GOVERNMENT DATA REQUIREMENTS IN A CHANGING TRAINING ENVIRONMENT

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ABSTRACT

Department of Defense specifications for technical data, spares and support documentation have been the proverbial "thorn in the side" to simulator and training device suppliers for many years. These government requirements are the most significant factor in the higher prices they pay for similar commercially available devices. As military aircrew training devices change from an all organic to a Contract Logistics Support (CLS) concept, there is a real potential for significant decreases in government training device life cycle costs. With the work force stability provided under CLS, the need for the highly sophisticated and costly logistic support is dramatically reduced. This paper will evaluate the various life cycle cost factors and assess the relative impact of reducing the current government standards (MIL-STD, MIL-SPEC) to best commercial practices in a CLS environment.

INTRODUCTION

In recent years numerous DOD solicitations for training devices have specifically required certain equipments to be supplied as commercially available in production or "off-the-shelf", especially CIG visual systems. These include Air Force solicitations for the Undergraduate Pilot Training program and the KC-135 (MB-26) refurbishment program and Navy/Marine Corps solicitations for the T-45, EA6B, and CH46D programs. In parallel with the procurement of commercial CIG equipment to satisfy military training requirements, contractor support is also being procured.

In December 1983, the Air Force Vice Chief of Staff directed an OMB Circulate A-76 study and re-evaluation of the Air Force's organic simulator maintenance career field. The resulting decision to terminate the use of military and civil service simulator technicians and schools closely parallels the June 1982 decision made by the Secretary of the Navy on the TRADEVMAN (TD) rating. By FY88 the last of the Navy and Air Force simulator and training device maintenance positions will have disappeared. The simulator and visual system support and maintenance will be primarily provided through the competitive selection of commercial contract service personnel. This transition from military concepts to commercial concepts has given rise to a new set of challenges.

The commercial concept necessitates a new look at old data and support requirements. We must look deeply to determine how and what changes are needed to insure a maximum success, a minimum life cycle cost, and the best trade-off of cost versus trainer availability for future trainer/visual system procurements.

When specifying commercially available equipment and contractor support for a simulator visual system program, there is one apparent advantage over specifying similar MIL-SPEC equipment. There is a much lower initial procurement cost and lower life cycle cost. Since there is little or no development cost to supply a commercial visual system, its price *can* be lower than one supplied from a development process. However, in recent solicitations, no special provisions were made to exempt the commercially available visual system from many of the military data and logistic support requirements associated with R&D procurements and organic military technical life cycle support. As a result, procurement costs as well as life cycle costs are significantly impacted upwardly.

This paper is offered as food for thought for logisticians who identify support and data requirements. We do not profess to have identified but a small portion of the numerous possibilities but only to bring forth some areas for consideration when tailoring future requirements for military training device contracts that will use the concept of commercially available equipment and contractor support.

TECHNICAL DATA

In the area of the low density, high technology simulation equipment, the trend in DOD solicitations has been to opt for the stringent MIL-STD criteria in the building of system specific technical order. In past years, these high quality tech orders were essential to the maintenance of the equipment for several reasons. The youth, experience level and high turnover of the military technician were among the key factors. The formal training, as well as the on-the-job (OJT) training, required technical orders of sufficient level of detail to guide the technician through a specific maintenance task and to insure a growing system specific knowledge through practical hands-on experience. This philosophy allowed for a rapid progression from a high school graduate to a productive system specific technician. With a reduced amount of formal classroom training, as compared to the more formal academic approach used prior to the Vietnam conflict, the school graduate/apprentice armed with his detailed technical order could effectively support a complex simulator and visual system operating at its designed capability.

The Vietnam conflict forced military decision makers to change the training philosophy that produced a qualified military technician at about the same time as his enlistment was complete. To satisfy increased manpower demands, the switch to a combination of formal training and OJT dramatically improved the availability of technicians and reduced the cost of producing them. The highly detailed specific technical order supported this change.

Now a fresh look is needed at the environment in which training devices are now or soon will be supported. With the ultimate extinction of the military simulator specialist, opportunity exists to further reduce the initial investment in technical data. Commercial support by equipment manufacturers, in the form of Interim Contract Support (ICS), Contract Logistics Support (CLS), or Contract Operations and Maintenance Support (COMS), by a competent commercial technical community carry the full responsibility for trainer/visual system availability. The competitive atmosphere and the source selection evaluation require a high level of technical competence on the part of the competing contractors. At the same time, the military is relieved of much of the cost burden associated with the use of military technicians. While support documentation is always necessary, technical data tailored to the needs of the commercial technician maintaining commercial equipment appears to be more realistic and cost effective than the MIL-SPEC technical order.

