NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

GE 4100 Collaborative Problem Solving
EMBA PROJECT REPORTS
Executive Summaries

Winter Quarter, 2007

March 2007

Professor: Dr. Roxanne Zolin

Table of Contents

Achieving Open Architecture through Application of an Open Business Model

The Surface Warfare Enterprise (SWE) seeks to implement Open Architecture (OA) in the modernization and construction of its ships and combat systems. We define OA as hardware and software built using standardized specifications, whose code and specifications are made available to the public. A truly open architecture system should be less expensive to produce and take less effort to upgrade. The SWE's efforts to date appear to have yielded little improvement in efficiencies, leading to the question:

How can the SWE more successfully implement Open Architecture?

Our objective was to inform SWE's development of a change strategy for implementing OA by:

- Comparing previous efforts to identify key factors
- Assessing stakeholders and the environment
- Identifying barriers and potential incentives

Our project provides qualitative analysis at the strategic level of implementing OA. It does not provide cost/benefit or other quantitative analysis. We conducted extensive research on OA implementation, focusing on four case studies of previous effort both within the DOD and outside. We found nine key attributes of an Open Business Model. We scored each of the case studies against the nine key attributes. We then analyzed stakeholders to determine potential barriers and incentives related to implementation of an Open Business Model.

Our research results show that OA implementation efforts that incorporated most, if not all, of the key OBM attributes were more likely to be judged as having been successful. This led us to our major conclusion that ***an Open Business Model is a prerequisite to the successful implementation of OA.***

After consideration of stakeholder positions, the paper makes the following recommendations against each of the nine common attributes designed to adopt an Open Business Model.

1. *Imperative for Change* – Create the imperative for change by reducing out-year funding for research and development.
2. *Collaboration* – Establish peer review of requirements/proposed solutions; Establish a Wikipedia-style online source for combat system software code and hardware specifications; Create an online testing resource community and divest a large portion of DoD testing from DoD agencies to contracted firms
3. *Continual Competition* – Purchase data rights to all software including source code, create repository to make available to potential competitors
4. *Multi-Source* – Make software and hardware requirements modular, compete each module to ensure multi-sourcing
5. *Small Business Presence* – Ensure small businesses are granted access to the software repository below through aggressive provider recruitment
6. *Facilitated Sharing (Repositories)* – The Wikipedia solution provides a repository available to all competitors, along with requirements and testing specifications.
7. *Functional Component Design* – Require future ships, combat systems and weapons be designed and constructed to incorporate functional components
8. *Tech Currency* – Allocate R&D funding equally across program life-cycle to allow periodic update of hardware and software.
9. *User/Customer Feedback* – Establish formal process to solicit Fleet input in all stages of capability development, production and delivery.

MARLOGCOM FLEET SUPPORT DIVISION'S PUBLICATION INVENTORY MANAGEMENT SOLUTIONS

The Fleet Support Division (FSD) at the Marine Corps Logistics Base, Albany, Georgia, houses the Publications Section, handling the technical and non-technical publication ordering, warehousing and distribution function for the Marine Corps.

Currently, the section's functions do not fully leverage current technology or business practices and divert resources from the MARLOGCOM's core competencies (receipt, store and issue of Principal End Items) resulting in large backorder quantities and unacceptable service levels.

The primary objectives are to determine the systemic causes of the backorder problem and demonstrate "before and after" performance models from both process and quantifiable inventory analysis. This includes calculating real re-order points (ROPs); re-order quantities and safety stock from historical demand data. The objectives also include helping the Publications Sections determine a new, clearly defined service level goal and providing recommendations for process-flow improvements.

The Academic framework permits only quantitative and qualitative inventory management analysis with a service-level perspective. Cost analysis/reductions are not formally addressed.

Historical data was used from the Marine Corps Publication Distribution System (MCPDS) software, and process-flow (task design) information from personnel associated with the FSD, Publications Section. Used spreadsheet analysis functions for the quantitative inventory management calculations.

The leading causes of FSD's increasing backorders and lagging customer service were found to be the absence of standardized inventory management procedures and a shortfall of FSD workforce available to prepare print requests for inventory stock.

