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E-Commerce and the Art of War

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ABSTRACT

This paper is designed to relate the rationale used by the Department of Defense, for the military to adapt the principles of e-commerce to Telemedicine, to meet increasing global crises, and to find ways to more effectively manage manpower and time. A mobile Telemedicine package has been developed by the Department of Defense (DOD) to collect and transmit near-real-time, far-forward medical data and to assess how this web-based capability enhances medical management of the battlespace. Telemedicine has been successful in resolving uncertain organizational and technological military deficiencies and in improving medical communications and information management. The deployable, mobile Teams are the centerpieces of this Telemedicine package. These teams have the capability of inserting essential networking and communications capabilities into austere theaters and establishing an immediate means for enhancing health protection, collaborative planning, situational awareness, and strategic decision-making through web-based internet applications.

Introduction to Telemedicine and Issues

Telemedicine is an approach of providing care for patients that are geographically separated from a doctor. Telemedicine allows a doctor and a patient to interact with each other using computer networks. Telemedicine, when used in military, has a potential to heal patients in the war zone where doctors may not be readily available. The U.S. national strategy for military pre-eminence is based on technological superiority. Through new discoveries in advanced science and technology, the goal of the Department of Defense (DoD) under Joint Vision 2010 (JV 2010) is to develop the ability to directly and decisively influence events ashore and at sea—anytime, anywhere —to meet current and future challenges.

To successfully counter these challenges, the DoD must continue to move forward in its effort to incorporate telemedicine into its prime mission —to keep every service member healthy and on the job, anywhere in the world, to support combat operations, as well as humanitarian, peacekeeping, and disaster relief missions.

Telemedicine supports the DoD's goal by electronically bringing the specialist to the primary provider who directly cares for service members in austere, remote, and isolated environments (Floro, Nelson, and Garshnek, 1998). Telemedicine also creates an opportunity to provide rapid, accurate diagnosis and therapeutic recommendations (Garshnek and Burkle, 1998). The end result is that telemedicine helps to maintain the health of service personnel and their ability to quickly return to duty, minimizing logistically burdensome, inconvenient, and expensive transportation to distant specialty care (Bangert, Doktor, and Warren, 1998).

For telemedicine methods to be successful, however, their operational effectiveness, suitability, and importance to the warfighters' mission must continuously be tested, evaluated, and proven (Oliver, Sheng, Paul and Chih, 1999). In 1997, the U.S. Army, in partnership with the Navy and Air Force, was tasked to develop exercises to explore the integration of advanced technologies with existing systems and architectures to meet the requirements established under JV2010.

These technologies are all aligned with the Joint Vision 2010 concepts of Dominant Maneuver, Precision Engagement, Focused Logistics and Full Dimensional Protection. The technology initiatives utilize dedicated, small mobile teams, with a sophisticated IT infrastructure, to provide telemedicine capabilities wherever they are needed in the medical battlespace (Mann, 1997).

This IT Infrastructure includes novel Medical Equipment Sets (MES) with digital capture devices such as digital cameras, digital scopes, digital blood and urine laboratories, physiological monitors, advanced digital radiography, and digital ultrasound (Perednia and Allen, 1995). Other, associated items of equipment include novel software, such as the Pacific Virtual Health Care System. This package offers electronic medical record archiving capability that enables automated, standardized tele consultation by forward medics to higher echelon physicians (Rodger and Pendharkar, 2000).

This ACTD has charged itself with operating within the concept of Focused Logistics and Full Dimensional Protection. It is, therefore, pertinent to understand just how this ACTD can accomplish its missions/objectives and meet the operational concepts of JV2010. This operationalization is embodied in the following quote. "To protect the force, the Army will rely on a technically advanced, operationally simple network of multi-component intelligence sources capable of detecting and locating forces, active and passive obstacles, in-flight aircraft, ballistic and cruise missiles and their launch sites, chemical and biological agents, electronic jamming sources and a host of still-developing threats."

