Using MIL-STD-31000A to Support BETTER BUY

This article applies areas of BBP 2.0 to exhibit ways a newly revised military standard enables DOD to modernize how it receives technical data and delivers results for greater program life cycle efficiencies.

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YINGPOWER 2.0

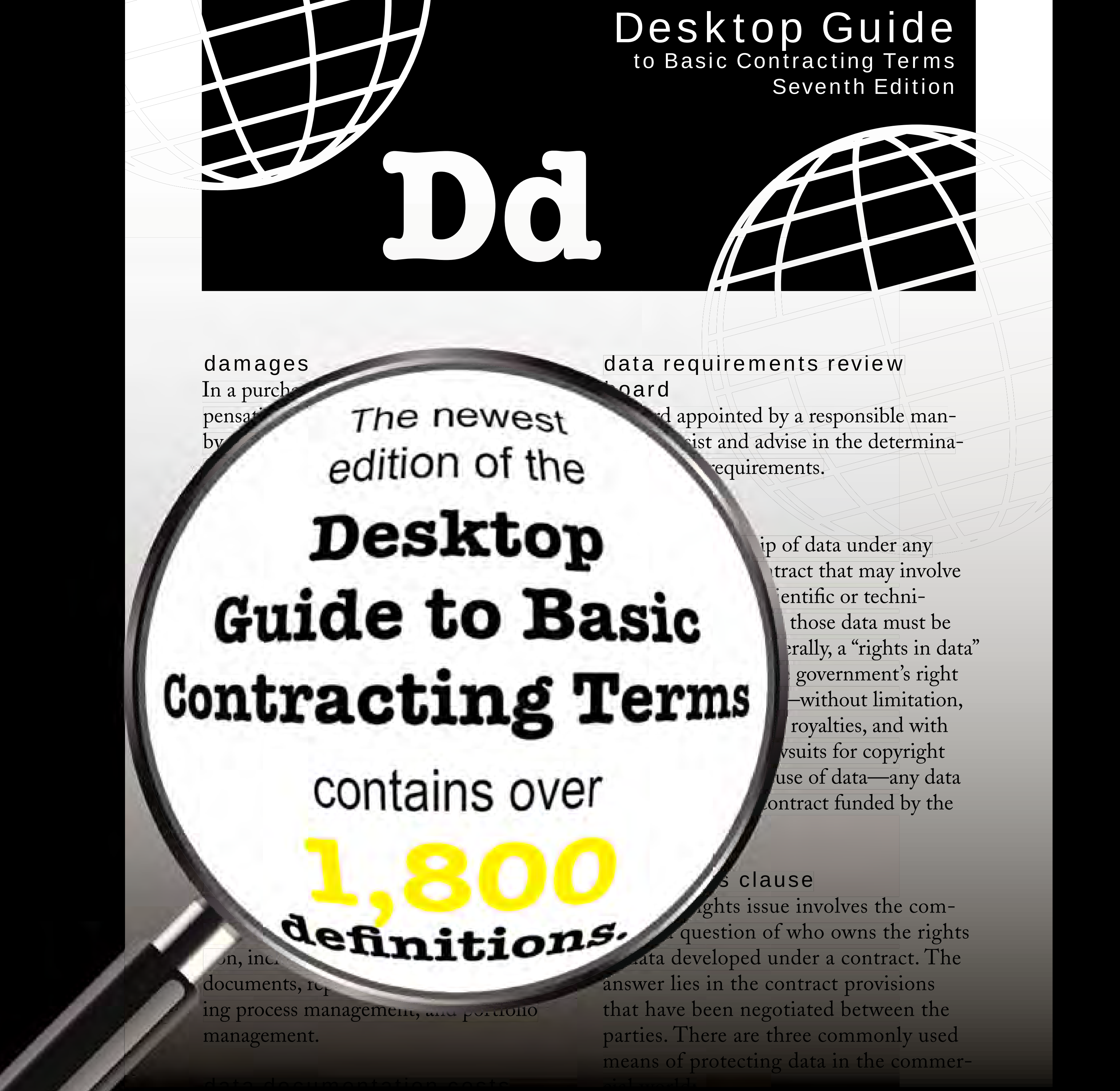
Launched in 2010, the "Better Buying Power" (BBP) initiatives encompass a set of fundamental acquisition principles to achieve greater efficiencies through affordability, cost control, elimination of unproductive processes and bureaucracy, and promotion of competition. Incentivizing productivity and innovation in industry and government and improving tradecraft in the acquisition of services are important parts of BBP. In daily practice, how can these tenets be used to affect change in current and future acquisition programs? In this article, the focus areas of BBP 2.0 will be applied to exhibit ways a newly revised military standard (MIL-STD) enables the Department of Defense (DOD) to modernize how it receives technical data and delivers results for greater program life cycle efficiencies.

