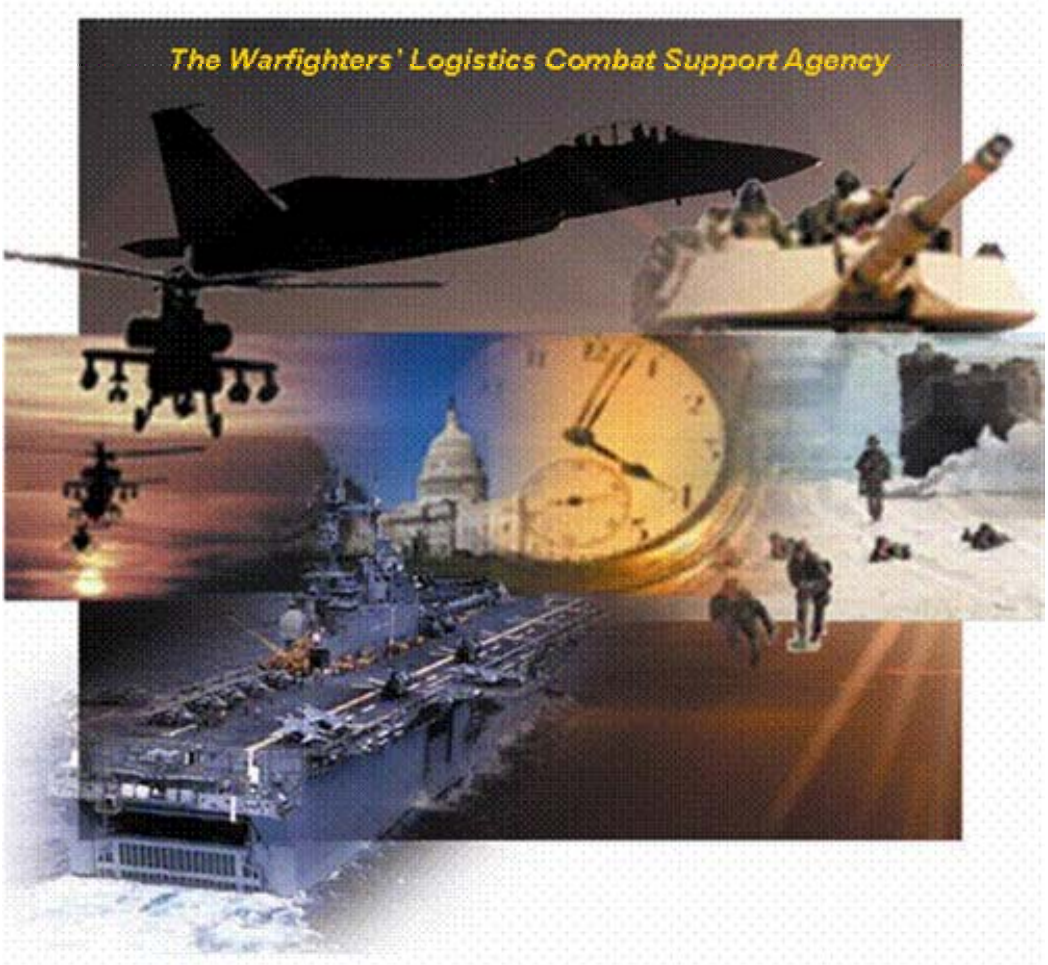
Supply Chain Council Awards for Excellence in Supply Chain Operations and Management

2002 Submission



SURGE

Supplier Utilization Through Responsive Grouped Enterprises

Defense Logistics Agency
Supplier Assessment and Capability Division

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Section 1: General Information and Project Complexity

(1) Submitting organization: The Defense Logistics Agency (DLA).

(2) Responding organizational unit: Supplier Assessment and Capability Division, DLA Headquarters, Fort Belvoir, VA.

(3) Mission description: DLA is a logistics Combat Support Agency whose primary role is to provide supplies and services to America's military forces worldwide, both in support of peacetime operations and in war. The Agency oversees a staff of more than 28,000 civilian and military employees who work in all 50 states and 27 foreign countries. It supplies over four million consumable items needed by America's Military Services to operate, from groceries to jet fuel and spare parts. DLA also helps dispose of materiel and equipment that is no longer needed. A key objective is to continue to help its customers to maintain readiness at a reduced cost while sustaining current and future deployed operations.

(4) Award category of submission: Operations – Department of Defense.

(5) Description of the supply chain and the processes the submission spans:

This submission is for the Agency's demonstration of the Supplier Utilization through Responsive Grouped Enterprises (SURGE) program. The activities of this program include the deliberate planning and execution of cutting-edge supply chain practices within one of the world's most challenging operating environments: manufacturing and supplying complex spare parts to support the unpredictable needs of customers supporting aging military tactical aircraft.

Attainment of Agency goals necessitated a range of actions spanning the entire supply chain, from the supplier's supplier to the end user of the product:

- Shifting to a supply chain strategy that supports the *Agency's customer's objectives* by innovative sourcing that enhances planning for flexible support from its supply chain partners.