One technology that is mentioned in the document that applies to this ACTD is the use of "advanced soldier technologies." It is necessary for this ACTD to fit within this concept and provide the warfighter with information that identifies, early on, those countermeasures that can be used to defeat medical threats (Dardelet, 1998). It is also important to recognize other action that may be used to defeat enemy deployment of weapons of mass destruction (WMD), especially biological agent dispersal. Focused Logistics makes only one mention of "telemedicine." "For the Army, Focused Logistics will be the fusion of logistics and information technologies, flexible and agile combat service support organizations, and new doctrinal support concepts to provide rapid crisis response to deliver precisely tailored logistics packages directly to each level of military operation." The document portrays medical support to Focused Logistics in the form of "internet triage" and "telemedicine" in order to enhance the survivability of the joint force (Zajtchuk, 1995).

Achieving 21st century medical support capability demands significant advances in the military's ability to provide force health care and medical protection and to deploy medical communications and information management in tactical operations (Institute of Medicine, 1996). The broad mission of Telemedicine in the military, is to assess advanced mobile applications that can potentially meet such demands (Paul, Pearson, and McDaniel, 1999).

US military has adapted a suite of software, databases, and architecture standards to provide deployable medical information management (Tanriverdi and Venkatraman, 1998). The Theater Medical Core Services (TMCS) is a database that stores data locally and is capable of sending encrypted e-mail to several redundant database servers via store-and-forward (Rasberry, 1998). The database servers aggregate information and store it in databases for distribution. Web servers supply data to medical personnel as customized encrypted reports.

The Medical Workstation (MeWS) is a network-based workstation equipped with portable medical devices, clinical support capabilities, medical information support, and a graphical user interface. The MeWS will support multi-patient monitoring, interface with the patient's clinical record, and provide access to a searchable database. It will also provide full Personal Information Carrier (PIC) read and write implementation. MeWS collect, store, and forward medical device data and images. By utilizing a Global Positioning System (GPS), MeWS have the capability to enter the patient's geographical location. The various software components of the MeWS help to facilitate clinical data entry, acquisition and retrieval. MeWS enable the generation of medical facility status reports, the monitoring of disease surveillance, the updating of supplies, and tracking of evacuation requirements.

The Field Medical Surveillance System (FMSS) is an expert system that systematically detects and monitors epidemiological trends and profiles patient populations. FMSS integrates patient information to the Global Infectious Disease and Epidemiology Network (GIDEON) knowledge base. Demographic and symptomatic information is used to arrive at a presumptive diagnosis or classify the patient using discriminate analysis. FMSS is also capable of providing incidence and prevalence trends for infectious diseases.

The Libretto is a commercial-off-the-shelf (COTS) hand held computer, manufactured by Toshiba. It has the capability to automate field medic PIC card software by reading service member's demographic information from the PIC into the software. It can also write GPS medical encounter information to the PIC and store the information as a pre-formatted message for transmission.

Tactical medical communications require updating of the existing IT infrastructure. The previously mentioned novel hardware, software, and interfaces were implemented in order to enable this change and facilitate the transmission of medical-unique information over the existing communications hardware and command, control, communication, computers, intelligence, surveillance, and reconnaissance (C4ISR) networks. However, telecommunications from the operational area of responsibility (AOR) to the medical sustaining base uses the existing Defense Information Systems Network (DISN).

The technologies described above have been assembled into an exportable capability that is specifically tailored to meet the medical Information Management (IM) and Information Technology (IT) needs of the unit it is supporting. This assemblage of technologies is referred to as the Capability Package. The capability package must work in concert with the unit's infrastructure, communications, tactical situation, and logistical constraints if the military is to realize its full potential in meeting today's global crises.

For such technologies to be successful, however, their operational effectiveness, suitability, and importance to the Telemedicine mission must continuously be tested, evaluated, and proven. To perform this task, the military established a Test and Evaluation Integrated Product Team (T&E-IPT) to evaluate candidate mobile models and architectures. These technologies are examined in a rigorous test and evaluation (T&E) environment with extensive user participation as a means of assessing their mobile applications. The T&E-IPT have leveraged and optimized existing communications technologies to transmit medical data. Database technologies for mobile technologies are utilized for epidemiological and trend analyses utilizing data mining of these data warehouses.