The challenges facing FSD's Publications Section are significant. The absence of standardized inventory management methodologies and policies lead to varied customer service results. Further, despite their hard-working staff, inefficient workflow processes suffer from significant misalignment. To effect immediate improvement in backorders and associated service-level deficiencies, FSD should take the following actions:

- Implement reorder points and order quantities
- Pass non-Marine Corps PCN requisitions to the Primary Inventory Control Agency (PICA)
- Reengineer reprint process
- Hire additional supply technicians

Additionally, our team suggests further research to develop a future supply support model to enable FSD to position itself for long-term objectives.

The Enterprise of Personnel Subsistence at Naval Air Station Fallon

***Challenge*.** Determine the best method for providing food service to the fluctuating population at Naval Air Station (NAS) Fallon while balancing mission requirements, cost-wise business practices and quality of life.

***Objective/Opportunity*.**

1. Present key stakeholders with information on issues and shortfalls that encompass the unique subsistence requirements at NAS Fallon.
2. Identify options that best serve the collective interests of the Navy Enterprise and Sailors at the deck plate.

***Scope*.** The consulting team did not look for solutions based solely on individual stakeholder perspectives, but instead, sought solutions that best served the goals of the Navy Enterprise. The study did not address or analyze the viability of specific alternative vendors or venues.

***Methodology*.** The team garnered essential information from current directives, regulations, interviews, historical food service statistics and a patron survey. Potential solutions were formulated, analyzed and either accepted or rejected based on the following critical constraints: *quality of life, fiscal and labor*.

***Results/Options*.** The team formulated and analyzed seven subsistence provision options, including analysis of the status quo. By balancing quality of life concerns and cost-wise business practices, five options were eliminated. The two viable alternatives are listed below in Conclusions and Recommendations.

Results/Personnel. Sailors that reside in the Bachelor Enlisted Quarters (BEQ) that receive Rations in Kind (RIK) have subsistence requirements that are not being met. Limited galley hours prevent Sailors from utilizing the facility for all meals. Contrary to the intent of RIK, Sailors miss meals or procure them out-of-pocket.

Conclusion and Recommendations. The current outlay of the Enterprise to provide subsistence at NAS Fallon is $6.65M. To improve NAS Fallon subsistence provision, stakeholders, in the roles of providers and enablers, must utilize methods that improve Sailor choice and opportunity. Recommendations provide solutions that improve Sailor quality of life at minimal cost and merit further study. (Future study topics/options are outlined in report)

Regardless of business option, the team recommends transitioning resident Sailors to Basic Allowance for Subsistence (BAS) at an annual cost of $470,448.

1. Increase available galley hours of operation. Approximate differential cost: $120,000.
2. Retain galley and augment meal service with Navy Exchange (NEX)/Morale, Welfare and Recreation (MWR) partnership. Approximate differential cost: $0 plus start-up costs.

The capabilities of the DMTs have not been fully analyzed, and it is uncertain how well the DMTs can train to the critical skills and tasks within the Training and Readiness (T&R) matrix. As a result, the current Skill Based T&R matrix, released in January 2007, is designed without DMT input. There is an immediate need to quantify, through a comprehensive simulator study, DMT capabilities and determine if they can effectively train to the critical skills outlined in the Skill Based T&R matrix. From the simulator study, if it is shown that the DMT can effectively train to a portion of those critical skills, there is a need to integrate the DMT into the Training and Readiness matrix. Finally, there is a need to evaluate current and future increases in utilization of the DMTs with regard to overall simulator capacity. The objectives of the study are to:

1. Identify which critical skills and tasks (both tactical and non-tactical) the DMTs can effectively use to train pilots for Operational Combat.
2. Incorporate DMT events into the Skill Based T&R matrix.
3. Identify the impact of increased utilization of simulator assets on Lemoore F/A-18C simulator capacity.

The scope of the study included a comprehensive simulator based evaluation that determined which critical skills and tasks the DMT could effectively train to. The team then integrated the identified skills into the new F/A-18 Skill Based T&R matrix. The effects of increased DMT utilization were analyzed with regard to overall NASL F/A-18C simulator capacity. While the scope of the study included only Lemoore based simulators, the results are valid for both the East and West Coast Hornet communities. The DMTs were analyzed as a "sunk cost" and no analysis was conducted regarding new investments or upgrades necessary to improve current capabilities.