- Aligning procurements with the objective of *promoting the efficiency and effectiveness of the supplier* (The Boeing Company) in performing activities that directly support the Agency's goals.

- Achieving flexible manufacturing and rapid delivery through actions taken to mitigate risks and promote positive results from the *supplier's suppliers*.

The intent of this program is to secure mutually beneficial supply chain arrangements that anticipate and prepare to meet sudden changes in demands that are inherent to this Agency's business – that are both affordable to DLA and profitable for the supplier. These arrangements

will improve DLA's ability to respond to demand surges, not by passing on the need to manage costly and inflexible inventories, but through strategies that mitigate their need by reducing the lead-times for these items. This approach will assist DLA in meeting another critical need: promoting a beneficial effect on the Defense Industrial Base through long-term arrangements that offer workload stability for critical producers and providers.

(6) Names of the supply chain partner organizations (external) involved in the project:

DLA's primary supply chain partner on this program is The Boeing Company, St. Louis, MO.

Boeing drew from the expertise across the following functional organizations:

Organization	*People Contributing to SURGE*
- Manufacturing Engineering	6
- Contracts	4
- Manufacturing	10
- Scheduling	4
- Information Systems	4
- Product Support	6
- Supplier Management and Procurement (SM&P)	8

The efforts of other sub-tier supplier organizations also contributed to this program success.

The Joint Strike Fighter (JSF) Program participated in the SURGE program (customer partnership). Primary involvement from this organization was with JSF's Manufacturing Integrated Product Team (IPT) Leader.

(7) Names of the functional organizations (internal) involved in the project:

DLA's SURGE program is noteworthy in that it involved a strong working partnership between Headquarters and two major field organizations: Defense Supply Center Richmond (DSCR), and Defense Supply Center Columbus (DSCC). The decisions and benefits related to the SURGE program demonstration extended across each of these organizations.

DLA drew from the expertise across the following internal organizations:

Organization	*People Contributing to SURGE*
- Supplier Assessment & Capability Division, DLA Headquarters (Includes SURGE Program Manager)	4
- DSCR Procurement, Contracting Officer	1
- DSCR, Program Analyst	1
- DSCR, Engineer	1
- DSCR, Price Analyst	1
- DSCR, Legal Counsel	1
- DSCR, Contract Specialist	3
- DLA Operations Research & Resource Analyst	1
- DSCC, Contract Specialist	1
- DSCC, Logistics Operations	1
- DSCC, Supply Analyst	1

(8) Point of Contact for each supply chain partner:

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Section 2: Implementation

(1) Explain why the supply chain initiative was undertaken and how it was selected:

As a Combat Support Agency, DLA is responsible for ensuring that critical items will be made available to meet its customers' peacetime and contingency needs. In doing so, the Agency must balance three competing challenges:

1. It must make these items available at the *lowest possible price* while maintaining the profitability and long-term integrity of its supplier base;

2. It must seek supplier arrangements that offer *quick response* to customer demands, permitting DLA to reduce infrastructure and gain efficiencies;

3. Its supply chain approach must maintain the *flexibility* to quickly and cost-effectively respond to even dramatic changes in customer needs (i.e. rapid response to the warfighter to support demand changes seen since September 11th).

Separately, each one of these represents a challenge; together they are especially daunting. For instance, consider a supply chain strategy that directly targets the second challenge listed above – achieving quick response. The supplier might simply increase his safety stocks to permit fast response directly from his own inventory. This action might adversely affect both of the other factors listed above:

- Increasing inventories may *adversely affect unit price* (both cost of inventory and associated carrying costs).

- Inventory measures *will not likely increase flexibility* to protect against sudden, substantial spikes in demand – a core part of this Agency's mission. These shifts may then result in stockouts, driving chaos across the supply chain – and ultimately to the customer.

The SURGE program instead seeks to simultaneously address all three of these challenges through a strategy drawn from leading industry practices: driving down the end-to-end cycle time for obtaining critical items across the supply chain. This program demonstrates that innovative supplier arrangements offer an important means for achieving dramatically lower lead-times – not simply by reducing administrative activities, but by slashing suppliers' production cycle times. This is particularly important for aerospace spare parts, since supplier cycle times typically make up the vast majority of supply chain response time. Furthermore, the SURGE program demonstrates that this can be accomplished while reducing prices even for low-demand, sole source items.

By driving down supplier response times for critical aerospace items, the SURGE program will pave the way for dramatically improving suppliers' ability to support the breadth of this Agency's peacetime and wartime needs. Figure (1) illustrates the importance of reducing supplier Production Lead Times (PLT) in meeting the warfighter's requirements for a notional aerospace item.

