

Virtual Fleet Support for CAD/PAD

A Business Systems Re-engineering Success Story

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Sometimes things *must* work, and that's the case with ejection seats and other emergency systems in military aircraft. Every day, without much thought to their survivability, aviators strap into jets and push the limits, dominating air warfare globally. They know that if necessary, they can eject—and they take great comfort in knowing that even if they lose the jet, they have a high probability of living to fly and fight again.

What does it take to foster such confidence? Thousands of men and women working for the Services, supporting a military-unique product line: Cartridge Actuated Devices/Propellant Actuated Devices (CAD/PADs), energetic devices that employ explosive compositions to provide the power required to position and eject the aircrew in a timed sequence of events, the timing measured in milliseconds.

CAD/PADs are used in aircraft ejection seats, weapons release, and fire suppression systems. The Department of Defense uses about 3,100 different configurations. CAD/PADs, needed for safe flight, can cause the grounding of aircraft if they are defective or past their service life. The CAD/PAD Joint Program manages engineering acquisition for all Services and sustainment for the U.S. Navy, Marine Corps, and Air Force. Perishable, like any product—*aspirin* and other drugs, for example—that depends on chemical mixes, they must

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U.S. Navy photo by Photographer's Mate Airman Jordon R. Beesley

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be replaced often. Within the Navy and Marine Corps, CAD/PADs generate up to 90,000 supply and maintenance transactions each year, and because of their explosive nature, they must be returned for demilitarization and disposal.

Historically, the effort to manage the hundreds of thousands of maintenance and supply transactions created a significant burden on sailors and Marines responsible for the paperwork required to order and receive the products, to manage and schedule maintenance, and to replace expiring parts in the aircraft. In recent years, there has been increasing emphasis on implementing smart business practices in the defense community. Virtual Fleet Support (VFS) is a successful initiative of the CAD/PAD Joint Program Office to apply commercial practices and Web technology to streamline many of the formerly labor- and paper-intensive processes associated with sustainment of CAD/PAD.

The Key ... Automation

VFS is a Web-based system for managing the full range of data used by the chain of entities responsible for aircraft sustainment, from the wrench turner on the flightline, to the support system, to the affiliated industrial base. It automates the processes by which sailors and Marines order, report, and track the CAD/PAD and by which they obtain safety information and training. In essence the system:

- Automates the business practices linking the flightline aircraft maintainers, ordnance logistics and supply systems, and the fleet support team in the Joint Program Office
- Moves users from administrative tasks to mission tasks
- Ensures data are input once only—at the source—then are used by all
- Employs safety, logistics, engineering, acquisition, maintenance, and supply data within a single automated life cycle support process
- Automates supply ordering using fleet maintenance data, eliminating fleet requisitioning
- Completes work for the fleet maintainers, instead of workloading them.

Achieving these goals has resulted in automated business processes and elimination of paperwork, such as archaic naval messages, and it has made possible the concept of data as a corporate asset, available to all in real time.

The Old Way

Before VFS, the Navy CAD/PAD Program at Indian Head, Md., relied on an intranet to carry out various technical, logistics, and program functions. A central database held key data affecting the sustainment of CAD/PAD. The system successfully facilitated several centralized responsibilities, such as budgeting and procurement of replacement items. But it had a significant limitation. Those

outside the program office had to come through the program office to input or receive data. Users at the 780 Navy maintenance activities worldwide sent a diskette each month with tracking information on installed CAD/PAD—a cumbersome process that, at best, produced central information that was constantly out of date. And in some cases, sources maintained costly and inefficient redundant data.

The old system did have some significant successes. One was automation of the requirements determination process using data showing when every CAD/PAD must be replaced. The result was greatly improved accuracy of procurement requirements and a definitive basis for budget justification. With this tool, the program office was able to justify its budget by identifying specific aircraft that would be grounded if cuts were made to the procurement request. This capability has been incorporated in VFS.

The New Paradigm

The previous focus was on collecting data for use by the CAD/PAD program and its chain of command. VFS shifts to managing corporate data for the primary user, the fleet maintainer, and to automating business practices using the data. Each authorized user is able to input directly to the central system. Validation and security routines have been built in to avoid corruption.

The backbone of VFS is the Coredata module in which common life cycle support data are collected and triaged. From Coredata, the CAD/PAD program is able to electronically author an interactive electronic technical manual, usually in a matter of hours, as opposed to months in the prior paper process. The technical manual authoring process includes a multitude of data validation rules to assure accuracy of the data published for fleet and fleet support team use. All other modules link to the published technical manual for common data.

Aircraft-Installed Asset Management

The basis for maintenance management, procurement planning, and technical support for installed CAD/PADs is the Trace module, which tracks all installed assets. Trace allows the program to maintain a Web-based electronic logbook for the 245,000 assets installed in Navy and Marine Corps aircraft. Previously, each maintenance activity kept its logbooks in an MS-DOS-based program on a standalone computer and sent a monthly disk containing updates to Indian Head. Shipping losses and lag time in receiving the disks diminished the accuracy of the data in the central database.

Today, fleet maintainers are able to manage aircraft and record custody and to make centralized logbook entries directly, when, for example, a damaged or expended CAD/PAD is replaced. As service lives change, logbooks

are updated and automated e-mail notifications sent to custodians detailing changes made on their behalf. One recent series of service-life changes affected over 200 CADs, with over 35,000 logbook records updated—without the fleet's taking a single action.

Service-Life Extension

About 400 times each year, because of operational tempo, deployments, or part shortages, users request a service life extension of installed CAD/PAD to keep an aircraft in flying status. Previously, mechanics had to visit the logs and records shop to transcribe key information on the subject CAD/PAD and retype the information in a naval message, adding only the length of extension needed and the reason. The message was routed through three levels of approval and sent to the program office for processing.

