

Designing, engineering and implementing Single Platform MAXIMO® for the U.S. Navy

Winning the battle required the power of the Internet, the foresight of Navy leaders, superior engineering expertise, powerful software and tremendous teamwork

The power of the Internet was there. Figuring out how to leverage it was the challenge. Like many large organizations, the Navy's Public Works Centers (PWCs) were dogged by disparate systems, islands of data and redundant input. A system capable of supporting concurrent use among multiple sites and time zones, and a myriad of project requirements and reporting standards was needed. No small order. New ground would have to be broken.

The mission included maintenance planning, work order execution and integration with the Navy's financial system. It also called for a thorough assessment of assets to determine deficiencies, redundancies and equipment condition. This was necessary to determine the extent to which consolidation was needed, while assessing the support required for the units covering the Navy's war fighting capabilities. In the end, there had to be one process, one consistent look, and one single set of rules for maintaining and supporting the Navy's facilities and assets.

Enterprise Asset Management standardization
Total Resource Management (TRM) started working with the Navy in 1996. In fact, it was TRM that proposed a best-in-class enterprise asset management (EAM) software solution – MAXIMO developed by MRO Software. TRM's first assignment was to standardize the use of MAXIMO at each of the PWCs. These centers were responsible for maintaining nearly 60% of the Navy's facilities with a combined annual facilities support operating budget of approximately \$1.6 billion.

Initially, the goal was to engineer nine (later reduced to eight) site-specific, similarly configured PWC systems, where each PWC ran an independent instance of MAXIMO that communicated with a local database in a client server architecture. The Navy specialists, with the help of TRM project managers and technical

THE OPPORTUNITY: Leverage the power of the Internet to consolidate the Navy's Public Works Centers (PWC) asset management and maintenance systems in each of eight PWC locations, and then standardize and further consolidate these systems to a single enterprise asset management platform.

THE REQUIRED OUTCOME:

- Total visibility of assets, requirements, work projects and resources
- Significant readiness improvement
- Compliance with DoD and NMCI certifications
- Open source, pure Internet architecture
- Ability to support more than 4,000 users in 14 different time zones
- Ability to manage as many as 1.3 million work orders; 250,000 purchase orders; 600,000 equipment items and 98,000 buildings annually



services staff, standardized all the PWCs to one system, creating the ability to assess business processes and organize and structure MAXIMO in a similar manner

for each location. This move to MAXIMO resulted in the reduction of nearly 300 separate systems to eight MAXIMO operations.

It was when TRM assisted the Navy in the development of "PWC Corporate Core Standards" to define the business processes, tools and configuration management policies required to implement and maintain the core standard that it became obvious that another level of consolidation was necessary. Ultimately this resulted in Single Platform MAXIMO (SPM).

Like most businesses during this time, the Navy leaders were being challenged to improve operational efficiencies and reduce costs. The Internet was proving to be a way to offer flexibility and scalability. In the fall of 2002, the

Naval Facilities Engineering Command (NAVFAC) team was directed to accelerate the move to web technology. The PWC MAXIMO community was challenged to go beyond "separate but equal" standardization to develop a single configuration that operated at a single host site with the ability to view facility maintenance management data across the entire Navy.

The evolution of SPM

TRM engineers and specialists worked closely with the NAVFAC team to develop the Single Platform MAXIMO (SPM) solution. The goal: to further standardize, consolidate and streamline EAM systems associated with all of the Navy's PWCs to one, single EAM platform with multiple entry points.

The technical and organizational challenges of SPM are great. The team quickly realized that the tradeoffs of being able to view asset information across the entire organization, from any browser, involved complex configuration considerations – including business rules, screens and interfaces to other applications.