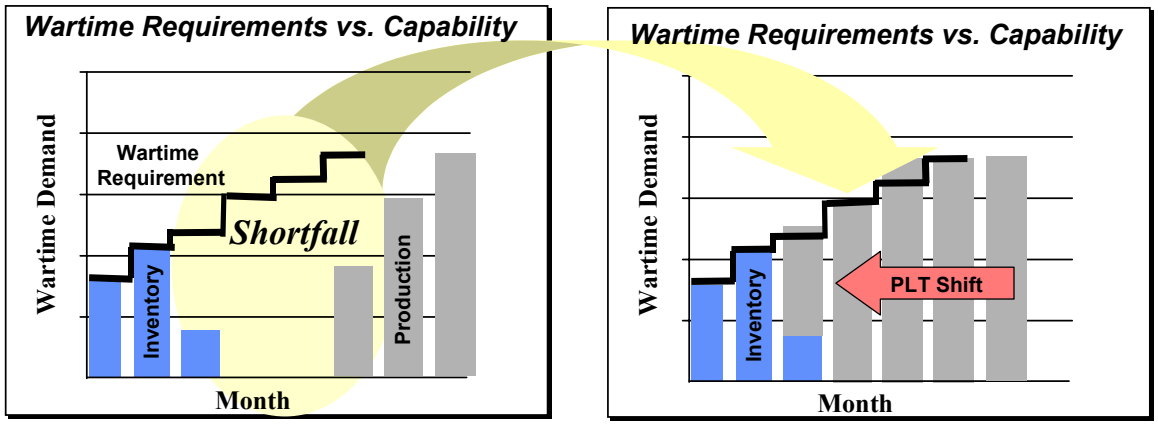

Figure 1: ***Criticality of PLT Reduction to Supporting Customer Readiness***

(2) Indicate the duration of the project:

The Boeing SURGE project originated when the company was awarded a contract for Concept Development in September 1999 based on response to a Broad Agency Announcement (BAA). Under this ongoing contract, Boeing performed extensive analysis of complex aircraft spare parts, identifying how items sharing processing commonalities could be combined into groups to promote supply chain efficiencies.

Boeing provided the first of these groupings to DLA in early 2001. Based on its successful business case which projected dramatic lead time reductions with concurrent price reduction, DLA made the decision to proceed with a demonstration of the SURGE concept. In April 2001, Boeing was awarded a follow-on contract for this purpose.

Demonstration of the concept proceeded throughout the year, with product delivery beginning in September 2001. Dozens of subsequent deliveries have provided the basis to draw statistically supportable program conclusions, proving the success of the SURGE concept and the validity of the Boeing methodology.

DLA is currently evaluating additional product family groupings and accompanying business cases provided by Boeing as part of the company's concurrent development contract for possible near-term expansion of demonstration activities.

(3) Detail the process used to complete the initiative:

The process to complete the SURGE demonstration consisted of four basic steps:

1. Developing supply chain strategy;
2. Initiating supplier partnership;
3. Set-up of the SURGE demonstration; and
4. Implementation and feedback.

Developing Supply Chain Strategy

The SURGE program began by developing a specific program strategy. Drawn from extensive research and site visits to identify industry best practices, a strategy was selected that sought to enhance supply chain efficiency and flexibility by speeding the flow of items through the supply chain to the customer. By changing the manner in which DLA approaches procurement – shifting from purchasing items individually to combining groups of items that share common materials or processes – SURGE aims to smooth the erratic demands typically imposed on its suppliers.

The underlying problem addressed by SURGE is illustrated in Figure (2): Variable demands for individual items disrupt supplier's operations. Figure (3) shows how grouping together items sharing similar characteristics under long-term arrangements slashes throughput variability across the group, allowing resources to be more efficiently applied to greatly improve supplier performance. The "efficiencies of scale" that can be realized across such a group are well beyond what is possible if items continued to be managed individually. This approach offers a range of benefits: reduced delivery time and variability, lower inventory needs, improved responsiveness to uncertain demand patterns, and better response to surges.