Most training devices specified today consist of many commercially available subsystems, ie. computers, peripherals, and visual systems, etc These subsystems are supported with parts lists, signal tracing guides, drawings, vendor manuals, and commercial technical manuals as part of their purchase price.

This accompanying commercial support package has supported and withstood the scrutiny of the commercial airline simulator community for years. There is every reason to believe that the same civilian contractors could now support "military" devices with the same commercial documentation. Why impose MIL-STD technical data requirements in procurements where high quality functional data is readily available without additional cost? Perhaps a better approach is to require only the addition of an integration document in commercial format which would tie together the subsystem manuals in a top down reference format. This approach, complemented by system specific interface documentation would provide the necessary documentation to effectively support commercial system maintenance of military devices without the cost burden.

DUPLICATION

While this paper is primarily directed at data requirements in a CLS environment, a duplication is an expensive consequence regardless of the support concept. Overlapping requirements are frequently evident in recent DOD solicitations for training devices and are adding unnecessary dollars to procurement costs.

As discussed under "technical data" the CLS support concept causes one to question many of the previously accepted data requirements. Whether or not one accepts the elimination of MIL-STD tech orders on programs requiring commercial equipment and CLS, maintenance plans closely duplicate the troubleshooting and procedural instructions of tech orders or of commercial manuals. Yet contract data requirements frequently call for development and delivery of maintenance plans as well as MIL-STD tech documentation. The same arguments, which support the elimination of MIL-STD tech documentation, seem to favor the same testing for the maintenance plan. It would appear that the Maintenance plan becomes an unnecessary data requirement, particularly with ICS or CLS.

Another seeming duplication is the OJT handbook. The OJT handbook commonly compares in cost to full technical documentation. Considering the fact that the military training device career fields are being terminated, the need for OJT manuals and handbooks to support training of military personnel would appear to be an unnecessary expense. Certainly an OJT handbook for a commercial contract technician is ludicrous. Selection of competent trained personnel is part of the commercial contractor's responsibility and is the basis for his risk and profit. Preparation, including training is assumed to be completed prior to starting a contract performance period. An OJT handbook would be of little value in a support concept in which the contractor assumes full responsibility for a device on the first day of the contract.

TEST REQUIREMENTS DOCUMENT (TRD)

For years the government has required contractors involved in simulator programs to include Test Requirements Documents (TRD's) as deliverable data items. The purpose of this requirement is to insure that sufficient data is available for the government to either buy or develop test program sets (TPS) for use on Automatic Test Equipment (ATE). The government depot level maintenance concept for circuit cards is based on the use of the ATE software to fault isolate and support the repair of these repairables by government or commercial repair facilities. For high volume repairables, this approach has proven to be a valuable concept. It has allowed the distribution of the repair work away from overloaded government facilities and from large manufacturing concerns who may otherwise set and control an upward trend in repair costs. The competition brought about by the availability of test program sets to the qualified repair facilities has kept the repair costs down and insured a long period of depot supportability.

On the other hand, low density components like simulator, visual system, and computer circuit cards with high reliability may reduce the benefits achieved in high density or lesser reliability components. Little attention has been paid to reliability factors when requiring deliverable TRD's and TPS's. A circuit card with 50 to 500 like items in the government inventory and a repair rate of 5 to 50 depot level repairs per year is given the same consideration as one with 5000 or more like items and 500 or more depot repairs per year. The data item for TRD's should be limited to only a list of selected components based on an analysis of the life cycle cost trade-offs. A calculation which considers depot repair action for the system (component) life cycle against the cost of TRD and TPS for the component during the same life cycle plus the actual per unit cost of diagnosis and repair should be part of the concept decision process to determine the need for TRD's.

