



SYSTEMS ENGINEERING & ARCHITECTURE

SUMMARY OF:

DoD INSTRUCTION 5000.97, “DIGITAL ENGINEERING”

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Purpose

The Department of Defense is transforming its engineering practices to incorporate digital technology and innovations into an integrated, digital, model-based approach. This instruction establishes policy, assigns responsibilities, and provides procedures for implementing and using digital engineering in the development and sustainment of systems.

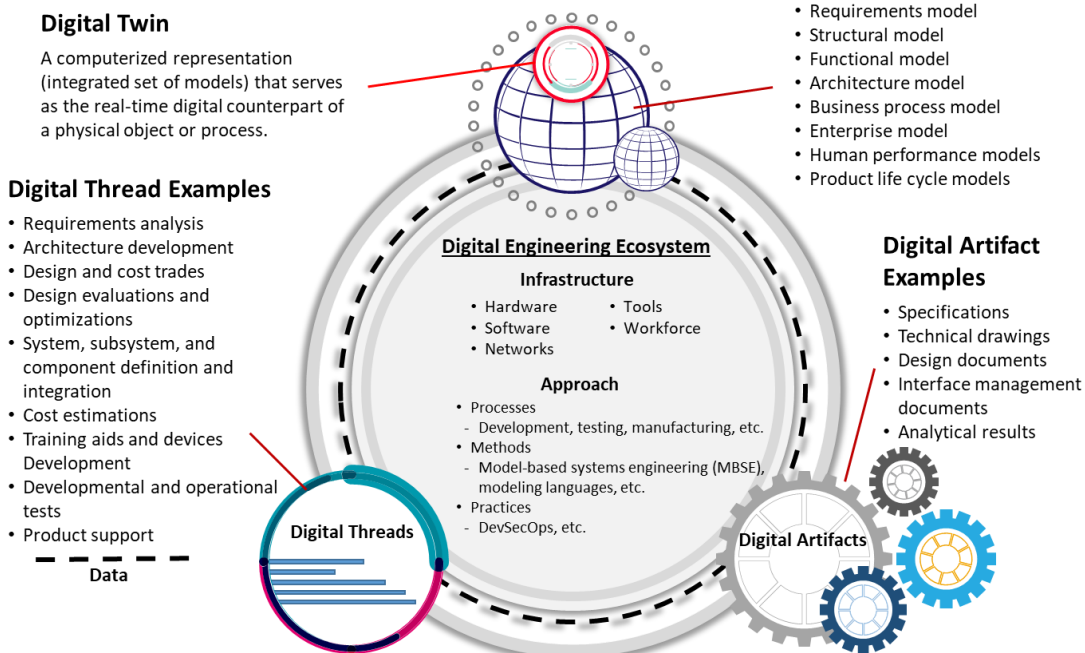
❖ THE POLICY DIRECTS . . .

- ◆ Programs started after the date of the policy will incorporate digital engineering during development unless the program’s decision authority provides an exception.
- ◆ Programs started before the date of the policy should incorporate digital engineering, to the maximum extent possible, when it is practical, beneficial, and affordable.
- ◆ Digital engineering should be addressed in the Acquisition Strategy and in the Systems Engineering Plan.
- ◆ Digital engineering methodologies, technologies, and practices support a comprehensive engineering program for defense systems.

*Digital engineering transforms
DoD systems engineering practice.*

❖ DIGITAL ENGINEERING

- ◆ Digital engineering supports the systems engineering process by moving the primary means of communicating system information from documents to digital models and their underlying data.
- ◆ Digital engineering:
 - Is a critical practice necessary to develop modern, complex systems in an environment of dynamic threats and rapidly evolving technologies.
 - Expands on current engineering practices to take full advantage of computation, visualization, and collaboration.
 - Uses computer systems to develop and manage models for use through all phases of system definition, design, development, test and evaluation, and sustainment.



Data management should adhere to DoD Data Strategy goals – make data visible, accessible, understandable, linked, trustworthy, interoperable, and secure.

Figure 1. Digital Engineering Framework

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SUMMARY OF:

DoD Instruction 5000.97, “Digital Engineering” cont’d

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❖ PROGRAM MANAGERS

- ◆ Consider whether digital engineering is practical, beneficial, and affordable.
- ◆ Consider how digital engineering will be used in the chosen acquisition pathway.
- ◆ Include required digital models, artifacts, and data sets as contract deliverables and secure DoD intellectual property rights.
- ◆ Consider implementing digital engineering ecosystems, digital models, digital threads, and digital artifacts into the program, and document their use.
- ◆ Use existing DoD or Service Component-level digital engineering resources before making new digital engineering investments.
- ◆ Leverage Major Range Test and Facility Base digital engineering infrastructure capabilities.
- ◆ When selecting an infrastructure, consult with the DoD Component and consider enterprise solutions.

❖ DIGITAL ENGINEERING CAPABILITY

- ◆ Used by individuals and organizations involved in the development of a system across its life cycle.
- ◆ Connects the phases of the acquisition life cycle.
- ◆ Provides for the development, verification, validation, use, curation, configuration management, and maintenance of technically accurate digital systems and models of systems, subsystems, and their components.
- ◆ Includes development, security, and operations (DevSecOps) and test infrastructure, processes, and software to automate testing, data reduction and analysis, and software distribution throughout the system life cycle.
- ◆ Operates within an appropriately secure ecosystem that uses policy, standards, and best practices.
- ◆ Consists of digital ecosystem assets from DoD, the DoD Components, and program offices (it is not a single entity).
- ◆ Complies with operational security requirements (DoDD 5205.02E).

Programs should establish an authoritative source of truth for data and models.

❖ DIGITAL ENGINEERING FRAMEWORK

- ◆ **Digital Engineering Ecosystem:** The infrastructure and architecture (hardware, software, networks, tools, workforce) necessary to support digital approaches for all phases of the system development life cycle.
- ◆ **Digital Model:** A computer (0 and 1 digits) representation of an object, phenomenon, process, or system. May include form, attributes, and functions and may be depicted visually or as a mathematical or logical expression.
- ◆ **Digital Twin:** A virtual representation of a product, system, or process that uses data to mirror and predict system activities and performance of its physical twin.
- ◆ **Digital Thread:** Connects authoritative data and digital models, providing actionable information to decision makers throughout a system’s life cycle.
- ◆ **Digital Artifacts:** Digital products and views that are dynamically generated from the digital ecosystem.

❖ RESOURCES

DoD Issuances

<https://www.esd.whs.mil/Directives/issuances/dodi/>

DAU Digital Engineering Training and Credentials

<https://dau.csod.com>

<https://www.dau.edu/credentials/ceng-001>

Digital Engineering & Modeling Practices (MIL-HDBK-539) (in ASSIST) <https://quicksearch.dla.mil/>

Digital Engineering Body of Knowledge <https://de-bok.org>

- SySML v2 Transition
- DE Tool Evaluation Criteria Template (DETECT)
- Other DE topics

SE&A <https://www.cto.mil/sea/>

Scan the QR code to view DoDI 5000.97.

