LOCATION:
St. Inigoes, Maryland, United States

YEAR:
2006

STATUS:
Laureate

CATEGORY:
Government and Non-Profit Organizations

NOMINATING COMPANY:
Booz Allen Hamilton Inc.

THE COMPUTERWORLD HONORS PROGRAM
CASE STUDY

ORGANIZATION:
Naval Air Warfare Center Aircraft Division/
Special Communications Requirements Division

PROJECT NAME:
MarineNet, Marine Corps Distance Learning

Summary
Delivering on the “Anytime, Anywhere” approach to training, the Marine Corps Distance Learning Program’s MarineNet system enables Marines, their family members and government civilians access to Interactive Multimedia Instruction in garrison, at home and deployed locations. Through the incorporation of innovative technologies that maintain compliance with DoD and USMC security policies, the MarineNet system has transformed training within the United States Marine Corps. The efficiencies generated by MarineNet enables the Marine Corps to increase manning in the operating forces by shortening the “Street to Fleet” process through just-in-time learning.

Introductory Overview
While the benefits of eLearning have been thoroughly documented, the method in which eLearning is adapted to an organization is critical to achieving program goals and objectives. Designing and adapting the appropriate architecture for an organization with the unique geography, operational and infrastructure considerations of the United States Marine Corps imposed a significant transformation challenge. The challenges to the development and acceptance of a globally deployed training infrastructure existed within organizational and technical domains. It is through the recognition of the relationship between organizational and technical transformation that the MarineNet system has matured into the architecture that it is today. Leveraging appropriate technologies through pilot and proof of concept approaches ensured that identified organizational goals could be achieved, as well as pave the way for new goals to be defined. Utilizing a pilot activity to demonstrate the value of web based learning, the Marine Corps Distance Learning Program (MCDLP) applied a decentralized architecture of remote Training and Education Points of Presence (TEPOP) servers to provide both student services and Interactive Multimedia Instruction (IMI) content to its users. Faced with increased demand for rich media, such as high bit rate video, the decision to migrate to a COTS Learning Management System (LMS), along with the desire to design and field a deployable eLearning system, required a new architecture be developed. The MarineNet student population includes all Marines (active duty,
The ComputerWorld Honors Program 
Case Study

Reserve component, retired), selected members of the other military services (Army, Navy, Air Force, and Coast Guard), DOD civilian employees to include (appropriated and non-appropriated fund employees) and selected family members. The resulting architecture needed to allow our student population access to the same high quality, media rich instructional content whether the student was in garrison, at home or on deployment.

MarineNet is enabling a Marine Corps wide training transformation by providing a global infrastructure that allows Marines ready access to training information that will provide for improved operational and personal readiness. Marines are able to engage MarineNet hosted content for the purposes of personal and professional enrichment. Organizationally, the Marine Corps is recognizing MarineNet as a viable alternative for addressing annual, recurring and regional training requirements that allow Marines to achieve increased qualifications and privileges. These training requirements include Pre-Deployment Training, Information Assurance, Operational Risk Management and Marine Corps Common Skills.

MarineNet is the realization of a partnership between MCDLP and NAVAIR. MCDLP provides the vision and direction for MarineNet, and Special Communications Requirements Division (SCRD), NAVAIR provides the technical expertise and delivery necessary to realize the vision. This partnership has resulted in a successful training solution that is gaining increased recognition within the DoD community.

Through the evaluation of emergent technologies and innovative adaptation of those technologies, SCRD provided technology and infrastructure recommendations and solutions that evolved the MarineNet architecture into a global training solution that incorporates a COTS LMS; an Enterprise Content Delivery Network (ECDN); Deployable Learning Resource Centers (DLRC); Learning Resource Centers (LRC) aboard Bases, Posts and Stations around the world; a central Network Operations Center and industry standards based courseware developed by and for the Marine Corps. Additionally, MarineNet communicates with other Marine Corps systems to ensure full representation of student training activities.

· The ECDN is the content management component of MarineNet. It provides four key architectural elements:
  1. Edge based content media engines within close proximity to user communities. The content media engines can store and deliver rich media files.
  2. Content distribution and management functions which enables the preposition of content to media engines and manages the health of the ECDN.
  3. Redirects users from the central NOC to the closest available content media engine, which have been strategically placed within the Marine Corps network.
  4. Overlay onto the existing Marine Corps enterprise network while meeting specific security requirements.

· The DLRC is a hardware component of MarineNet that provides Marines with access to electronic courseware while they are deployed aboard ship or from remote locations ashore. The system offers the same functionality as garrison-based equipment and incorporates a modular design for maximum configuration flexibility.