EXAMPLE:

$$\frac{\text{Cost of TRD} + \text{Cost of TPS} + \text{Cost of Avg. Repair} \times \text{No. of Life Cycle Repairs}}{\text{Repair Action/yr} \times \text{no. of years of system life}} = \text{Average cost per unit over system life}$$

Based on this computation for selected components, a life cycle cost comparison can be given to several options:

- Additional spares
- More off-line organizational capability
- Expanded warranty
- Up front contract support from the vendor.

Anticipated life expectancy is also a major factor in this computation. For advanced technology and high turnover systems like computers, where the life of the system or component may be as little as five years, the investment costs for TRD's and TPS's can drive the repair costs of low density, low frequency repairables above the cost of other support options. Here a straight CLS approach, where the manufacturer sells the product, maintenance and availability, is the most cost effective.

While TRD and TPS remain important support considerations, the determination should be made on an item by item basis. The government's risk in making this decision can be reduced significantly if system reliability — availability — maintainability are considered in the component and quantity decisions for the purchase of system spares.

PROVISIONING AND SPARING

Of all the requirements for Aircrew Training Device (ATD) support, military provisioning is the most highly structured and most lucrative as a potential cost avoidance candidate. The detailed provisioning instructions of MIL-STD-1388-2A (Logistics Support Analysis Record), and the numerous Data Item Description (DIDS) are well directed at meeting the demands of the previous ATD support concepts. In this current format they are too rigid to allow industry the necessary creative flexibility in its proposals to identify and offer improved and more cost effective provisioning support for a contract logistics support concept. The risk of being non-responsive overrides the potential for cost avoidance. The emphasis in recent solicitations remains directed at format, media, data elements, documentation meetings, reports, and other administrative efforts designed to substantiate the management process for the provisioning effort. Some reduction in provisioning costs could be realized if less time and money were directed at administration and more emphasis were placed on part identification, validation and a specified availability. A less structured commercial oriented approach is a potential option to the military training device community without sacrificing supportability and system longevity.

BASIC COMMERCIAL KIT

This approach would require the manufacturer to provide the customer with a list of every LRU and repair parts replaceable at the organization level. It would also include hot spares for selected peripherals such as disk drives, displays and computers to reduce the cost which their equivalent piece/component addition would add to the spares kit.

The recommended quantities are based upon the manufacturer's experience and on their analysis of critical path LRU's which directly affect system availability, and component reliability. The kit would be tailored for and delivered to each site concurrent with the device. The obvious advantage to buying all spares from/through the device manufacturer is that he buys all the risk for delivery and kit accuracy because he must achieve a demonstrated system availability. The government still retains the option to procure components, spares, and repair parts from their source, but would also assume responsibility for timely delivery. The support kit list provided by the manufacturer would include:

Part Number
Item Description
Manufacturer
NSN When Appropriate
Quantity Per Device
Recommended Quantity
Unit of Issue
Unit Price

In light of the average $5000.00 cost to the government to document and the $500/year per site to stock and inventory each stock listed item, it may be appropriate to stop adding new line items. The use of non-stock listed ATD support kits was suggested by the USAF CLS working group in the fall of 1983. The idea was discussed to package all non-NSN components into a kit, and turn the kit over to the ICS/CLS maintenance contractor or site support team to manage, control, and maintain. The kit (not NSN listed) would be retained as government property with custodial responsibility transferred to the maintenance contractor or the support team as part of the support contract. The quantity of items, condition and control would be administered by the contractor as any other GFE. NSN (stock-listed) items would continue to be controlled, managed, and stocked through the Standard Base Supply System (SBSS).

The screening of the manufacturer's kit list by DLSC would determine which items are available in the federal supply system and would not be procured for the kit. The concern for replacements/additions to the kit and depot level support poses a challenge for either the government supply system or to the support contractor responsible for the kit and ATD availability. The obvious trade-off for risk is to increase item quantities, but the up front cost factor climbs directly with the quantity increase. An alternative approach has been offered in some recent proposals which keeps the front end spares cost down and alleviates a large portion of the availability and price risk throughout the life cycle.

DEPOT SUPPORT

Basically, the concept is an extension of the component warranty. The manufacturer offers his accuracy in forecasting the kit LRU's, quantities, and the competition helps to cap the quantities and to keep the kit price low. In return he guarantees LRU availability at the site within a given time period. He can do this in one of several ways. The easiest is to retain stock of the proper configuration, at a central location, to serve as the depot stock. Government customers may prefer to own the stock as a centralized depot kit subject to inventory and control. The manufacturers would identify the depot kit items as Category I (Catastrophic), Category II (Critical), or Category III, IV & V (Levels of Routine) based on the impact a failure would have on the system and its availability.