The initial concept of operations (CONOPS) was to employ a tailored Joint Task Force (JTF) to accomplish missions in controlled environment demonstrations. The first series of demonstrations, tested communication methodologies, functionality, and the field utility of collecting and sending patient data from the forward edge of the battlefield. As the information and results were obtained the CONOPS was expanded to use additional activities. These activities are as follows:

- The deployment of mobile technologies and agents, called Theater Telemedicine Teams (TTTs), to medical treatment facilities (MTFs) to establish and conduct telemedicine operations; coordinate with signal and Command, Control, Communications, Computers, and Intelligence (C4I) assets to establish and maintain tactical medical networks; receive, verify, and log Command information provided from lower echelons
- The use of advanced mobile information management models and technologies, such as software, databases, and architecture standards, that were adapted to provide deployable medical information management for advanced mobile applications
- Two radio frequency (RF) networking technologies that were enhanced for user interface design in a battlefield setting
- Modeling and simulation (M&S) capabilities provided through advanced mobile application software during training exercises.

All of these capabilities are being evaluated by the military. The goal of this approach is to first establish effective, interoperable mobile communications in the early stages of the exercises and to then implement more robust mobile database technology capabilities as the application matures. This paper will provide the following details of this advanced mobile application.

- Types of mobile technologies that were identified and tested as potential candidates for enhancing Telemedicine capabilities
- Objectives of each mobile agents in the field
- Methods and applications of these mobile technologies
- Performance results of these mobile database technologies
- Recommendations, lessons learned, and feedback received from actual mobile users

Operational Effectiveness

The effectiveness of the systems used in the exercise was demonstrated by typical users, who operated them in a realistic operational environment. The Capability Package demonstrated the ability to collect both patient encounter and Annex Q-type information; however, it did not meet the threshold values established by the Performance Integrated Product Team (P-IPT) for transmitting that information to the theater medical command. The purpose of the exercise was to move patients through the evacuation system, and most decisions that needed to be made could be made without referring to the information stored on the TMCS server. In fact, most of the decisions did not require the type of information that was reported, and therefore, the staff instead used other data. As stated in the feedback questionnaires, the Marine Expeditionary Force (MEF) and Third Fleet Surgeons neither relied on the data provided by TMCS nor trusted its timeliness or reliability.

HOLISTIC MODEL

For this project, the authors applied a holistic model to the DoD's mobile e-commerce re-engineering strategy. Strong evidence from prior case studies shows that holism offers a viable management model for successful transformation, or re-engineering (Clark, et. al., 1997). Our model consists of five interdependent components – environment, people, methodology, information technology (IT) perspective, and vision (Paper, Rodger, and Pendharkar, 2000).

Environment

Basic environmental factors that lead to structural change include top management support, risk disposition, organizational learning, compensation, information sharing, and resources (Amabile, T.M., 1997; Lynn, G.S., 1998; O'toole, J., 1999). Innovation can come from any level of an organization, but environmental change originates at the top (Paper, D. 1999; Cooper, R. and M.L. Markus, 1995). When employees actually see top managers initiating process improvement changes, they perceive that their work is noticed and that it is important to the organization (Paper, D. and S. Dickinson, 1997; Paper, 1999).
It has been argued that the fear of failure must be limited and risk taking promoted for innovation to thrive (Nemeth, C.J., 1997). Many organizations make the mistake of trying to manage uncertainty with creative projects by establishing social control; however, it is the freedom to act that provokes the desire to act (Sternberg, R.J., et.al., 1997).

The ability to learn as an organization dictates whether and how fast it will improve (Harkness, et.al., 1996). Knowledge exchange between and among teams appears to give some organizations a distinctive competitive advantage (Lynn, G.S., 1998). Learning as part of the environment enables top management to disseminate its change message to the people who do the work (Gupta, et. al;1999). Compensation has been attributed as a means of motivating employees to perform better (Pfeffer, J., 1998). Being rewarded for one's work sends the message to employees that their contributions to the organization are valued. It seems logical to conclude that people who are well compensated for risk taking, innovation, and creativity will continue that behavior (Paper, D., J. Rodger, and P. Pendharkar, 2000)

Information sharing enables people to better understand the business and what it requires to be successful (Paper, D. and S. Dickinson, 1997; Harkness, et.al., 1996). Restricting information, on the other hand, inhibits change. Resources can be viewed as a source for providing a variety of services to an organization's customers (Kangas, K., 1999). According to Barney (1991), an organization's resources can include all assets, capabilities, organizational processes, attributes, information, and knowledge that enable the organization to develop and implement strategies that improve its efficiency and effectiveness.