· The LRC is a computer classroom fielded in support of MCDLP goals to provide users access to web-based training content.
MarineNet is the Marine Corps’ online learning network that provides Marines with access to both military and civilian education programs. MarineNet offers more than 800 courses from “Trafficking in Person” to “Recognition of Combat Vehicles,” and custom Marine Corps training courses and business and information technology courses 24 hours-a-day, seven days-a-week. MarineNet allows students to take tests online and receive credit. Some classes are transferable for college credit, depending on individual college requirements.

Benefits

The MarineNet infrastructure is beneficial to the user community and other organizations for multiple reasons. One of the benefits comes from the realization of a global training architecture that positions interactive multimedia instruction at the Marines’ fingertips whether the Marine is on base, on deployment or at home. This enabling solution also reduces the cost of maintaining the currency of training materials, eliminates the cost of travel to training sites, and brings instructional advantages of advanced training technology to remote sites.

As called out in the ORD, MarineNet enables distance learning students to perform the following functions:

- Search the course catalog
- Register for a course
- Complete a course online
- Take an exam online
- Take a survey online
- Review course enrollments and transcripts
- Print course completion certificates

These functions allow a student better control and responsiveness over their training opportunities. The students are experiencing an easier and expeditious course enrollment process, a reduced timeline for the availability of newly developed and time appropriate courseware and a shorter turn around time for the posting of grades to their permanent training records. The MarineNet global infrastructure has resulted in a proliferation of self-paced multimedia instruction available on demand by MarineNet students.

Prior to the implementation of MarineNet, training was often conducted via mail correspondence and relied upon the production of paper training manuals, mail delivery schedules and several manual touch points. Continued and growing interest in the MarineNet infrastructure components exists, most notably the ECDN and DLRC components.

There have been numerous inquiries regarding these two system components and the benefits derived from them. There have been several requests for information and technical exchanges between the MarineNet Team and other DoD services. This is, in part, due to the learner benefits, adaptability and accreditation that has been executed to get these solutions accepted and fielded within DoD networks and Navy shipboard environments. Other Marine Corps organizations are interested in these components, as well. The DLRC provides a portal solution that is targeted for the deployed Marine and is proving to be a stable environment for delivering
additional custom and commercial warfighting simulations. The ECDN is fielded within the Marine Corps and makes web-enabled training content accessible to global and specific communities. The benefits of these training systems are that they enable organizations to focus on the development of enhanced training solutions, without having to also focus on developing the delivery platform for their content. There were many unexpected benefits of the MarineNet architecture. These included:

- A reduction in the preparation time for the fielding of MarineNet system components
- A reduction of required installation time on site
- An unexpected increase in the number of Marine Corps sites that are able to access MarineNet and were not on the original Fielding Plan and
- An agile architecture that can adapt to changes within the Navy / Marine Corps infrastructure and policies.

The Importance of Technology

Technology has remained an integral part of the MarineNet system and has been the enabler of the organizational vision. The MarineNet architecture is reliant upon emergent and innovative incorporation of technology for the purpose of increasing Marine training opportunities. Beginning with a limited pilot in 1996 to prove the value of web-based training within the Marine Corps, to today's global enterprise architecture answering training needs at home, in garrison or on deployment, technology has been a key factor in the MarineNet architecture. Whether the challenge lies within developing a solution for expanding MarineNet into the deployed environment or enabling training access from home, SCRD has conducted the requisite technology reviews and insertions needed to comply with Program requirements, DoD and Marine Corps policies and the betterment of services and functionality. Paramount to each of these technology solutions was the ability for these solutions to augment each other, improve MarineNet and use commonly available technologies. These include the communication channels used to exchange information between components and between MarineNet and other systems. Perhaps the most notable role technology has played within our project lies within the ability to create the infrastructure that has grown into MarineNet today. If it was not for the technology of the Enterprise Content Delivery Network, we would not have been able to realize a global architecture that, at its core, is a centrally managed system that provides efficiency of courseware delivery, enhanced configuration management and reduced fielding costs. The realization of the ECDN technology enabled these benefits to be realized and have contributed to the growth of MarineNet. The technologies enveloped by MarineNet have resulted in original solutions that have been purposefully developed to enhance the Marines' learning experience. These solutions include the ECDN, DLRC and TECOM Classroom, and the resulting communication infrastructure to support these solutions.

Originality

The Deploable Learning Resource Center (DLRC) is the solution within MarineNet that provides Marines with access to training and electronic courseware while they are deployed aboard ship or remote locations. The DLRC is designed to be taken into the field by Marines and, therefore, needs to adapt to the various operational modes that the Marines exist in. The
DLRC enables Marines to go on deployment for field and operational exercises and still engage in the same training and education benefits that exist in the central MarineNet system. One of the technical objectives that resulted from the SCRD based design is that the DLRC is easily re-configurable to provide maximum flexibility for the deploying unit. At the same time, the DLRC design needed to address the limited space and LAN drops available aboard ship. The DLRC can be used in any of three operational environments. To this end, SCRD designed a DLRC capability that is a self-contained scalable suite of suitcase sized ruggedized containers. Each DLRC suite consists of a server, LAN switch, router, and laptops. The server stores and distributes all electronic training courseware and hosts the necessary management tools to monitor student progress. The multimedia laptops provide individual Marines access to the courseware and content available on the DLRC server. The DLRC is unique in the fact that it will authenticate and validate users who are not known to the system at time of deployment. This means that Marines who decide to engage in training opportunities while on deployment may do so without diminished functionality. The DLRC is designed to reach back to the central NOC to exchange training records to ensure currency of information between systems.