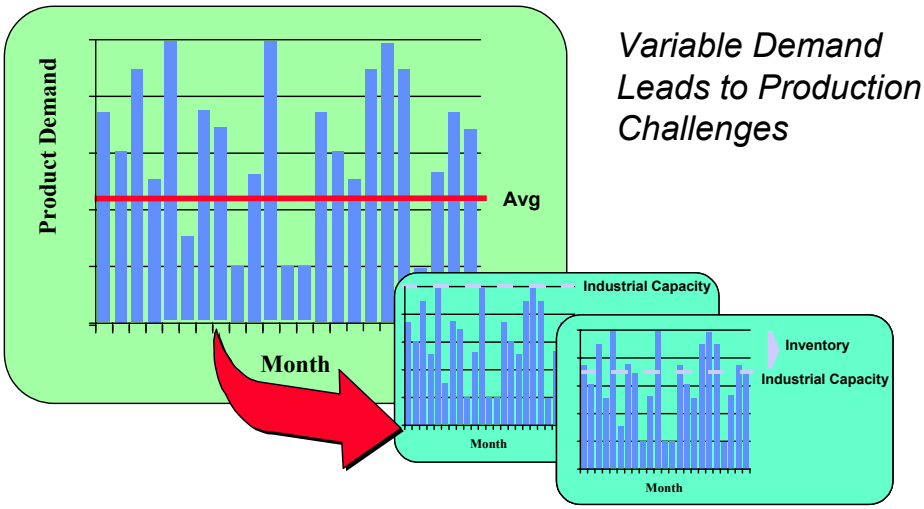

Figure 2: ***Negative Effect of Demand Variability on Supply Chain Efficiency***

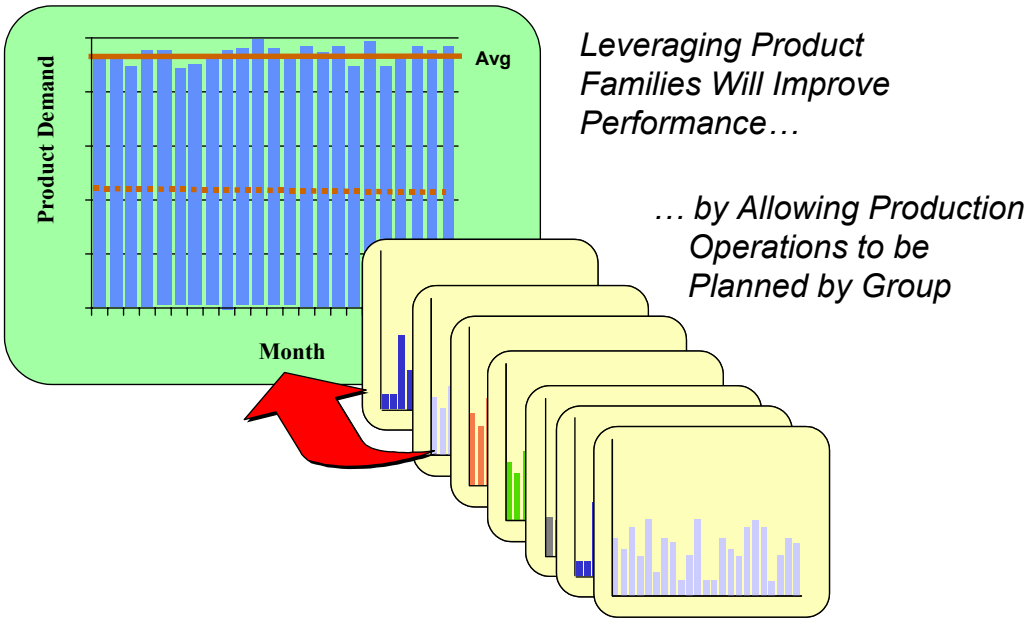

Figure 3: ***Intention of DLA SURGE Program as Portrayed to Industry***

Initiating Supplier Partnership

To demonstrate this concept, DLA released a BAA providing a basic framework while encouraging industry's proposal of creative solutions. This permitted companies to propose their own detailed strategies to improve support for any of the 4-million items DLA manages, provided they emphasize support for those items representing the greatest challenge to the Agency (e.g. those with a history of low, erratic demand and with the risk of sudden surges).

In order to encourage the widest opportunity for industry feedback, DLA announced in the Commerce Business Daily, advertised in the Wall Street Journal, conducted an Industry Day conference, and presented at several major industry conferences. DLA facilitated industry's concept preparation by making available a wide range of data related to the items of interest (web-based, unless requested via an alternate format).

In 1999, DLA awarded a contract to The Boeing Company to develop its detailed plans to produce low-demand, complex aircraft spare parts -- very rapidly and at a reduced price. Boeing chose to demonstrate this concept on key spares used on three tactical aircraft that support three military Services: the AV-8B, F-15 and F/A-18 aircraft. The company targeted the population of items that fall into each of four major processing categories: tubes, sheet metal, machined parts, and wire bundles.

Set-Up of the SURGE Demonstration

Boeing began its efforts with a series of actions focused on linking the capabilities of its prospective SURGE supplier base with the core group of processing capabilities necessary to produce items within identified product families.

- Boeing began by leveraging its existing database that mapped detailed part manufacturing processes to its suppliers based on their proven processing capabilities. These "sort codes" were further refined to include such detailed parameters as material type, and any special proven qualifications to produce particular items.

- Next, the company assessed the processing requirements for an initial target population of 340,000 items. Using the range of expertise from across such departments as Manufacturing Engineering, Supplier Management and Procurement (SM&P), and Product Support, this population was narrowed to a much smaller demonstration target group of about 3500 items.

- Dozens of individuals performed such functions as correlating National Stock Numbers (NSN) to part numbers (matching government to commercial identifiers), assessing drawings and other processing documentation, and identifying tooling, materiel, and other requirements and constraints.

- Identifying specific product family candidate groups was complicated by the need to consider the likely demand patterns for individual items and how they would contribute to smoothing the flow of the overall group – not only by increasing the likelihood of reasonable demand flow, but also by minimizing the risk of exceeding suppliers' overall production capacity.