The recently released MIL-STD-31000A defines a "technical data package" (TDP) and outlines modifications to support a life cycle productivity transformation from a technical and contractual standpoint. Other noteworthy results from the release of the new standard are modernization of the requirements for the deliverable data products associated with a TDP and its related data management products, in addition to an easy to use tool to direct the format of data product contract deliverables.

Through the focus on the updated TDP, a dividend is achieved when the best practices of MIL-STD-31000A are applied to the mandates of BBP 2.0, which are to strengthen DOD's buying power, improve industry productivity, and provide an affordable, value-added military capability to the warfighter. The impact of this relationship can be expressed in the following ways:

- Fewer sole-source contracts will be needed because of the ability to increase competition by acquiring the complete product definition;
- Higher quality data is available, thus reducing the risk of errors during production and sustainment;
- Time to mission is reduced on critical programs by providing reusable, quality, modern data;
- Cost savings can be realized by using the same modern data as the contractor, thus reducing labor through reuse versus re-creation; and
- By defining the right TDP early in the life cycle, it helps to avoid costly renegotiations for missing data during the later part of the life cycle.

The previous standard defining TDPs was MIL-DTL-31000C. MIL-STD-31000A was released on February 26, 2013, and superseded MIL-STD-31000C, which was issued on November 5, 2009. How is MIL-STD-31000A different from the past standards? It's all about improvements in technology.


Desktop Guide
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definitions.

Historically, the standard communication tool was a Level 3 2D drawing, which used to be generated painstakingly by hand on a drawing board. This process has been upgraded over the years to a computer-assisted design program; however, the issue remains with the visual output being in a 2D format. MIL-STD-31000A helps eliminate this by using 3D solid model data.

From a procurement perspective, this is important because contracting personnel will play a pivotal role in delivering government TDPs to the industrial supply base and retrieving contractor-generated TDPs as contract deliverables. The data acquired must be in a format that ensures it can be reused, along with meeting stringent quality and validation guidelines. The consequences of not doing this is loss of data rights, increased cost, and extended time to mission. To accomplish this task, MIL-STD-31000A must be included by reference in future procurement contracts.

So, if MIL-STD-31000A is the Solution, What is the Problem?

A well-defined and available TDP is essential to the success of any system. Unfortunately, the current approach for DOD's handling of TDPs has raised many issues, such as the following:

- When a TDP is not procured, or has limited access, it severely limits later competition;
- Never purchasing a TDP results in many difficulties during the sustainment phase;
- Sometimes it is deemed too expensive to purchase a TDP in addition to the weapon system;
- If a TDP resides only at the original equipment manufacturer (OEM), it limits long-term access and use by DOD;
- If the original OEM goes out of business, getting the TDP becomes problematic at best;
- Currently, most TDPs, if available, are incomplete;
- In reality, many sustainment facilities, such as depots, have nothing to work from;
- Many times it is unknown if a TDP may, or may not, exist due to the lack of the infrastructure needed to track data;
- A bad or non-existent TDP means that a physical product must be reverse-engineered in order to make a part to sustain the equipment;
- Legacy systems have almost always been produced by the incumbent and are in service for decades;

FIGURE 1.

- If a 2D TDP is being used, there is a real need to recreate it in a 3D format for many modern uses;
- Due to lack of revision control, an outdated revision of a drawing is a distinct possibility; or
- Dealing with "bad" data wastes 50 percent of an engineer's time.