The MarineNet DLRC is the first of its kind and is being explored for incorporation into other DoD services. Its uniqueness comes from its ability to be deployed into multiple environmental configurations without having to be rebuilt for each environment. Through simple setup changes, the DLRC is able to operate in multiple settings to include land-based, shipboard and stand-alone modes.

Deployed Shipboard - The DLRC may be deployed onboard various Navy ships such as Multi-purpose Aircraft Carrier (nuclear) and Amphibious Assault Ships. The DLRC normally will be set up in USMC spaces on the ship. Where available, the DLRC will interface with the ship's LAN providing approved users with access to the DLRC courseware. When bandwidth is available, the DLRC may access the NIPRNET and reach back to MCI for student training record updates.

Deployed Land-based - The DLRC may also be deployed with MEF units and MEUs to land-based remote deployment sites. The DLRC may be set up in fixed base facilities or at remote sites in tents. Where available, the DLRC will interface to existing MANs providing all approved users with access to the DLRC courseware. When bandwidth is available, the DLRC may access the NIPRNET and reach-back to MCI for student training record updates.

Deployed Fixed-based Sites - The DLRC may also be deployed with units to fixed-based site deployment areas. The DLRC may be set up in rooms or tent with suitable electrical power and HVAC. Where available, the DLRC will interface with a MAN providing all approved users with access to the DLRC courseware. When bandwidth is available, the DLRC will access the NIPRNET and reach back to MCI for student training record updates.

Success

MarineNet has provided key training benefits through the realization of self-paced online training. This training has enabled the Marines to take required annual and periodic training or familiarization from the convenience of the workplace or home environments. This has resulted in a diminished need to conduct troop level gatherings for the purpose of disseminating this critical training information. Given the large increase in MarineNet participation, we are able to determine that the MarineNet solution is reaching an increasing number of Marines...
MarineNet’s accomplishments can be measured by the annual review of performance factors. The following information provides a depiction of the influx of movement within the MarineNet e-learning system:

- There were 33,266 new users; a 204% increase from 2004.
- 384,203 individuals logged on to MarinNet; a 173% increase from 2004.
- A 568% increase from 2004 with 303,756 enrollments.
- 78,113 courses were launched; a 195% increase from 2004.
- 149,222 individuals completed a course which reached a 212% increase from 2004.
- E-tests submitted totaled 201,450; a 676% increase from 2004.
- MarineNet users had the option to enroll in 2,105 courses of those courses 43 were activated in 2005.
- As of 31 January 2006, 179,983 Marines and 73,898 Non-Marines have active accounts.

**Difficulty**

The MarineNet Project Team faced and addressed many obstacles from the onset of the Program. These challenges include organizational, technical and user domains. A large part of the challenge lies within mitigating changes to historical learning models.

With the advent of web-based technologies, self-paced online learning became possible within the Marine Corps. In order to move against this possibility, the Marine Corps needed to recognize this potential as a viable option for providing training. Following a successful pilot, the challenge then moved to implementing a centralized solution that met Program requirements and complied with Marine Corps and DoD network and security policies. This provided for new and unexpected challenges, as well.

Perhaps the largest challenge that we took on was with the ECDN. The challenges were a result of technologies and implementation requirements. The ECDN was required to ride upon existing Marine Corps networks and comply with the Marine Corps network security policies. The technologies used within the ECDN were not standard technologies incorporated within the Marine Corps at the time. The ECDN relied upon, at the time, non approved operating systems and a proliferation of ports for communicating information within the ECDN. Working with the ECDN vendor, we were able to successfully modify the ECDN to reduce the number of ports needed for operations and turn off operating system functions to comply with Marine Corps security policies. In working with the Marine Corps, we were able to get waivers and security measures in place to enable the activation of the MarineNet ECDN. As the Marine Corps network changed configuration management and operational structure, the ECDN needed to flex to accommodate those changes. Through the incorporation of minor software changes and hardware relocation, the ECDN was able to accommodate the network changes.
As a result of this configuration change, the MarineNet system became available to a much larger and broader operational force than originally targeted. This is the result of Marine Corps bases moving onto a single large scale network.

The benefits gained with the ECDN proved worthwhile; the key benefit being the ability to provision multimedia courseware within the DoD and Marine Corps environment.