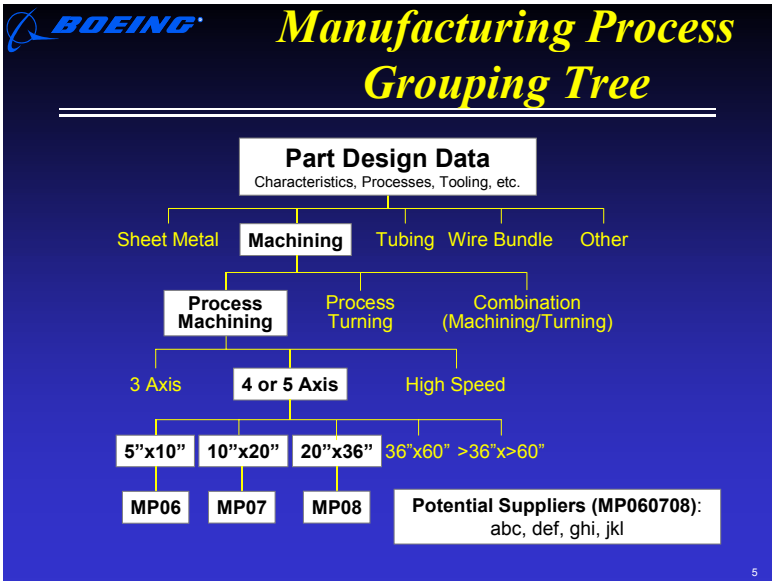

Figure 4: ***Example of the Application of the Basic Hierarchical Manufacturing Process Grouping Tree***

Implementation and Feedback

Next, Boeing developed a strategy to gain positive results from its own supplier base:

- The company identified a strategy based on leveraging high quality, small businesses proven to be capable of producing those items targeted by this program. This was based on the expectation that these companies offered the flexibility needed, interest to participate in grouping sizes anticipated, and willingness to accommodate the type of shift in mindset required for the success of this program.

- The SURGE supplier strategy was expanded to incorporate the requirements and elements necessary to provide similar support to other customers and programs. This becomes the vehicle to expand the part population within each group and further increase supplier interest.

- Boeing developed a methodology for streamlining its source selection activities to support the special needs of this program. This included building a tool that enabled the program team to balance the complex issues of part-to-supplier alignment, and evaluating product families both on an item-by-item basis and as a group. Developing a speedier approach was needed for several reasons. As with most efforts, the SURGE program had to compete with other Boeing activities for resources; thus, efficiency and speed to accomplish necessary steps was critical. Also, because this program was striking into new territory, an increased ability to quickly react/iterate source selection activities was needed.

(4) Identify significant challenges encountered, the process for resolution, and the solutions. Identify any best practices employed or developed:

Implementing the SURGE program meant overcoming a wide range of barriers across each program phase, spanning every point in the supply chain. At times, many of these seemed insurmountable. However, resolution was achieved in each case, resulting in powerful program results and substantial lessons that will dramatically streamline follow-on efforts.

It is important to note that two critical factors proved to be essential in resolving these issues: Strong program management, and an enthusiastic business change "champion" driving the effort forward at DLA and within the organization of its supply-chain partner (Boeing).

Changing Procurement Culture

DLA has a long-standing history of meeting its customers' expectations despite facing a range of challenges. Perhaps the greatest of these challenges has been bridging the gap between its customers' uncertain ordering patterns and its suppliers' very long lead times. For aerospace items, in particular, production lead times alone frequently span more than a year; combined with

the lead times to perform administrative activities, parts do not arrive until well into the future (Figure (5) displays production lead times for DLA's aerospace items).

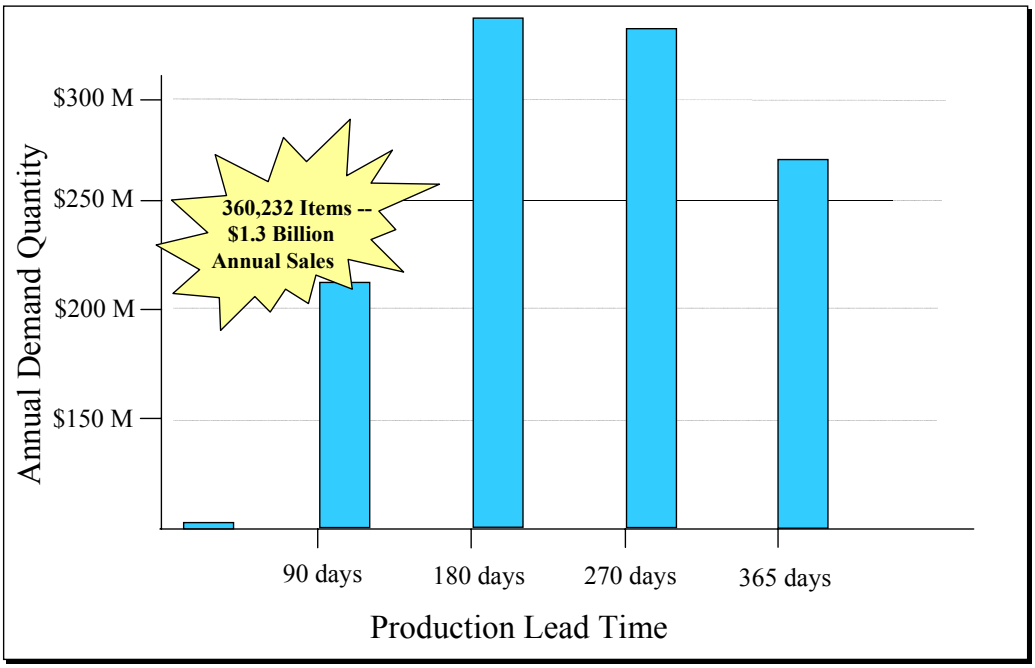

Figure 5: ***Production Lead Times for Aerospace Items Managed by DLA***

The Agency has come to view this obstacle as one that is outside of its span of influence. Thus, a tremendous shift in mindset was necessary to demonstrate that:

- Supplier lead times *can* be dramatically reduced;
- Such a fundamental shift in result will similarly require a *fundamental shift in strategy*;
- The *customer (DLA) has a critical role* in enabling its suppliers' ability to offer flexible and efficient support.

This program's positive outcome was due in large part to its success in gaining support from DLA Headquarters and a key field activity (Defense Supply Center Richmond) to divert premium resources from current operational priorities in order to demonstrate the attainability of these goals.

Balancing Program Objectives

Initial responses to Boeing's supplier solicitations were not favorable to achieving its desired program objectives. While lead times generally dropped, proposed prices varied substantially. It became clear that considerable changes to the company's detailed strategy were needed. The following corrective actions were taken:

- Boeing's initial strategy of "winner take all" was abandoned. The company found that the *potential* groupings developed through its own detailed analysis required further refinement by those who were to apply them. By permitting potential suppliers to submit proposals for those portions of these groupings that best fit how their operations were aligned, Boeing found that it gained proposals with consistently greater benefit. (An added advantage was that multiple awards would serve to preserve a competitive field for future expansion of the items within these product families as the overall Out-of-Production Spares Procurement (OPSP) strategy is implemented.)

- The company's initial solicitation did not apply a sufficiently heavy weighting to unit price. Increasing the emphasis on price as well as establishing specific price and lead time target values, drove more consistent responses, better portraying what was desired both by Boeing and by their customer, DLA. In essence, Boeing better identified their expectations to the supply base.

Mitigating Supplier Risk

A key tenet of Boeing's approach to SURGE was to take actions that mitigated risk. This meant dampening supplier risk – real and perceived – without incurring increased risk for either itself or its customers. Initial supplier responses indicated that changes to its strategy were necessary to foster this result:

- Information to suppliers emphasized the need to perform capacity planning *across the processing group*, rather than on an item-by-item basis. To support the supplier's proposal development and capacity planning efforts, Boeing provided up to six years of historical consumption and demand data for each part within the group. That data also helps to ensure that processing groups would offer adequate business to make arrangements financially attractive, while dampening the impact of unforeseen surges.

- Boeing shifted from a single-price approach to a quantity-based price. This mitigated suppliers' concerns that uneconomical order quantities would drive up costs while both suppliers and their customers were becoming accustomed to this new way of doing business. The result: supplier responses that were much more consistent, and offered greater overall value.

Enabling Other DLA Initiatives

DLA's SURGE program is being conducted at a time when the Agency is implementing other procurement programs for a wide range of its items. This created some concern from the program's outset. What would happen if others set up long-term contractual arrangements for the same items that Boeing was exploring?

This was resolved with a simple strategy: The SURGE program's focus was to simply make items available at an improved overall value. Any DLA program could simply draw from Boeing's surge capabilities, potentially enhancing performance.

(5) Indicate the metrics used to measure (a) progress and (b) success:

In order to fully and accurately assess the impact of the SURGE program's results, metrics are broken into three distinct categories:

1. Contract metrics;
2. Program metrics;
3. Agency metrics.

Contract Metrics

Contract metrics are necessary to track progress and ensure that the supply chain partner (Boeing) has performed all duties required by contract during the period of performance. They also indicate how well specific supply chain objectives have been met, as well as the broader applicability of these results. These metrics formed the basis for other metrics in the two other categories, serving to keep objectives synchronized across the supply chain. The following specific metrics apply to those activities pertaining to the different program phases:

Study Phase

- Number of items assigned to product families
- Successful identification of product family processing flow
- Detailed tooling availability analysis
- Business Case Analysis including:
    - Percent reduction in production lead times – for each unit and by processing group
    - Percent reduction in prices – for each unit and by processing group

Demonstration Phase

- Actual supplier base processing time
- Supplier delivery performance (percent on-time delivery rate)
- Rationale for deviations

Program Metrics

Program metrics are intended to evaluate overall success of the SURGE program in attaining its stated targets, and serve as a roll-up of Contract Metrics. The following are the specific metrics that have been employed:

- Actual percent PLT reduction times – for each unit and by processing group **(Corresponds to SCOR Level 1 Metric: Supply Chain Response Time)**

- Actual percent price reduction times – for each unit and by processing group **(Corresponds to SCOR Level 1 Metric: Cost of Goods Sold)**

Agency Metrics

(Each of the Following Correspond to SCOR Level 1 Metric: Production Flexibility)

Agency metrics are those stated measures that are important to attaining DLA's objectives as a Combat Support Agency. Their outcome can be tied directly to performance against the SURGE Program Metrics:

- Backorder reduction

- Supply availability

- Surge & Sustainment coverage (percentage coverage by item)

(6) Document and quantify cost and performance benefits:

This year, SURGE demonstrated the tremendous efficiencies that can be gained by arranging the procurement of low-demand military unique items based on their commonalities. Administrative lead-time was reduced from 91 to 3 days, production lead-time (PLT) was reduced an average of 60% from 345 to 141 days, while providing needed wartime surge capability *at a net savings in price*.