Many of these issues can be resolved by converting to a modern 3D TDP that enables the reuse of data throughout the life cycle (design, build, support, sustain). Without it, the data must be reverse-engineered or remastered, meaning that duplicate work has to be performed.

To provide further insight into the importance of utilizing 3D solid model data, the 3D TDP in question is a fully defined 3D version of the part, subassembly, assembly, or full weapon system that contains annotations, geometry, and various metadata. At this point, it should also be noted that it can contain associated 2D drawings during the transition phase (just in case it appears that 2D drawings may be phased out overnight, please note that the transition period will realistically evolve over years of practice). This level of detail will allow the industrial supply base to quote from, as well as manufacture from, a single source of data without remastering it during in-house processes. This effort should result in reduced lead times because of data reuse, cost savings through better information provided up front, and improved quality due to less ambiguity around engineering intent.

Currently, the excessive cost of a drawing-based TDP is tolerated because there isn't a readily available alternative. Some of the acquisition and sustainment costs are outlined as follows.

Acquisition

- Inability to source,
- Hard to incorporate small businesses,
- OEM maintains strategic advantage,
- Increased cost of changes,
- Data remastered for manufacturing,
- Increased ambiguity,
- Hard to deal with all the government requirements, and
- Schedule delays.

Sustainment

- Reverse-engineered TDP,
- Depot start-up delays,
- Technical publication delays,
- Decreased readiness, and
- Increased rework.

Better Buying Power 2.0

Now that the problem and issues have been discussed, an interesting analysis is to investigate how the technically innovative MIL-STD-31000A can strategically achieve the focus areas of BBP 2.0 (see **FIGURE 1**).

Achieve Affordable Programs

Eliminating ambiguity in design intent is an effective way to reduce lead times. Shorter lead times beginning in the design stage and lasting throughout the sustainment phase help to achieve affordable programs. Upon utilization of a 3D TDP, contractors will have full access to the product definition of a part for quoting. Accurate data can then be reused throughout the manufacturing process without having to create a 3D model and subsequently another 2D drawing by the contractor's engineering department. It should be noted that *International Traffic in Arms Regulation* restrictions still apply regarding the handling of technical data. Additionally, other documents like technical manuals can be made quicker, which allows sustainment activities at depots to be planned earlier and more efficiency. MIL-STD-31000A can improve the overall efficiency of