DMT T&R matrix Study

The methodology utilized in the DMT study began by examining the skill / task relationship from the VFA Skill Based T&R matrix. The team determined which skills were capable of being evaluated in the DMTs. Next, task options were grouped into 23 scenarios that would analyze multiple skills in single simulator scenarios. With help from the Center of Naval Analysis (CNA) and drawing from the Wing Training Manual, the team developed surveys which were distributed to the pilots that participated in the study. Pilots were first "in-briefed" on the intent and goals of the study. After the simulator scenario was executed, the pilots involved completed the survey and graded specific skill sets executed during the scenario. CNA then analyzed the data from the hundreds of critiques and, utilizing statistical methodology, was able to divide the simulator events, via normal distribution, into three categories; "good", "fair" or "poor. Only scenarios which scored "good" in the study were considered to have "effectively trained" a particular skill set. These skill sets were then examined for inclusion into the Skill Based T&R matrix. One of three values was then allocated to each skill which could be effectively trained in the DMT. Extend periodicity (EP), effectively extends the periodicity over a specific time frame. Precursor (P), requires the skill to be performed in the simulator first in order to receive T&R credit in the aircraft. Required (R), is the preferred method to receive T&R credit.

As a result of the DMT study, the team recommends the incorporation of 11 of the 39 skills examined, into the Skill Based T&R matrix. This analysis is based on data that was collected from 30 NAS Lemoore pilots, in 92 simulator scenarios, over a 2 week period. The skills recommended for inclusion in the T&R matrix (EP, P or R) include:

1. Night Vision Devices (NVD)
2. NATOPS Proficiency / Instrument Check
3. Night Flight
4. FLIR Operations
5. Time-Sensitive-Targeting (TST)
6. Conduct Mining
7. IR/LMAV Tactics
8. GP Tactics and Delivery
9. LGB Tactics and Delivery
10. Section Air-to-Ground Employment
11. Division Air-to-Ground Employment

DMT Capacity Study

Currently, Naval Air Station Lemoore (NASL) utilizes one Tactical Operational Flight Trainer (TOFT), one Operational Flight Trainer (OFT) and four Distributed Mission Trainers (DMT). The capacity study addresses the concern of an increase in simulator utilization due to an increase of simulated T&R critical skills.

The study found that the recommended use of simulators, within the T&R Matrix, would add an additional three hours of DMT time to each pilot per year per squadron. An additional three hours would be added to newly arrived squadron pilots per year.

The proposed increase adds an additional 72 DMT hours per squadron. This increase in simulator usage yields an additional 4-5% decrease in DMT simulator capacity at 15 minutes "set-up" time and 6-7% decrease in DMT simulator capacity for a 30 minute "set-up" time.

The model indicates that currently, both the TOFT and DMTs are under the 80% baseline capacity using the 15 minute "set-up" time. However, the simulator study has proven that a 30 minute "set-up" time is more realistic and decreases current capacity to above 80%. With the inclusion of 6 simulator events into the T&R matrix, DMT capacity stays below 80% at 15 minute "down" time, but decreases close to 95% capacity for a 30 minute "set-up" time, in FY07 and FY08. Using current data, DMT capacity should improve in FY 09 and FY10 due to the arrival of a second TOFT in the 2nd QTR of FY08. Capacity is predicted to shrink, beginning in FY11, due to the VFA 106 East Coast draw-down plan. **For every DMT skill required to be executed by all squadron members, as part of the T&R matrix, DMT capacity will shrink by 1%.**

For future predictions following FY11, capacity should remain constant due to level loading in future fiscal years. These numbers are based upon the current FRS and SFWT syllabi, as well as the VFA-125 FY07 PPF Annual Submission and IPP CNATRA predictions. An increase in T&R events will increase the usage of the simulators and further shrink the current device capacity. **An increase in 1 DMT contract hour during peak NASL squadron periods will provide a 10% improvement in DMT capacity.**

Proposal for the Optimization of the Helicopter Anti-Submarine Squadron Community Fleet Replacement Pilot Curriculum

Helicopter Anti-Submarine Squadron Ten trains naval helicopter pilots, acoustic sensor operators, and rescue swimmers in the SH-60 “Foxtrot” helicopter. Category I Fleet Replacement Pilots (FRPs) are pilots who have never flown the H-60 nor served in an operational fleet command;. HS-10 needed to ensure that its training provided a solid foundation of flying and tactical skills which would prepare CAT I FRP’s for missions to be encountered in the fleet. Past curriculum reviews were conducted at standard intervals, but were generally a tool to update and align training with newly introduced tactics and technology, and did not factor-in the fundamental skill sets required of the end product.