Specific improvements demonstrated are as follows:

- Lead-time reductions from as much as 508 days to 129 days with a concurrent price reduction of 30% (specific example part shown in Figure (6)).

- Flexibility to fill even dramatic increases in customer orders *without the need to hold additional items in inventory*. The SURGE demonstration successfully responded to more than a 1000% increase over initial projected demand for this performance period.

- Dramatic reduction in a key factor affecting readiness: *supply backorders*. Prior to the SURGE demonstration, the backorder rate for items subsequently included on this demonstration contract was about 38%. Despite a substantial unforecasted increase in demand for these items during the SURGE performance period, backorders have been drawn down considerably, and currently stand at only 7%. Normally this tremendous surge in demand would have dramatically increased backorders for these items (stock would have been quickly depleted, with additional needs taking up to just short of two years to arrive.)

Figure 6: ***Sample Item with PLT Reduced from 508 to 129 Days at 30% Price Reduction***

Additional anticipated SURGE program benefits:

Additional business cases provided by Boeing offer the opportunity for expansion of the SURGE demonstration effort to other parts families. It is anticipated that these groupings will offer similar value to the Agency and its customers, including dramatically improved flexibility to changing demand patterns, reduced need to stock costly inventory, reduced backorders and improved customer responsiveness, and enhanced capability to support the warfighter across an expanding range of key items.

Broader Agency benefits:

- Expansion to other Agency programs: Using the same strategy of slashing supplier lead times, Boeing has already cost-effectively improved combat readiness on another DLA program: the F-15 Virtual Prime Vendor. This arrangement has slashed production lead times from the company's suppliers for critical go-to-war items

from as much as a year to no more than 75 days. This permits the majority of the warfighters' requirements to be met directly through supplier deliveries, offsetting the inventory previously required to support these needs by hundreds of thousands of dollars.

- Boeing's willingness to expand the SURGE methodology into the ongoing broad-scale Strategic Supplier Alliance with DLA may reap similar benefits across a very large pool of items. The scope of this effort offers the potential for broad-scale benefits for a wide range of items as measured by such Agency metrics as reduced backorders, increased supply availability, and cost-effective surge and sustainment coverage.

(7) Outline how the success of this effort supports the organizational objectives described in Section 1, Item 3:

Each of these successes directly support the Agency objective identified in Section 1, Item 3: "…continue to help its customers maintain readiness at a reduced cost and sustain current and future deployed operations."

Each of the Agency Metrics identifies in Section 2, Item 5 directly support this and other Agency objectives:

- Surge and sustainment coverage: As a Combat Support Agency, DLA must be ready to provide to the warfighter the right part when the customer needs it. Preparing for associated dramatic increases in demands through the use of inventory is costly and largely impractical. Alternate supplier-based strategies are possible only if lead times are decreased dramatically. The SURGE program demonstrates that this cost-effective approach is possible, paving the way for broad expansion with the potential for many millions of dollars in inventory savings.

- Backorder Reduction: Backorders degrade readiness by preventing DLA from quickly filling customers' orders. When backorders occur for items with the very long supplier lead times associated with aerospace spare parts (depicted in Figure (5)), customer wait time increases accordingly. Normally, surges in demand would exacerbate this problem; the SURGE program demonstrates that backorders can be controlled even while the Agency is sustaining increased demand.

- The success of the SURGE program also demonstrates that supply availability can be increased (with fewer items out of stock because of reduced backorders), resulting in reduced delays in shipping customer orders. This will ultimately increase customer satisfaction and operational readiness.

- As with any automated long-term contract, buyers, item managers, and management are freed up from day to day activities to perform other urgent matters affecting operations and customer readiness.

Section 3: Knowledge Transfer

(1) Describe the efforts to share lessons from this effort with other internal organizations:

Lessons from the SURGE program are already being transferred to a range of Agency programs to support the breadth of this Agency's peacetime and wartime needs.

- As was indicated in Section 2, Item 6, this same strategy of slashing supplier lead times has already cost-effectively improved combat readiness on another DLA program: the F-15 Virtual Prime Vendor.

- DLA is working with Boeing on the potential for adapting SURGE lessons to the ongoing Strategic Supplier Alliance. It is hoped that this will help this partnership achieve broad-scale gains in reducing backorders, increased supply availability, and providing cost-effective wartime support coverage.