People

Transformation success hinges on people and their knowledge, creativity, and openness to change (Cooper, R. and M.L. Markus, 1995). Real change will not occur without mechanisms in place to help people transform processes. Such mechanisms include training and education, challenging work, teamwork, and empowerment. "Education and training is the single most powerful tool in cultural transformation." (Wong, W.Y.L., 1998) It raises people's awareness and understanding of the business and customer (Wong, W.Y.L., 1998). Training helps develop creativity, problem solving, and decision-making skills in people previously isolated from critical roles in projects that potentially impact the entire enterprise. Business education is equally important in that people need to know how the business works in order to add value to business processes (Paper, D., 1999; Paper, D. and S. Dickinson, 1997). When work is challenging, people are more motivated, satisfied, and often more productive (Hackman, et. al., 1975). Challenge allows people to see the significance of and exercise responsibility for an entire piece of work (Cummings, A. and G.R. Oldham, 1997). Challenge stimulates creativity in people and gives them a sense of accomplishment (Amabile, T.M., 1997). People cannot reach their creative potential unless they are given the freedom to do so (Pfeffer, J., 1998). Management, therefore, needs to be sensitive to and aware of their role in creating a workplace that allows people freedom to act on their ideas.

Methodology

Methodology keeps people focused on the proper tasks and activities required at a specific step of a transformation project. It acts as a rallying point for cross-functional teams, facilitators, and managers as it informs them about where the project is and where it is going (Paper, D. and S. Dickinson, 1997). It allows people to challenge existing assumptions, recognize resistance to change, and establish project buy-in (Kettinger, W.J., et. al., 1998). Of critical importance in the beginning stages is the buy-in and direction from top management, which is essential to identifying information technology opportunities, informing stakeholders, setting performance goals, and identifying BPR opportunities. Direction is important because large-scale re-engineering spans functional boundaries in which people from across the organization are involved (Paper, D., 1998).

Information Technology (IT) Perspective

The perspective of IT professionals toward change is critical because technology implementation is an organizational intervention (Markus, M.L. and Benjamin, R.I., 1996). As such, IT can either strengthen or weaken an organization's competitiveness (Kangas, 1999). As introduced by Markus and Benjamin (1996), the three fundamental models of IT change agentry are traditional, facilitator, and advocate. Each model offers the dominant belief system or perspective of IT professionals toward the goals and means of work that shape what they do and how they do it. IT professionals with the traditional perspective believe that technology causes change. IT professionals with the facilitator perspective believe that people create change. IT professionals with the advocate perspective also believe that people create change. However, they believe that the advocate and the team are responsible for change and performance improvements. The facilitator perspective best characterizes the philosophy adopted at the DOD Telemedicine project.

Consistent with the change-agentry theory, IT perspective is categorized rather than measured. IT perspective cannot really be measured because one has one belief system or another. The facilitator perspective views change as influenced by the people who do the work. Managers facilitate and guide the process.

However, they do not control the process in any way. People control the processes, set their own goals, and are responsible for the consequences. However, managers share goal-setting tasks with the group, champion the effort, and are jointly responsible for the consequences. Mata, et.al.'s (1995) findings reinforce the facilitator model, and suggest that two factors effectively contribute to an organization's competitive advantage: 1.) Developing methods for strategy generation involving information resources management that emphasizes and enforces the learning of these skills across the entire organization and 2.) Developing shared goals within the entire organization. This facilitator attitude toward common business processes and systems has been adopted by many organizations, including General Motors (Schneberger and Krajewski, 1999).