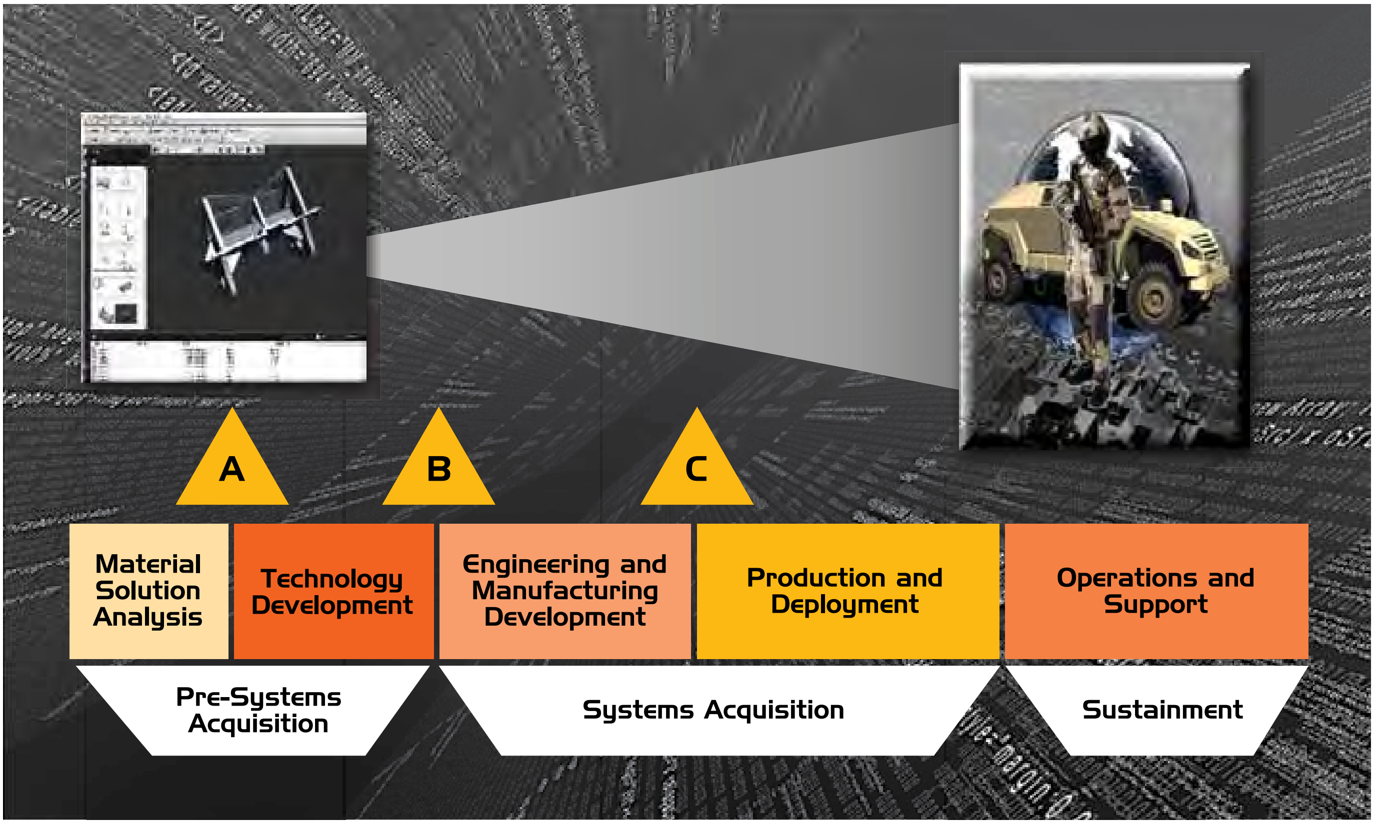

FIGURE 2.

the life cycle by reducing labor and time to mission throughout the acquisition cycle by the extended enterprise.

Control Costs throughout the Product Life Cycle

Providing accurate, intelligent, and timely sourcing and product information up front effectively controls costs throughout the product life cycle. The use of MIL-STD-31000A provides the contractual language to acquire full product definition, if not proprietary to the defense contractor, for many types of weapons systems, assemblies, subassemblies, and parts. It also provides information in a standard format promoting reuse versus re-creation. Life cycle activities will have access to the product definition, thus reducing the need for reverse engineering. By utilizing the tools within 31000, the full costs of the TDP can be negotiated up front instead of after the fact, thus providing more opportunities for increased competition in government contracts.

Incentivize Productivity and Innovation in Industry and Government

Collaborating during the design and manufacturing process to ensure both parties' needs are met can incentivize productivity and innovation in industry and government. If used correctly, MIL-STD 31000A establishes a requirements framework that can be used up front to ensure both sides have an opportunity to collaborate on issues such as functionality, producibility, and sustainability. If done properly in the contracting phase, the government can request the same data that the contractor would normally create to manufacture the part, thus reducing costs incurred by an inefficient transfer of data. As a result, more contractors will be interested in working with the government during sustainment activities since better information will be available.

Eliminate Unproductive Processes and Bureaucracy

Creating a detailed TDP that utilizes modern tools and processes results in greater overall efficiency of the supply chain. As previously stated, the 3D TDP can be used to streamline many sustainment, tech pubs, and other downstream processes by reusing the data versus re-creating it. By utilizing the modern TDPs defined in MIL-STD-31000A along with modern tools to receive and manage the data, many old processes can be updated making more efficient use of technology. Used properly at the beginning of a program, MIL-STD-31000A defines the requirements reducing the need to go back to the contractor at a later date for more information or inadvertently compromising data rights.