The objective of the project was to define the required skills for a CAT I FRP, determine which graded items contributed towards these objectives, adjust the syllabus to meet these objectives, while constrained by current flight hours and total number of events in the syllabus.

To do this, every discussion item or flight maneuver on each flight event was assigned a value based on whether it met established core requirements for FRP’s to be NATOPS qualified, SAR current, and ACTC level 1 complete.

Based on this and data obtained from Fleet feedback it was determined that several areas were consuming precious flight time, while more time was needed conducting tactical training.

The results and conclusions of the project include the data-supported identification of maneuvers recommended for elimination, reduced emphasis, and in some cases increased emphasis to optimize the FRP curriculum.

The Implementation of Unique Identification/Radio Frequency Identification

Recent Deputy Assistant Secretary of the Navy – Logistics (DASN-L) policy requires Navy acquisition activities implement Unique Identification (UID) markings for all procurements over a specified item unit price of $5,000 or more and for all items that are centrally managed. The directive states that contract clauses for UID markings will be incorporated into all new procurement contracts beginning January 2004 and individual program offices are to develop a plan to implement UID on all previously fielded legacy equipment. Additionally, DASN-L policy states that Radio Frequency Identification (RFID) "tagging" will be implemented on all end item equipment and shipping containers beginning in January 2005.

While this policy is widely known, there aren't any current military implementations, plans or funding available to set-up or manage a UID/ RFID program at the appropriate level to support the required data collection, recording and management once the marked items are delivered from the vendor and fielded to Fleet Users.

The primary objectives of this study was to describe and design a UID/RFID inventory management system, to develop a plan to introduce a fully compliant UID/RFID inventory management program, and to determine costs and necessary funding to implement the plan.

There are approximately 170 programs in the Program Executive Office, Command, Control, Communications, Computers and Intelligence Command (PEO C4I). This study is limited to the Navy's Extremely High Frequency (EHF) Satellite Program (NESP). The study is looking specifically at current inventory management processes for the NESP system. Due to the limited timeframe, this study did not address how to implement UID/RFID on fielded legacy systems (i.e., those systems that are installed on operational fleet platforms).

Based on data collection and cost analysis, PEO C4I consulting team recommends the implementation of a UID/RFID inventory management process and infrastructure for NESP inventory management. This implementation will reduce the time required for the mandated annual inventory by approximately three quarters of a work year, thereby avoiding costs of approximately $86,798 annually. The start up costs are $16,000 for this plan. Implementing a common/standardized UID/RFID approach for all programs could compound these results, providing much larger potential cost avoidance across the entire PEO C4I and Space and Naval Warfare (SPAWAR) claimancy.

MH-60R ACTC Level 200 Curriculum

MH-60R ACTC provides a squadron level training program designed to promote standardization post-Fleet Readiness Squadron (FRS) tactical training, increase unit combat readiness, and achieve efficiencies in training. It is also designed to provide Commanding Officers with the necessary metrics to make an objective assessment of squadron aircrew tactical performance levels. To date, there has been a limited opportunity for aircrews to utilize the MH-60R in a tactical environment. The advanced capabilities of the MH-60R paired with limited aircrew experience poses potential barriers to developing a comprehensive advanced tactical curriculum.

The objectives of this project were to develop the overall architecture of the MH-60R ACTC curriculum, determine the most effective and efficient advanced training method, apply that and develop the 200 level specific syllabus, meanwhile initiate a cooperative team with Delex System, Inc to start ground work on Computer Based Training (CBT) lessons. This study was conducted to develop a comprehensive 200 Level curriculum in order to facilitate the ACTC program to provide a sound foundation in tactical knowledge. This study also provided a guideline for how higher levels should be designed. In completing this project our scope was limited to only developing the 200 level specific curriculums and we merely addressed the foundation of the 300 and 400 level training architecture. Methodology used for this study included using existing curriculums from the air wing to see which aspects apply to the MH-60R, applying information from experiences MH-60R aircrew members to make 200 Level training the best possible and most cost efficient, and finally getting applicable information to Delex Systems, Inc. to develop courseware that is both efficient and informative for advanced tactical aircrew training.