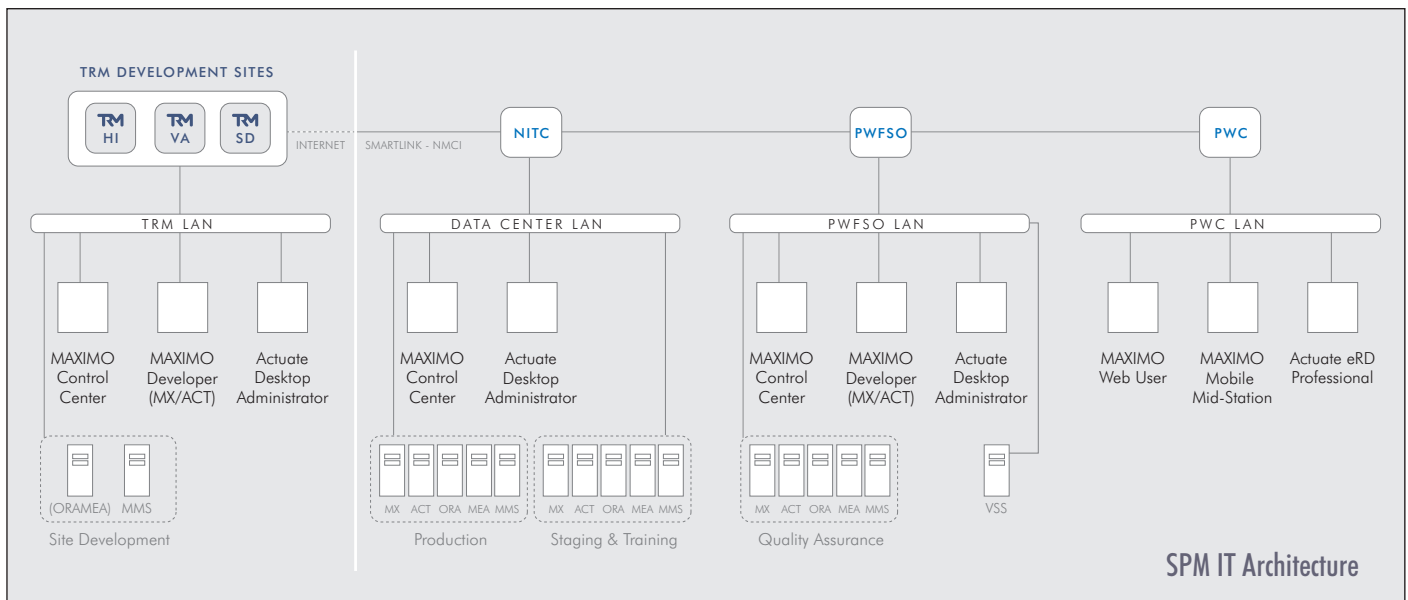
Because of the complex nature of the project and the vast number of concurrent activities, the SPM-integrated product team recommended a structured project management approach. Phases included planning, requirements, design and installation/acceptance. "TRM was able to quickly shift focus to meet the dynamic nature of the Navy's PWC world. In-depth analysis and problem-solving occurred at every step, especially as we dealt with emerging requirements," said Ken Kelley, NAVFAC Assistant CIO for PWCs.

Two pilot sites were designated, PWC Washington and PWC Norfolk. The functionality and application of SPM

was to be completely defined by the time the first two pilot sites were in full production. After both pilot sites go live and Initial Operating Capability (IOC) is achieved, the rest of the PWCs will phase into SPM, two sites at a time. Due to its close proximity to NAVFAC headquarters and its organizational and functional complexity, Washington was the first site to go live. "My hat's off to the TRM Team," said John Hopkins, PWC Washington MAXIMO project manager, when the Washington PWC went live in August 2003. "I was impressed with TRM's problem-resolution process during the go-live week, and how well activities and processes were organized." Norfolk, the Navy's largest PWC, is expected to go live with SPM in July 2004. Additional load testing and continual application monitoring will precede each additional PWC as it is converted to the new SPM platform.