Promote Effective Competition

Providing the government the tools to acquire a complete TDP helps level the playing field for the defense supply chain made up of a few large defense contractors and many

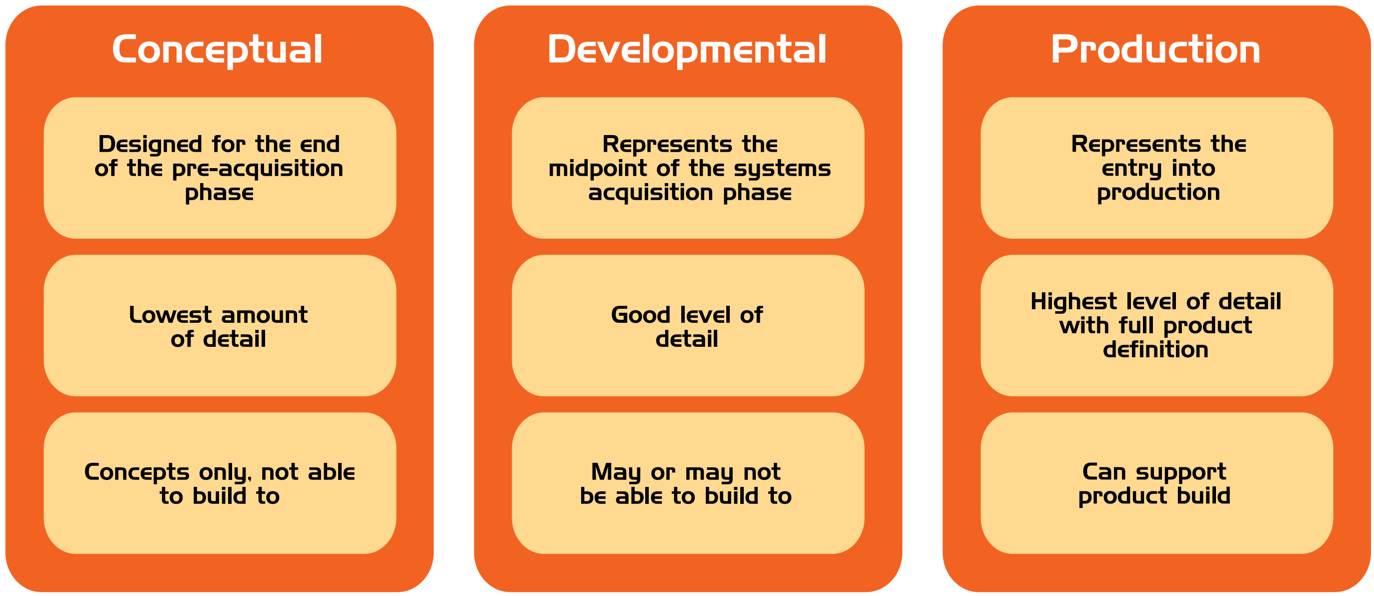

FIGURE 3.

small diverse businesses including woman-owned, disadvantaged, veteran-owned, service-disabled veteran–owned, and those located in historically underutilized business zones. By providing a complete and reusable definition of a product (the TDP), the government can increase the use of effective competition, which will have the desired outcome of fewer sole-source contracts. The TDP levels described later in this article can be used to acquire TDPs at various points in the development life cycle, thus allowing the next milestone to be openly competed. Furthermore, utilizing the data quality guides described in MIL-STD-31000A will ensure that the acquired TDP is complete and easy to reuse, enabling contractors who use the data to respond to more requests for quotations.

Improve Tradecraft in the Acquisition of Services

Instituting a method to provide a better set of requirements and contractual language for concept and design programs that usually do not focus on the delivery of a "product" is an effective way to improve tradecraft in the acquisition of services such as engineering and consulting services. MIL-STD-31000A was created with industry and government input, so it reflects current best practices and can be used as a training tool for those practices. This version of the standard includes a sizable component focusing on quality of the TDP, which allows the government to raise the quality of its data that is typically used in the acquisition of services.

