

imaginestics

**Diminishing Manufacturers Acquisition Transformation
System
(DMATS)**

Contents

Background	3
Problem Statement	3
The Imaginestics Innovation	4

Background

United States defense logistics centers encounter multiple issues in the acquisition of components for aging weapons systems. A large number of problematic miscellaneous National Stock Numbers (NSNs) impact various organizations at the different logistics centers. Over 90% of these NSNs are low-demand items. The administrative and production lead times for procurement of these NSNs can be from 6 months to 3 years. These metrics are repeated in varying degrees for a variety of weapon system parts and support equipment. In all cases, there is a very real and direct impact on the war fighter in terms of delayed deployment and readiness of crucial weapon systems.

The hurdles faced by the logistics centers in acquisition of components has been exacerbated by the rapid diminishing of the US manufacturing base in the last decade, which has led to significant erosion in production capabilities and knowledge for producing these problematic parts and components, almost 100% of which are non-stock, fairly complex, custom-produced parts. With changing political environments, declining defense budgets and reallocation of funds to areas of conflict, defense agencies have been compelled to extend the service life of systems that were developed decades ago. Given this situation, the number of problematic NSNs is expected to increase, and the issue of diminishing manufacturers compounds the challenges.

Problem Statement

Although the problem faced by the defense procurement and maintenance agencies in supporting aging war fighter systems has been known and grown in urgency over the last decade, no commercial solution exists that can effectively address the situation. Existing e-marketplace solutions that are available and that help connect buyers and suppliers cater mainly to parts and components available off-the-shelf (OTS) and do not address part and component types that are by nature complex and require custom production. The lack of suitable commercial solutions is mainly due to the technological challenges posed in mapping the part geometry, which represents its shape complexity and part specifications, to manufacturers' process capabilities. The knowledge required for such mapping lies with manufacturers and experienced manufacturing personnel, many of whom are near their retiring age. This vanishing resource of manufacturers and expert knowledge represents a critical diminishing resource for the defense industrial base and a matter of national security, an urgent issue that none of the e-marketplace solutions address.

Thus, the need of the hour lies in systems that can capture expert manufacturing knowledge and that can map part requirements to manufacturer capabilities and help defense logistics centers identify sources for procurement of parts for aging weapon systems. This white paper proposes an innovative solution that utilizes a community-based platform along with a unique shape and ontology knowledge-based data capture and search engine to help the defense logistics centers identify manufacturers that have relevant manufacturing know-how and the appropriate production capabilities.

The Imaginestics Innovation

Preface

To address such a need, the **Diminishing Manufacturers Acquisition Transformation System (DMATS)** will utilize a single, secure web-based platform to:

- a) capture manufacturer capabilities in the form of production capabilities for specific manufacturing processes using templates and visual representations of part types that manufacturers have produced before in the form of 3D CAD models, 2D drawings, and images.

The manufacturer's capability capture mechanism under DMATS recognizes the fact that it is not the machine tools but the process used that is critical for producing parts of varying degrees of complexity. Visual representations of parts produced before provide significant input on manufacturer production capabilities. The manufacturer capability information will be indexed and made available for search and collaboration activities in the secure platform.

- b) enable defense logistics centers to search for manufacturers having relevant capabilities using a patented shape and capability search engine. Procurement and maintenance personnel can utilize the shape search engine to identify suppliers that have produced parts with similar shapes. The engine maps the shape/geometry of the part to be procured with the visual representations provided by suppliers of parts that they have manufactured previously. They can also utilize the capability-based search engine in combination with the shape search engine to identify manufacturers.

The goal of the capability capture and search functionalities is to provide procurement personnel with the ability to search for suppliers that are capable of producing required components with a high degree of certainty and aims to remove an enormous barrier to maintenance and repair operations.

- c) provide each defense logistics center with the ability to post opportunities using template(s) where they can specify detailed requirements and associate relevant drawings and models. The logistics center content will be indexed and made available for search and collaboration by manufacturers.