A TYPICAL SCENARIO

The ATD site has a component failure whose repair is beyond local capability. The spare is drawn from the on-site kit and used to return the device to a mission ready condition. The site manager calls or telexes the device manufacturer warranty section to order a replacement part. He provides the proper routing and billing information, system identification, and part number required. The Category I & II parts are shipped via overnight express for delivery within (negotiated time) a given time. Categories III, IV & V would be shipped and received within a time commensurate with their urgency. The government site or commercial maintainer is billed at the catalog price for the part. Upon receipt of the failed item at the manufacturer's facility, the customer is then credited for the catalog price. This provides an excellent tool for inventory control and timely turn in of the repairable to the repair facility. The part is now repaired and returned to stock by the device manufacturer. For items under warranty, there is no residual billing for repair or shipment. Kit additions are made by placing a call (request) to the manufacturer who ships the part and bills the customer at the same catalog price.

The mandate of "competition" in government contracts, in this case repair contracts, is sustained. The only difference is that the repair contract is a part of the device procurement competition and contract award. In return for a repair work base and predictable workload, the manufacturer offers in his proposal a pricing standard for any non-warranty repairs he provides during system life ie. time and materiel *with an inflation adjustment clause. Condemned parts would be billed at* the negotiated, ie., catalog price. Shipment and handling costs for non-warranted items are also billed to the customer. The added advantage to this contract is that its support remains valid for any site maintenance contract (customer) authorized by the government to maintain its ATD's. For subsequent maintenance contracts, the pricing and billing information would be provided through the government, or directly to the competing maintenance contractors, for use in preparing their CLS price and technical proposals.

With a fixed charge rate for repairs and guaranteed delivery times, the long term cost is predictable. This long term depot support approach, using these same fixed charge rates, eliminates the need for costly TRD's, TPS's and Level II drawing/proprietary data presently necessary to ensure system supportability and still permits a realistic competitive environment for subsequent ICS/CLS maintenance contracts. A secondary benefit to the government is the built in configuration control by the manufacturer and the access to a system approach to modifications, revisions and updates as the item circulates through the manufacturer's repair facility.

The elimination of most of the administrative cost factors in government provisioning and sparing is a realistic goal. The benefit of this cost cutting approach can only be realized if this revised provisioning *approach results in the right parts and right quantities being delivered* on time to the required location. A validation/verification process similar to that discussed by Mr. Arthur Doty[2] would provide the level of confidence necessary to protect the government's interests. The kit/spares validation could be accomplished on-site at the same time as the availability demonstration for the system. By identifying failures, kit deficiencies, evaluating depot (discussed earlier) support, an accurate assessment of availability performance can be achieved. The ILS/CLS or commercial maintenance contractor, in conjunction with the site administering contracting officer, could document the spares list/kit without the added cost associated with government per diem and do so over an extended period on the first device. Using the data secured during the validation period, the manufacturer would make adjustments to the kit levels and effect corrective action for any deficiencies relating to required system availability prior to government acceptance.

COMMERCIAL-OFF-THE-SHELF (COTS) AND LOGISTICS SUPPORT ANALYSIS (LSA)

The volatility of the computer industry, the short production life of five years (normally) and the desire to minimize acquisition and R&D costs prompted the government to exempt computers from many government specifications and to accept commercial off-the-shelf (COTS) computers in its training devices. The use of non-standard, non-MIL-SPEC components, on-call service contracts, special repair activities, and vendor updates are routinely employed to support these off-the-shelf products. Replacement computer systems and ECP's are forecast into the ATD budget to support the ATD system life.

