

Systems engineering for aerospace and defense

Teamcenter Systems Engineering module enables defense forces and their suppliers to create intelligent Department of Defense Architecture Framework (DoDAF) deliverables

fact sheet

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► Summary

Teamcenter® Systems Engineering software provides an add-on module that enables defense services, agencies, suppliers and contractors to establish an intelligent architecture for all defense-related systems, platforms and infrastructures mandated to comply with the U.S. Department of Defense Architecture Framework (DoDAF). Users employ the DoDAF module to create “living” Visio diagrams interconnected by information intelligence. The resulting intelligent architecture enables defense forces to rapidly answer questions about contracted defense systems and their underlying operations, subsystems and databases.

Benefits

Ties a defense system to the initial needs statement and its evolving requirements, thereby enabling program managers to eliminate instances of over-building or under-building

Provides architectural visibility to all program stakeholders across the acquisition process, as well as throughout the delivered system's useful life

Provides built-in decision support, enabling program managers to determine whether a system design can successfully execute its defined mission

Facilitates decision support at the field level, enabling field personnel to use the delivered system in ways consistent with its intended design

Leverages architectural models that are “living” data models, instead of static documents

Facilitates uniform and standardized communication between all program contractors and DoD program managers, as well as between field personnel

Facilitates interoperability between delivered field systems by enabling field personnel to understand how to use a new system in conjunction with other field-based systems

By supporting the deliverable requirements of the Department of Defense Architecture Framework (DoDAF), Teamcenter Systems Engineering enables defense forces and their suppliers to intelligently capture and document the system architectures for today's military weapon systems, platforms and infrastructures.

These users can take advantage of a broad range of capabilities by integrating DoDAF deliverables with Teamcenter, the world's

market-leading digital lifecycle management environment. For example, they can leverage:

- *Teamcenter Systems Engineering* to define a whole product, including its physical and software components and systems-level metrics and architectures. Developers can capture all of the product's market, regulatory and design requirements and relate these requirements to fine-grain design elements and performance targets that can be tracked and updated throughout the product lifecycle.
- *Teamcenter's data management* capabilities to configure, track and control all components that comprise complex military assets and their related product/process definitions, as well as to manage in-service performance and maintenance.

Issues addressed by the DoDAF mandate

In response to interoperability problems between various branches of the military services, the U.S. Congress passed the Clinger-Cohen Act to require that an asset's system architecture be evaluated and reviewed as part of all defense acquisitions.

Since then, both the government and aerospace and defense contractors have been using diagramming tools such as Microsoft PowerPoint and Microsoft Office Visio to comply with the DoDAF mandate. However, while these tools provide visually compelling 2D drawings, their deliverables do not support the decision making needed by today's joint-force combat missions.



Teamcenter Systems Engineering's Explorer-like client user interface along with living DoDAF OV-1 and SV-3 diagrams.

Features

Standard enterprise information model for capturing, organizing and re-using work product data for architectural development

Extensive data model designed to accommodate individual architectural projects

Process governance (rules-based engine) for data organization, relationships and reporting to ensure defense system consistency and quality across a complex organization structure

100 percent object-oriented DoDAF data model

Structured processes, tools and techniques to automatically generate DoDAF work products including AV-1, AV-2, OV-1, OV-2, OV-3, OV-4, OV-5, OV-6a, OV-7, SV-1, SV-3 SV-4a, SV-5a, SV-6 and TV-I documents (with other work products in process of being added)

Teamcenter Systems Engineering's DoDAF module overcomes these limitations by facilitating intelligent DoDAF systems architectures. Users employ the DoDAF module and its database schema, scripts and Microsoft Office Visio stencils to create "living" models and diagrams that capture deliverables about the operations, systems and data architecture that pertain to a contracted weapons system or platform.

These "living" diagrams enable users to document a weapon system or platform by capturing all of its related specifications and definitions. Just as importantly, they also let users define the relationships that exist between these elements as the system interacts with them during its mission.

Intelligent DoDAF architectures

Teamcenter's DoDAF module enables contractors and systems integrators to build intelligence into a system's architecture – intelligence that military personnel subsequently can leverage to extract information for decision making, as well as to determine how a weapons system interacts with its mission and environment.

For example, with an intelligent DoDAF architecture in place, field commanders can evaluate intelligence input, identify what resources are available to address these concerns and rapidly react to changing field conditions.

Because the DoDAF module is delivered in conjunction with Teamcenter, it is the only tool on the market today that is able to integrate requirements engineering, systems engineering and systems architecting functionality in a single package.

The DoDAF module enables the government and its contractors to incorporate a common architecture into military systems, platforms and infrastructures during the earliest phases of the development process. This common architecture provides diagramming tools that document and understand the connections between a system's various elements – thereby facilitating an acquisition and development process that ensures systems compatibility among all branches of service.

The DoDAF module enables users to rapidly create and review the most commonly used DoDAF work products required to document the acquisition/development process from requirements definition to actual implementation.

Use cases

Teamcenter Systems Engineering's DoDAF module can be applied to a variety of real-world situations, including three relatively familiar instances.

Initial acquisition process. When military commanders realize that the capabilities of their current weapons systems fail to address one or more pressing field requirements, they prepare an initial needs statement to describe these requirements in the DoDAF format. They can use the DoDAF module to prepare an architectural statement that defines a system, platform or infrastructure whose mission it is to address the initial needs statement and its underlying requirements. This architectural statement consists of a set of work products that can then be communicated to program contractors and subcontractors to describe what needs to be developed. These same work products can be communicated to field personnel. In essence, these work products provide everyone in the acquisition process with a tangible means for making crucial program decisions, particularly with respect to meeting the requirements expressed in the initial needs statement.

Evolving system development. The program's prime contractor and subcontractors can use the DoDAF module as they develop the system in question. They use the initial view diagrams to understand the system's mission and its requirements. Equally important, as the program continues and design changes arise, contractors can use the module to document these changes and send them back to the program managers by leveraging the DoDAF architecture as a communications medium. In essence, these diagrams are essential to the program review process as they enable DoD managers and field personnel to understand how individual design changes impact the system's mission, functional capabilities and usable features.

Real-world usage. After the initial acquisition process is complete and the system has been delivered, field personnel can use the system's architectural diagrams to understand how to use the delivered system to maximum advantage. These diagrams enable field personnel to determine how to use the delivered system in joint combat missions involving multiple weapons systems. Equally important, field personnel can use the DoDAF module to document changes they want made to the delivered system and communicate these changes back to the program managers and various contractors.



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