Improve the Professionalism of the Total Acquisition Workforce

Tying the levels of a TDP to the life cycle, allowing for several types of TDPs, and providing a tailoring mechanism gives the government tremendous flexibility in how it acquires data. MIL-STD-31000A can improve the professionalism of the total acquisition workforce by bridging the gap between technology and contracting. It is a perfect example of technical expertise and procurement expertise coming together as a total acquisition team that has a professional acquisition plan and aligned focus to achieve the mission. By modernizing the government TDP to be at the same level as most of industry, there will be fewer conflicts between contractors and the government. With the inclusion of 3D TDP requirements and appendix B, the model organizations schema, MIL-STD-31000A is now on the leading edge of the acquisition product data. The 3D validation and verification guide in appendix C of the standard is intended not only to provide requirements for data quality, but to inform government personnel on the process.

Summary–Better Buying Power 2.0

In summary, MIL-STD-31000A achieves BBP 2.0 initiatives by utilizing technology to increase competition, reduce sourcing costs, shorten lead time, and improve quality throughout the product life cycle by modernizing the TDP process to be equivalent to industry and raising the bar on how the government acquires TDPs.

TDP—The Heart of the Standard

MIL-STD-31000A defines a TDP as follows:

> A technical description of an item adequate for supporting an acquisition, production, engineering, and logistics support (e.g., engineering data for provisioning, training, and technical manuals). The description defines the required design configuration or performance requirements and procedures required to ensure adequacy of item performance. It consists of applicable technical data such as models, drawings, associated lists, specifications, standards, performance requirements, [quality assurance

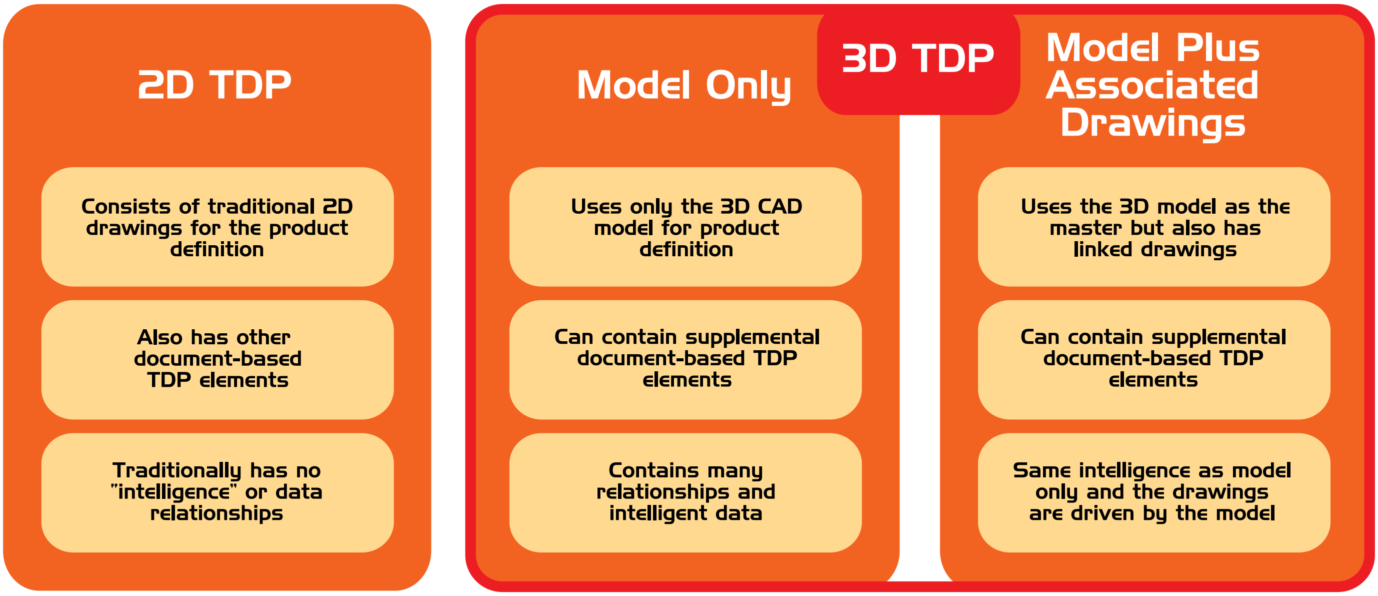

FIGURE 4.

provisions], software documentation, and packaging details.

A TDP does *not* include the following:

- Manufacturing information,
- Requirements information,
- Test information, or
- Logistics product information.

