



SYSTEMS ENGINEERING & ARCHITECTURE

SUMMARY OF:

DoD INSTRUCTION 5000.97, "DIGITAL ENGINEERING"

PUBLISHED DECEMBER 21, 2023

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

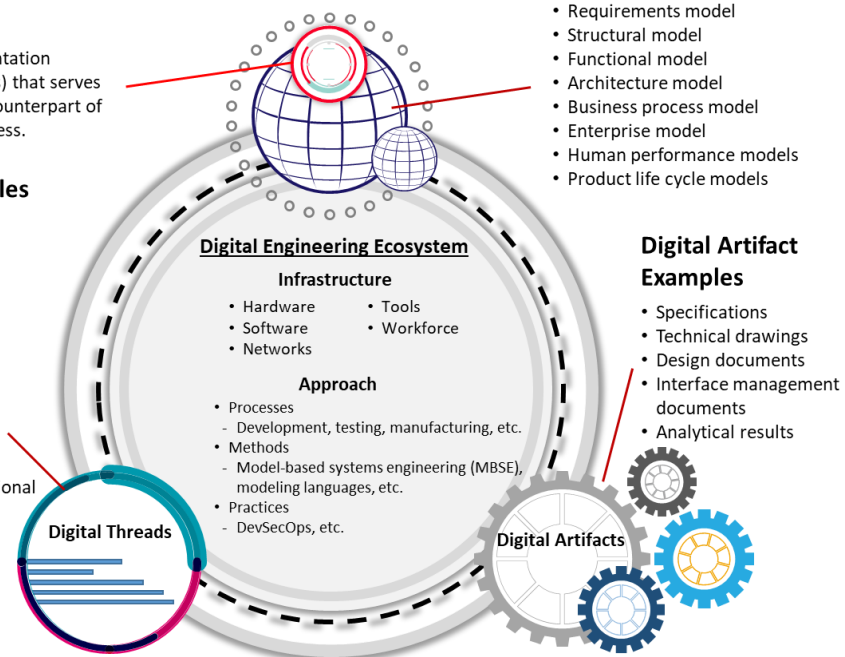
- ◆ Digital engineering supports the systems engineering process by moving the primary means of communicating system information from documents to digital models and their underlying data.
- ◆ Digital engineering:
 - Is a critical practice necessary to develop modern, complex systems in an environment 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.

Digital Twin
A computerized representation (integrated set of models) that serves as the real-time digital counterpart of a physical object or process.

Digital Thread Examples

- Requirements analysis
- Architecture development
- Design and cost trades
- Design evaluations and optimizations
- System, subsystem, and component definition and integration
- Cost estimations
- Training aids and devices Development
- Developmental and operational tests
- Product support

--- Data ---



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).

❖ 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.

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

❖ 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 Body of Knowledge

<https://de-bok.org>

SE&A

<https://www.cto.mil/sea/>

Scan the QR code for more information



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