"Single Platform MAXIMO is historic," says Don Omura, vice president of Pacific operations for TRM. "It leverages web technology to simultaneously standardize business practices, consolidate facilities data and reduce IT development and operating expenses. And, while this has been a major technical challenge, the job of managing changes to organizational and business processes has been equally important. We're not just moving MAXIMO to the web; we're moving people and organizations to an enterprise-level set of standardized business processes. This calls for major adjustments on all fronts."

The difference is real at PWC Washington. Users double-click their Internet browser and access a new, industrial strength web application hosted at a central location 2,700 miles away, in Port Hueneme, CA at the NAVFAC Information Technology Center (NITC). Functionality and integration, including customer (work order) management, handheld devices, financials, facilities condition assessment



SPM IT Architecture

and readiness, purchasing and reporting, are being migrated to one application, one data base, one set of standardized business processes. The bottom line – one view of the facilities management data across the entire corporation.

Virtual teaming

A project of this scope, on technology's leading edge, calls for a skilled, flexible team that can vary not only in size but also in skill mix. TRM worked with the Navy's Public Works Field Support Office, or PWFSO, to put together a truly "virtual team." Both information technology and telecommunications capabilities are combining with tremendous human talent to make certain the expertise that's needed is available anytime, anywhere.

The virtual teams have worked to finalize the functional and data requirements and design a system architecture that supports the MAXIMO web technology, complies with Navy IT security rules, supports 4,000 users and provides enough redundancy to ensure continuity of operations 24/7.

This virtual teaming method uses collaborative tools for communication and configuration management to maintain the integrity of the development code. TRM has developed a center of excellence around application benchmarking and monitoring as part of its standard system engineering procedure. TRM's virtual team provides system diagnosis and problem solving in real time using sophisticated load testing, application performance tuning and monitoring tools.

"There's definitely an ebb and flow to a project of this magnitude," says Omura. "We apply resources when we need them. The number of TRM people working in the development stage is fewer, but there is a huge surge of work checking, testing and meeting before we go live. At times, we've had as many as 40 people working on our highly specialized team."

Systems engineering

The approach to enterprise-wide planning and provisioning of hardware, network infrastructure, application optimization and tuning has been critical. Moving each PWC from a local, client-server instance of MAXIMO to the enterprise web architecture of SPM presented a whole host of engineering challenges. "TRM's engineering consulting services are outstanding and have proven to be a key component to our successes to date," adds Lisa Abad, NAVFAC's MAXIMO program manager.

TRM's ability to successfully work with the Naval Information Technology Center, or NITC, the application hosting site, plus representatives from each PWC and other SPM team contractors is a critical component of success. This collective organization brings deep experience and history in providing enterprise computing support for Naval

Facilities Engineering Command. Other activities in areas such as load testing and wide-area network analysis have provided insight on performance requirements, connectivity, security maintenance, capacity planning and end-user desktop viewpoints.

TRM system engineers are focusing a keen eye on methodologies directed toward risk mitigation before, during and after system rollout. World-class tools are being used to ensure continued success throughout the system lifecycle. This global enterprise asset management system is being deployed during the Navy's transition from a legacy environment to the Navy Marine Corp Intranet (NMCI) – the environment that provides network-based information services to sailors and marines during day-to-day activities.

Training

Part of any migration is training users in new web protocols as well as changes and improvements in functionality. TRM's approach is to involve users early on in prototype evaluations using small teams from each site. Site training is set to occur just before final data conversion. By using preliminary data conversions in the training process, each group gets to see its own information on the screen. This serves the dual purpose of helping ease the users through the transition to the new MAXIMO look and feel, while providing an extra "hands on" validation of the data conversions.

Tools that improve productivity, flexibility and reporting

TRM has developed several productivity enhancement tools to assist MAXIMO users in rolling out large projects on time and within scope. By analyzing the challenges facing the Navy in providing for the standardization of many complex rules (as well as the flexibility for each location to tailor some of the behavior and screens), the TRM team utilized TRM RulesManager™, TRM ScreenBuilder™ and TRM KPI Manager™. These products also are available to clients worldwide.