The New Levels

The old MIL-DTL-31000 used numeric levels (1, 2, and 3) to describe ascending levels of detail, where a level 3 would fully define a product (i.e., Level 3 drawing). MIL-STD-31000A ties this concept to the life cycle in order to address the fact that the TDP evolves and requirements change over time:

- Conceptual Level (Milestone A),
- Developmental Level (Milestone B), and
- Production Level (Milestone C) (see **FIGURE 2** on page 39).

Definition: Conceptual Level

A conceptual design TDP shall consist of those TDP elements necessary to define design concepts in graphic form, and include appropriate textual information required for analysis and evaluation of those concepts. The data will generally consist of simple sketches/models, artist renderings, and/or basic textual data. The data may consist of the system performance specification and can be supported by conceptual design drawings and/or models (as specified by the contract).

Definition: Developmental Level

A developmental prototype TDP shall consist of those TDP elements necessary to provide sufficient data to support the analysis of a specific design approach, the fabrication of prototype materiel for test or experimentation, and limited production by the original design organization or with assistance from the original design organization. The data may consist of the unique item specifications for all system component configuration items and can be supported by developmental design drawings and/or models, along with any required associated lists (as specified by the contract).

Definition: Production Level

A production level TDP shall consist of those TDP elements necessary to provide the design, engineering, manufacturing, inspection, packaging, and quality assurance provisions information necessary to enable the procurement or manufacture of an item. The product shall be defined to the extent necessary for a competent manufacturer to produce an item, which duplicates the physical, interface, and functional characteristics of the original product, without additional design engineering effort or recourse to the current design activity. Production data shall reflect the approved, tested, and accepted configuration of the defined delivered item. The data may consist of product drawings and/or models along with all required associated lists; special inspection equipment drawings and/or models, along with all required associated lists; special tooling drawings and/or models, along with all required associated lists; specifications; software documentation; special packing instructions drawings and/or models, along with all required associated lists; and quality assurance provisions (as specified by the contract). See **FIGURE 3** on page 40.

Types of a TDP

MIL-STD-31000A supports two basic types of TDPs: 1) 2D drawings, which are traditional drawings and are document-based; and 2) 3D drawings. Additionally, there are two subsets of 3D TDPs: 1) model only, and 2) models with associated 2D drawings. A 3D TDP is a set of technical data based upon a 3D solid model (also called an "annotated model") that provides the product definition of an item. It replaces a traditional drawing-based TDP and it can contain many types of related data. The overarching intent is for the 3D TDP to provide a foundation for reuse downstream. For a comparison of the two types of TDPs, see **FIGURE 4** on page 41.

The "option selection worksheets" are the primary way to use the standard. Understanding that each contract/program has different needs, MIL-STD-31000A has incorporated the option selection worksheets, which allow the user to select which TDP elements are needed for their effort. There are two worksheets, the first of which covers the primary TDP elements. It contains 9 sections spread over two pages. These sections focus on what elements are needed and their corresponding formats. Appendix A provides detailed explanations of each block contained within the worksheet.

General Recommendations

If drawings are required, they should be associated to the model. You should require models whenever possible. Also, try to obtain the "native," "neutral," and "lightweight" file. Finally, whenever possible, non-native deliverables should be in a standard-based format.

Summary

MIL-STD-31000A defines what makes up both the 2D and 3D TDPs. It provides better alignment between the TDP and the product life cycle to ensure that right data is acquired at the right point in the life cycle. It defines a 3D TDP that uses modern data to provide a product definition foundation that can be reused throughout the life cycle. It also defines a complete, up-to-date TDP that can be used to competitively bid the product. Finally, it provides a method for both structuring and verifying the quality of a 3D TDP.

Whenever possible, you should obtain the 3D model data as part of the TDP. Also, always obtain the TDP in both its "native" and "standard-based" format. Use the option selection worksheets to define what TDP elements are needed. Specify all appendices and standards in the contract that are needed to support the complete TDP. Finally, while it may incur substantial cost to acquire a complete TDP in the initial stages of a program, it will cost dramatically more to acquire it once the product is made. **CM**

ABOUT THE AUTHORS

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