The same approach lends itself to a broader application and considerable savings to the government if the solicitations permit. Some recent solicitations appear to give encouragement by emphasizing the acceptability/preference for proposals which offer COTS ATD/simulator equipment. Unfortunately the bidder's conferences only bring to life the confusion which exists in defining "off-the-shelf", "commercially available" or other similar definitions. The solicitation definition for COTS *and the narrative guidance must give a clear indication from which the* manufacturer can build a successful proposal. Frequently, the contractor is directed to FAR 15.804-3 which mandates the need for an item to be "sold in substantial quantities" to be considered as COTS. Certainly it would be rare indeed for a given simulator/ATD system configuration to be sold in substantial quantities like bullets or even aircraft. The government may well achieve an added pricing advantage by expanding the COTS label to include other selected, identifiable subsystems and components which make up the majority of a simulator/ATD. These, in fact, are sold in larger quantities and are normally available as an end item to the general public, ie., disk drives, CRT's hydraulic actuators, pumps and power supplies. A new definition in the basic solicitation, to clearly identify this broader COTS application, would permit potential bidders to submit less risky proposals and better define the cost elements in the price volume.

The positive impact of COTS on the pricing structure is realized from the commonality of many of the individual items and the absence of R&D costs for their development. A COTS item comes as an established design with commercial documentation, and already has its R&D costs amortized in the product, thus keeping the cost comparable to the vendor catalog price. The manufacturer's costs and pricing can be narrowed down to system integration, software, data base and the R&D for only those items and tasks which are peculiar to a given solicitation. The potential price advantage to the government for selecting a COTS ATD is lost if the manufacturer is forced to burden his costs with the same labor intensive MIL-STD-1388-1A/2A (Logistics Support Analysis (LSA) and Logistics Support Analysis Record (LSAR) documentation required for a design/development effort and conventional government

provisioning. Under current solicitation guidance LSA/LSAR is levied equally for COTS and non-OTS systems and subsystems in an ATD solicitation.

On the one hand, the government seeks to reduce costs (R&D, data, etc.) by selecting a device comprised largely of COTS components, documented with commercial data and with an established performance. The MIL-STD-1388-2A, Appendix E, Paragraph 30, Page 359, cautions against indiscriminate application of LSA/LSAR because of the cost impact. Yet these same solicitations which seek COTS levy specific LSA/LSAR taskings on the manufacturer, top down, on every LRU, non-OTS and COTS alike. These taskings routinely mandate completion of B, C, D, and E data records, data processing and production of LSA specific reports for the government. The cost to prepare these data records and produce the products is extensive because of the number of data elements, and the volume of data records. This drives up the price and causes the manufacturer who offers a COTS system to lose some of his competitive price edge over the manufacturer who offers only design concepts, predictions, and LSA for his proposal. The government ends up paying the price.

The salient point is that these data records and the report products are developed to influence system design, training and technical publications for the system. They serve no useful purpose for a (COTS) which is designed, available, and is normally supported with commercial publications and training. The simple addition of a broader definition of "commercially available", etc. and a reduced requirement for LSA/LSAR documentation for approved COTS in future ATD solicitations will realize immediate cost benefits to the government without sacrificing ATD quality, performance and longevity.

SUMMARY

This paper has touched only a few of the basic cost drivers routinely embedded in government aircrew training device solicitations. The contract data requirements for reports, plans and outlines could turn our discussion into a library. In their time and in the environment from which these requirements were established, they were essential tools for the government manager and support team. The rules have changed significantly, but the data requirements are lagging far behind the management and support concept now being employed. Industry is being asked to relieve the defense department of some of its non-combat related responsibilities like aircrew training device support. In addition to the defense manpower advantage, there is a tremendous opportunity to realize direct dollars savings to the taxpayer. If the emphasis is changed from administration, documentation and reporting to the real goal of a successful ATD procurement ... AVAILABILITY.

Industry now has the task of ATD support and has the ability to achieve a level of support beyond the expectations of the government planners who elected to go CLS. The only factor remaining is one of opportunity. Here the government solicitors and logisticians can make the difference by the constraints of their requirements and/or the latitude they include in their future solicitations. They must turn the emphasis in their specifications from documentation/data to availability.

The topics in this paper offered to identify some of the constraints and suggest approaches which can change the procurement direction to complement the new CLS environment. For every area discussed, there are a multitude of better ones yet to be offered from the industry. These ideas can be allowed to surface and be evaluated on their own merit by the source selection team if up front changes are made in the solicitation document. Future solicitations should:

- *Reduce the specifications* to basic performance issues — AVAILABILITY.
- Delete requirements for data not required by commercial support.
- Emphasize demonstration as the basis for compliance and payment.
- Require a spares kit validated by on-site performance, not documentation.
- Include authority to offer new ideas in a solicitation without imposing the penalty of recompeting the solicitation.

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