Under a separate but related effort, DLA has recently developed and fielded an information tool that offers the potential to broadly expand on the SURGE demonstration.

- Known as the Worldwide Web Industrial Capabilities Assessment Program (WICAP), this tool assists DLA in identifying potential industry-based product families – a proven enabler to cost-effective procurement strategies (depicted in Figure (7)).

- This grouping capability has made WICAP one of the main tools supporting the Agency's Strategic Material Sourcing program this year.

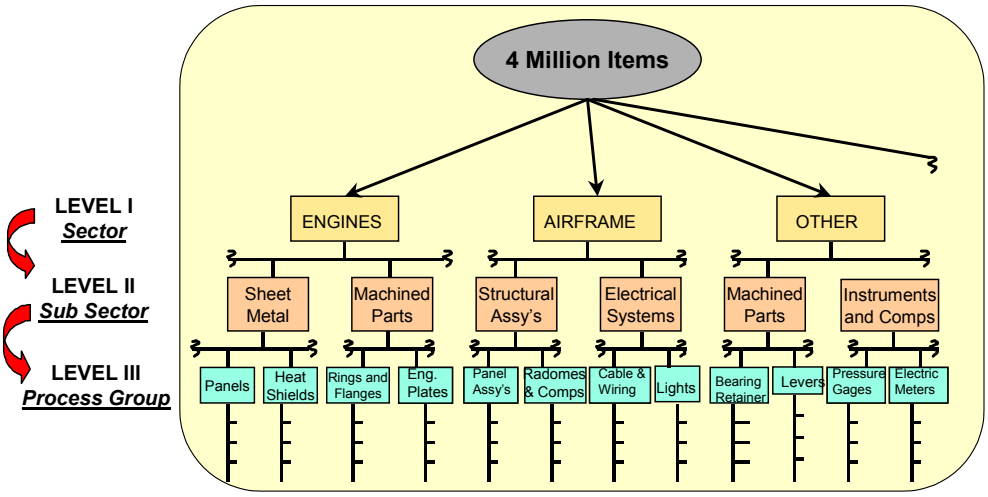

Figure 7: ***Depiction of the WICAP Industrial Taxonomy***

(2) Explain how this initiative can be transferred to other organizations and specify the likely candidates for transference:

- By partnering with the Joint Strike Fighter (JSF) Program, DLA has ensured that these lessons will be exported to possibly reduce lead-times for major weapons systems acquisitions.

- Procurement across the Military Services faces similar challenges, and thus might benefit from the strategy demonstrated successfully by SURGE.

- Boeing has indicated an intention of broadly expanding the SURGE concept across its Military Spares Procurement operations, as illustrated in Figure (8) below.

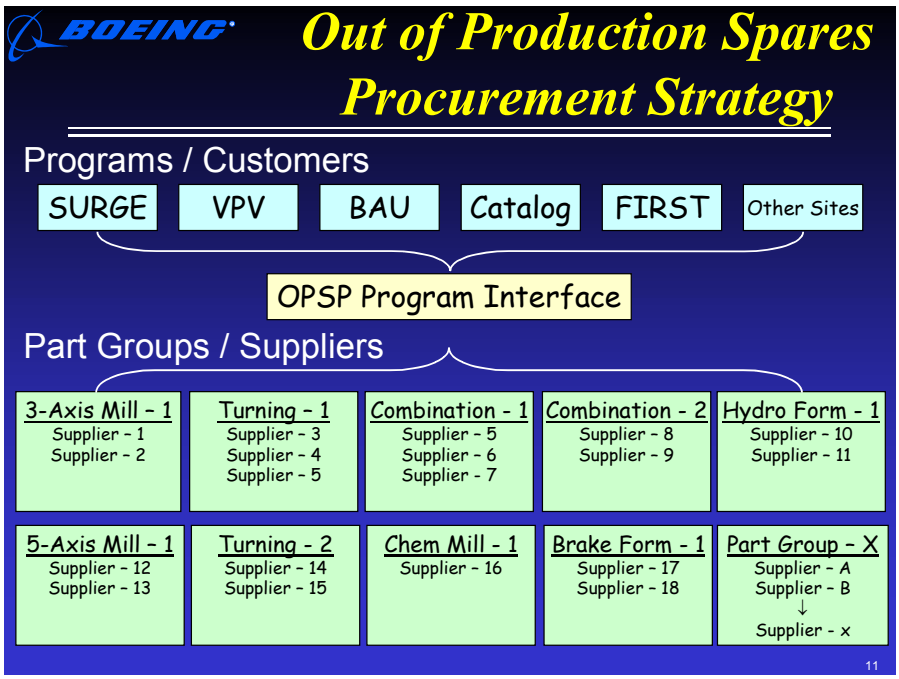

Figure 8: ***Overall Boeing Military Aerospace Support Out-of-Production Spares Procurement (OPSP) Strategy***

- DLA presentations to industry groups at major conferences have been well received, indicating significant potential for broad expansion across the aerospace industry. A recent briefing at Aviation Week's Aerospace Expo was referenced in multiple articles in professional journals.