At the beginning of the project we collected and analyzed the existing ACTC curriculums from the HSC and HSL communities. From the existing documents we selected lessons that could be utilized in the MH-60R syllabus until Delex Systems, Inc completes CBTs. We also combined the two formats into an HSM ACTC instruction. In the course of completing this project we also interviewed 23 MH-60R pilots with various amounts of training and proficiency. The interviews and questionnaires provided a user input on how to proceed with the development of the advanced tactical training. These inputs provided the time, amount, and areas of training. With a baseline 200 level syllabus developed we calculated a cost analysis for completing the training in the aircraft versus the simulator. We also compared the cost of following the DRRS hour's requirements instead of the standard 2.0 hour event. This basic cost analysis can further be used to work towards extended use of the simulators for completing the syllabus when applicable and available.

Our recommendations for the development of the curriculum is to have less then 50 hrs of CBT and tailor it to what is actually needed by a 200 level Airborne Tactical Officer (ATO). Then we recommend to shorten the 200 ACTC Level syllabuses to 3-4 months and to utilize a HCS Pilot handbook format for ACTC that includes courseware and learning objective reviews (LORs). Once the 200 Level is adjusted, the follow on qualifications need to be made with the same high standard and with a similar design. Finally when at all possible existing legacy HSL and HS courseware should be utilized for MH-60R training to supplement the LORs until Delex completes the initial specific lessons.

This project quickly became a much larger problem then previously expected. Not only was the 200 level ACTC syllabus an issue to tackle, the DRRS-N requirements along with simulator standardization all needed to be factored in when completing this project. Time,

Experience, and other programs will continue to be constraints in the development and modification of the ACTC syllabus. With continued work between HSM-41, HSM-71 and HSMWSP, the follow on training levels should be easier to outline and subsequently develop and standardize.

O-Level Lean. IMPLEMENTATION OF AIR*SpEED* TECHNIQUES IN USMC ORGANIZATIONAL LEVEL MAINTENANCE ACTIVITIES

Problem and Opportunity: Marine Aircraft Group-13's material readiness is being challenged by aging aircraft, decreasing experience levels, and increased utilization rates in support of Operation Iraqi Freedom. This, combined with steadily increasing maintenance man-hours per flight hour flown, brings into question the long-term operational viability of the AV-8B Harrier unless efficiencies can be found. Leveraging lessons learned from the Naval Aviation Enterprise AIR*Speed* program and applying those techniques at Organizational Level Maintenance activities could provide operational commanders an opportunity to address inefficiencies impacting material readiness.

Background: Great inroads have been made with AIR*Speed* implementation at Depot and Intermediate level maintenance activities but little has been done to implement these techniques at the squadron level within MAG-13. MAG-13 has an ongoing initiative for a Line-of-Sight supply (LOS) solution that addresses O-level constraints with Theory of Constraints, Lean, and 6 Sigma solutions.

Objectives:

- Provide a Cost and Operational Effectiveness Analysis (COEA) for a LOS supply solution at MAG-13
- Identify obstacles to implementing LOS
- Provide MAG-13 Commander with recommendations

Scope: The research data used in this report was limited to MAG-13, and only for the six month period 1 July - 31 December 2006. The focus of this research was on issue response times for in-stock items and measurement of cannibalization / conditional inspection hours. This project did not address broader organizational design issues or evaluate alternative solutions to LOS.

Methodology Used: Describe the current supply system, determine validity of a LOS solution and make comparisons. Gather data that will quantify potential savings for LOS and make recommendations based on conclusive evidence.

Findings: MAG-13 squadrons spent nearly 50,000 hours waiting for *in-stock* consumable items over the six month period. LOS is a low-risk solution with the potential to reduce the time waiting for consumable parts by 95%.

Recommendations and Conclusions: Fund LOS prototype in MAG-13, conduct OPEVAL and solicit DC/A and NAVAIR sponsorship for fleet implementation. Conduct further research – including Rapid Improvement Events - to address other organizational level constraints.