The performance of CAD/PAD varies depending on the manufacturer or the ingredients; and with hundreds of product designs and thousands of lots in service, the worst performer determined the stated service life. But engineers are able to review the performance data for a given lot and approve an extension in many cases. The review, associated paper work, and approvals could take a week or more. Rather than request an extension, the fleet often chose to ground the aircraft and change the item at an undesired time.

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Under VFS, with Web-enabled CAD/PAD data, a mechanic can access the item's record and submit a request, all with a few clicks of a mouse. In the program office, engineers have developed a parameters database that allows an automated response to the request in most cases. If the request falls within acceptable parameters, the computer grants it, the logbook is updated automatically, and key individuals are notified of the change by e-mail. The whole transaction now takes only a few minutes. If the request falls outside an acceptable range, it is forwarded to the responsible engineer for further analysis and response. Since VFS became available, the number of service life extension requests has increased fivefold, resulting in a significant reduction in the maintenance burden.

Web Ordering: The Next Step

In 2001, the Joint Program won the David Packard Excellence in Acquisition Award for re-engineering the requisitioning process from the deckplate perspective and for implementing an innovative 1-877 telephone system for ordering and re-supplying CAD/PAD. The 1-877 project was the first to use maintenance data resident within the aircraft logbook (VFS Trace) to automatically create the required supply requisitions, eliminating the need for fleet maintenance and ordnance supply personnel to create and process over 11,000 requisitions annually. The Web Ordering module of VFS takes the next step, providing the first Web-based capability for ordering explosive parts.

Previously, ordering replacement CAD/PAD required 18 paper-intensive steps involving four entities: the requesting squadron, the host base weapons department, the Navy CAD/PAD inventory manager, and the stock point at Indian Head or Seal Beach Naval Weapons Station, Calif. Many requisitions were lost, and 62 percent of deliveries were late. As a result, CAD/PAD were viewed as hard to get, and squadrons often stockpiled assets as a hedge, leading to shortages elsewhere. The benefits of a just-in-time acquisition system were lost because of a "just-in-case" supply approach.

Using an aircraft's electronic logbook, the flight line mechanic is now able to determine all the items that will expire before the next scheduled maintenance and place an order in just a few minutes. The module validates the need and produces the required supply requisitions, "pick list," box labels, and shipping data for the stock point. Shipping is, in most cases, by overnight commercial carriers. VFS automatically sends order confirmation and shipment tracking information by e-mail to interested personnel. Management actions by the weapons departments are significantly reduced and those of the inventory manager minimized.

The results have been striking. Where an order used to take up to 120 days, it now takes about eight, which has

allowed the fleet to reduce significantly the amount of inventory it holds. In addition, Web ordering automatically calculates ship load-out requirements for deployment, based on the aircraft assigned to the embarking air wing. A sailor enters the squadrons planned to be on board, and VFS calculates the type and quantity of CAD/PAD needed, considering the item's damage history and the likelihood the part will be needed during the deployment. This allows ships to take less than half the emergency stock previously carried.

An unanticipated benefit of the Web Ordering and Service Life Extension modules' working together is additional savings. Now, whenever the fleet places an order for replacement CAD/PAD, VFS determines whether a service life extension can be granted instead and initiates the extension process if possible. In 2003, this resulted in over 1,100 such extensions, again eliminating unnecessary work for the mechanic.

Technical and Safety Data Management

Previously, the CAD/PAD technical manual contained over 3,000 pages and had a distribution to more than 3,500 sites. The burden associated with maintaining the manual is illustrated by the following: Interim rapid action changes (IRACs), which typically impact 15 to 20 pages of the manual, required each manual "owner" to apply the changes to his or her copy. With VFS, fleet maintainers are able to access a level 4 interactive electronic technical manual (IETM) that is "authored" using the central technical database. In 2003, the workload avoided because changes to the IETM are managed centrally by VFS was equivalent to over 860,000 page changes (IRACs multiplied by the typical number of pages per IRAC, multiplied by the number of manual owners).

Disposition Information and Instruction

The Disposition Information and Instruction module implements the Military Munitions Rule for excess, over age, and unserviceable CAD/PADs. The rule imposes new requirements for determining when military munitions are hazardous waste and, therefore, must be subjected to certain environmental controls. Within this module, users may request and receive disposition instructions via the Web. While most disposition requests are routine and handled automatically by systems operated by the item manager, many activities have no access to the compartmentalized ordnance supply system, and many items are found with obliterated or missing identification markings. The disposition module fills the reporting gaps for non-routine requests and will also produce a series of executive reports to assist program officials facing environmental audits.

The Payoff

This initiative shows conclusively the power of creative re-engineering applied to sustainment processes. Initial

The performance of
CAD/PAD varies
depending on the
manufacturer or
the ingredients,
and with
hundreds of
product designs
and thousands of
lots in service, the
worst performer
determined the
stated service life.

estimates of the manpower savings were 50 work years for the 1-877 reordering system and up to 100 work years for VFS. Ongoing analysis of the implementation indicates that these estimates have been met or exceeded. Cost savings and procurement efficiencies are also being realized. Typical of the response from the fleet was the comment of Petty Officer First Class Jeanna Saccomagno, formerly with VFA-106 in Oceana, Va. She said, "We used to assign one person, actually the CAD petty officer, who would come in every day, all day, and work CADs. Now that VFS is online, one person spends 10 minutes one day a month to order CADs for all [the squadron's] jets."

Perhaps as important, VFS is giving local fleet personnel a much greater ability to interact with and control the sustainment processes that affect their missions, leading to greater confidence and more efficient management of those processes, with less time devoted to administrative tasks and more time devoted to direct mission support of the warfighter.

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