A key feature of DMATS will be its ability to suggest to manufacturers' the opportunities that match their capabilities in real-time through capture and utilization of manufacturing process know-how.

This will enable transformation of the supply chain, which is currently reactive in nature to a proactive one.

- d) enable manufacturers to identify and collaborate with partners having complementary capabilities and jointly bid for opportunities posted by defense logistics centers through search and an automatic partner recommendation engine.

For example, when a defense logistics center puts out an RFQ for a finished casting, the bid is often made by a machine shop which has expertise in finishing castings and other rough shapes. However, the machine shop must first identify a foundry that has the capability to produce the rough shape. DMATS will promote collaboration between manufacturers having complementary capabilities and expertise, which in turn will lead to greater number of order fulfillment for the defense logistics centers.

State-of-the-Art Technology

The DMATS platform will utilize the latest in networking and internet concepts and technologies:

- a) In contrast to e-marketplace solutions currently available, which are geared more toward catalog parts and have a “one-size-fits-all” approach, the Imaginestics platform has been developed with a clear understanding of the needs of the defense services, providing them with a more custom solution that addresses part types that often create procurement hurdles.
- b) Furthermore, existing e-marketplace systems continue to utilize a “static” method of collecting supplier capability information that is mainly text-based and uses traditional text-based search engines to make buyer-seller connections. DMATS, on the other hand, utilizes an approach of capturing supplier capability information that is more visual in nature along with relevant attribute information that qualifies the manufacturer capability in a more comprehensive manner. DMATS also utilizes a “dynamic” approach to collecting supplier capability information whereby the suppliers’ capability will be updated in real-time as parts and components are being produced in their machines, utilizing the MT Connect standard and patented data collection technologies.
- c) Unlike traditional text-based search engines utilized by e-marketplace solutions, DMATS will be powered by a patented visual search engine based on proprietary Shape Signature technology that combines with an ontology-based text search capability to store and retrieve part geometry and associated information.
- d) The unique community-based approach of the DMATS platform can lead to proliferation of defense-posted opportunities to multiple supplier networks, leading to better response rates and reduction in no-bid situations. Further, the growing connections with other community networks can potentially help the defense procurement and maintenance agencies increase their supplier base substantially.

DMATS’ capability to suggest opportunities to suppliers and recommend partners with complementary skills aims to bring about a paradigm shift in supply chain philosophies from one which has essentially being reactive in nature to one that is proactive, a shift that can bring significant benefits to defense services.
- e) Importantly, DMATS will enable capture of manufacturing knowledge, a critical diminishing resource that can be leveraged to not only map part requirements to manufacturers’ capabilities, but also can serve as a knowledge resource for a future generation of engineers. No such solution for capturing this critical manufacturing knowledge exists commercially.

Benefits

DMATS will significantly benefit defense logistics centers in their efforts to support maintenance of aging war fighter systems through reduction of weapon systems currently under development or existing systems that are undergoing upgrades. Some of the key benefits envisioned from the DMATS system are as follows:

1. For hard-to-procure items needed for maintenance of weapons systems facing ongoing military operations, DMATS can be utilized to identify manufacturers having relevant capabilities even outside existing lists of defense suppliers, which in turn will substantially help in reducing no-bids and/or lengthy procurement lead times.
2. It can enable lower cost of ownership through increased competition from private contractors (small and large) to produce the components at a lower cost. It is conceivable that data rights for the re-engineered component will remain with the defense entities.
3. It can stem the loss of critical defense-related manufacturers.
4. It can reduce maintenance costs.
5. It can support leadership in reducing acquisition cost by 20%, increase material availability by 20%, and increase supply chain responsiveness by 50%.

For scalability and ease of implementation, DMATS can be accessed through any web browser and does not require individual seat-based installations and licensing. The system can be deployed on a server inside a military facility's internal network, where it can be accessed by multiple users across the facility or can be deployed on a secure server where it can be accessed by users in multiple defense facilities using secure HTTPS.