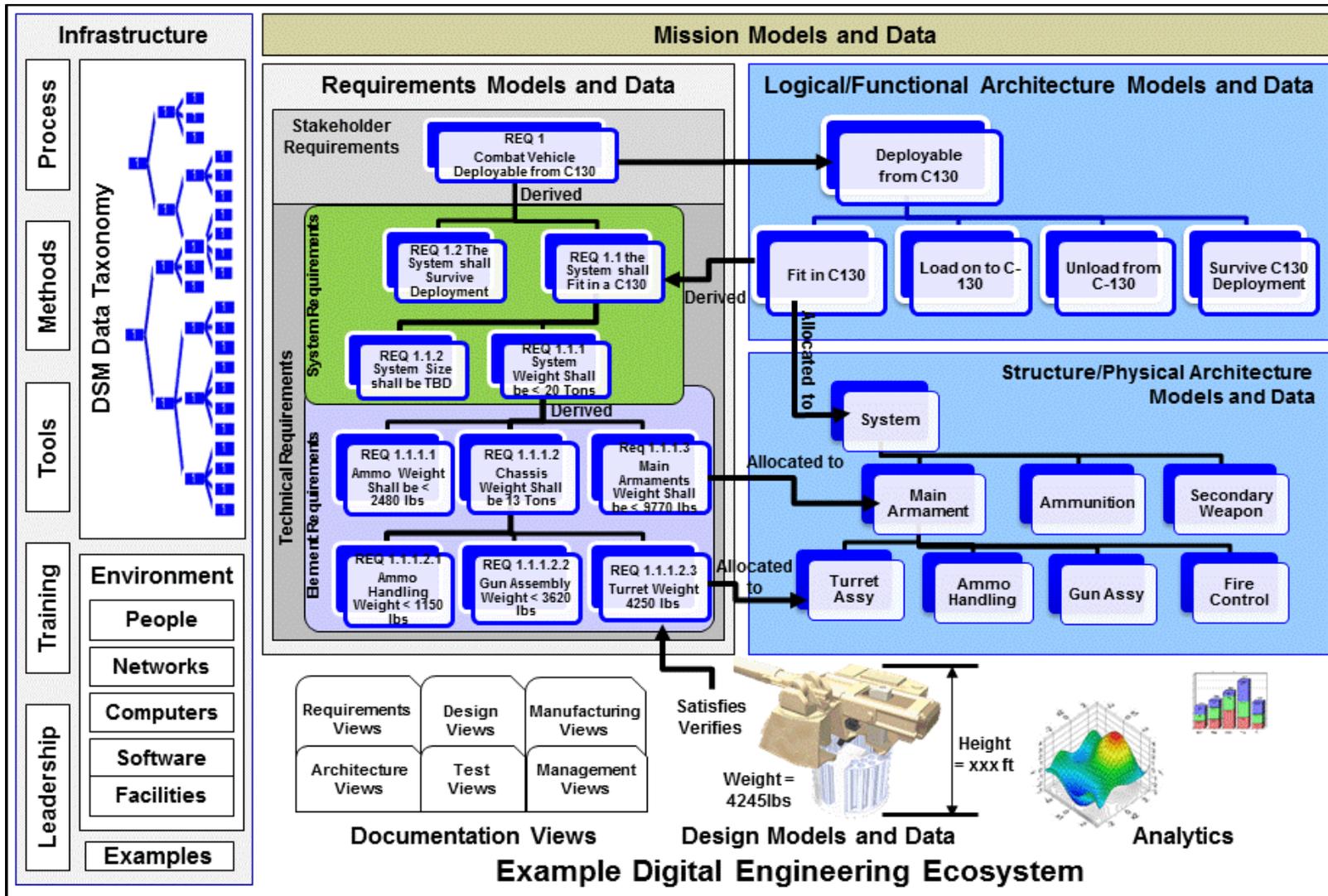
Identifies the data and data rights



Digital System Model provides the broad categories that should be considered across the lifecycle



Weapon System Example





Next Steps



- **Develop Digital System Model Use Cases**
- **Transition Taxonomy to a model-based software tool**
 - Provide a mechanism to define taxonomy and provide visualizations from the same source of data
- **Journal of Defense Modeling and Simulation Special Issue**
 - Develop a special issue paper with three focus areas: Digital Engineering, Engineered Resilient Systems and Modular Open Systems Approach. Includes OSD, Services, and Systems Engineering Research perspectives
 - February 2017 Publication
- **Digital Engineering Strategy**
 - Instantiate strategic goals, objectives, and recommendations to realize the DoD Digital Engineering Vision
- **Digital Engineering Training (CLE 011)**



For Additional Information



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Systems Engineering: Critical to Defense Acquisition



Defense Innovation Marketplace
<http://www.defenseinnovationmarketplace.mil>

DASD, Systems Engineering
<http://www.acq.osd.mil/se>