TRM RulesManager allows the team to implement complex rules within MAXIMO without complex technology. TRM RulesManager plays into the rapid development and turnaround of prototypes as well. This tool allows the user to continue operating at optimum capacity while SPM provides flexibility to accommodate site-specific requirements and needs. Customer requirements vary, as do the regulatory environments from state to state. TRM RulesManager provides a method for bringing localized rules into a fully standardized system. The addition of TRM RulesManager provided the Navy with the ability to implement its business rules without extensive internal Java programming in MAXIMO. This reduced costs associated with development and future upgrade or migration as MAXIMO 5 matures.

TRM ScreenBuilder allows rapid development of MAXIMO screen designs. TRM and the Navy users were able to prototype an application to check whether or not it met end-user requirements. TRM ScreenBuilder is an easy, drag and drop, graphical screen editor that provides a means to prototype quickly, make modifications and turn around prototype findings. The MAXIMO screens now are easily adapted to fit the Navy's work processes.

TRM KPI Manager resulted from TRM's analysis of how the Navy at the Norfolk and Washington PWCs reported their maintenance activities. Initially, only seven reports were thought useful. A closer analysis helped TRM determine that 25 elements were critical measures for effectively viewing the maintenance processes. TRM created KPI Manager to graphically display and manage the maintenance and financial data as required from the report. More than 50 measures are now in place.

Customizing a successful solution

SPM didn't exist before. Success is coming one step at a time. Teamwork is critical. Timing and efficiencies of scale are essential. Experience – lots of it – is necessary. A consolidation of this magnitude has never taken place before within the Navy or any asset intensive organization of this size. It's the largest assignment of this kind TRM has undertaken in its 10 years in business. But it's made up of all of the components TRM puts into every assignment – strategic project planning, precise system engineering and execution, teamwork and technology.

"The SPM experience with the Navy allowed us to further refine our approach to enterprise asset management challenges," said Ray Brisbane, TRM president and chief executive officer. "We respond to key stakeholder missions and specific business problems that affect assets, facility management information delivery and demands at every level of the organization."

As the Navy continues to consolidate each of the PWCs systems onto Single Platform MAXIMO the methodologies developed in the pilot phase with TRM will be applied to each new site. The system itself continues to evolve. The network is getting stronger and more efficient. And the Navy is getting closer to winning the operational improvement battle it set out to win over two years ago. The Navy's PWCs soon will speak with one very strong, clear engineering voice, using a single, efficient and cost-effective system.

ACRONYM REFERENCE LIST

PWC	Public Works Center
IOC	Initial Operating Capability
NAVFAC	Naval Facilities Engineering Command
NITC	NAVFAC Information Technology Center
PWFSO	Public Works Field Support Office
DOD	Department of Defense
TRM	Total Resource Management
SPM	Single Platform MAXIMO
NMCI	Navy Marine Corps Intranet
CNI	Commander Navy Installations
CMMS	Computerized Maintenance Management System
EAM	Enterprise Asset Management

About Total Resource Management, Inc. (TRM)

Total Resource Management, Inc. (TRM) delivers consulting and information technology solutions that help organizations improve the management and performance of their enterprise assets (facilities, infrastructure and production). TRM products and services – many based on the industry leading MAXIMO software – help organizations reduce the costs associated with planning, building, deploying, operating, maintaining and utilizing their assets.

Over the past decade, TRM has supported nearly 200 clients with services ranging from EAM implementation services, business process improvement, network engineering and design, project planning and delivery, systems engineering, business case analysis and performance measurement, resulting in significant improvements

to their business operations. TRM is headquartered in Alexandria, VA, and has six U.S. locations. More information is found at www.trmnet.com.

About NAVFAC

The Naval Facilities Engineering Command (NAVFAC) manages the planning, design, construction and public works support for shore facilities for U.S. Navy activities around the world. They provide the Navy's forces with the operating, expeditionary, support and training bases they need. NAVFAC is a global organization with an annual volume of business in excess of \$8 billion.



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