Transformation (Change) Vision

Vision offers a means of communicating the re-engineering philosophy to the entire organization and to push strategic objectives down through the process level and align the project with business goals. If the change vision is holistic, work is viewed as part of the whole system (Teng, T.C., et. al., 1998). The underlying goal of a holistic change vision is to align employee goals with those of the organization and vice versa (Drucker, P.F., 1989). Change management, however, is very difficult because people tend to react negatively to it (Topchick, G.S., 1998). Hence, a top-down vision is imperative because it helps people understand the reasons for change. If people believe that change will benefit them or the organization, negativity is reduced. Top management has in its power the ability to influence how the organization perceives environment, people, IT, and methodology.

The vision can help open communication channels between IT and top management. One cannot be successful without frequent interactions between top management and IT change advocates (Markus, M.L. and Benjamin, R.I., 1996). Open communication can help inform top management of political obstacles, training issues, and budget problems before they stymie the project. It can also help top management disseminate information about the business and BPR progress across the organization. The more informed people are about the business, the better they feel about what they do. It is well known that organizations need information in order to compete (Ives and Jarvenpaa, 1993). The source for the following comments is the briefing Army Vision 2010. (Briefing is on the web at URL www.army.mil/2010/introduction.htm). This document and the efforts underway to achieve its objectives shape the Army's vision for the year 2010 and beyond. In the aggregate, the Army is seeking to "lighten up the heavy forces" and to "heavy up the capabilities of the light forces." From mission receipt through deployment, operations and transition to follow-on operations, Army elements will execute their responsibilities through a deliberate set of patterns of operation. These patterns are:

- ***Project the Force,***
- ***Protect the Force,***
- ***Shape the Battlespace,***
- ***Decisive Operations,***
- ***Sustain the Force,***
- ***and Gain Information Dominance.***

These patterns are all aligned with the Joint Vision 2010 concepts of Dominant Maneuver, Precision Engagement, Focused Logistics and Full Dimensional Protection, and illustrated in the Figure 1 in the appendix. The technology initiatives utilize dedicated, small mobile teams, with a sophisticated IT infrastructure, to provide telemedicine capabilities wherever they are needed in the medical battlespace (Mann, 1997). This IT Infrastructure includes novel Medical Equipment Sets (MES) with digital capture devices such as digital cameras, digital scopes, digital blood and urine laboratories, physiological monitors, advanced digital radiography, and digital ultrasound (Perednia and Allen, 1995). Other, associated items of equipment include novel software, such as the Pacific Virtual Health Care System. This package offers electronic medical record archiving capability that enables automated, standardized teleconsultation by forward medics to higher echelon physicians.

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- capture the data
- see the data
- use the data
- use decision tools to plan and prioritize
- model and simulate,
- utilize the GSSS strategy to accomplish the above.

That strategy is to develop the hardware, software, database, and network solutions that impact the computer-based patient record, medical threat identification, and command and control of medical units. This will be accomplished through management of information and information technologies, deployed throughout the battlespace. Most logisticians consider medical under their purview. Therefore, logistics organizations will be streamlined and "right-sized" to allow the delivery of service in a balance between "just in time" and "just in case = just enough." The operatives in the impact of Focused Logistics are "reduced footprint" and "tailoring on the fly" of units. This will provide for rapid crisis response, the trackin g and shifting of assets while en route, and the delivery of tailored logistics packages and sustainment directly at the operational and tactical levels of operation. The JMO-T ACTD will tailor forces using novel Modeling and Simulation packages. The GCSS Strategy is shown in Figure 3. The most important facet of all of the JV2010 concepts is that the enablers and technologies will empower soldiers and not replace them. The enablers listed for Focused Logistics are germane to this ACTD as well. These are:

- Integrated Maneuver & Combat Service Support Systems Command and Control
- Total Asset Visibility
- Modular Organization
- Movement Tracking System

Wireless Information Management Systems

Conclusions

Testing and evaluation of the JMO-T ACTD have produced tangible evidence for the military utility of telemedicine. Results from Demonstration I indicate that the essential data collection and dissemination requirements of JMO-T can be met consistently, reliably, and cost effectively.

The ACTD promises the potential to demonstrate technology-enhanced data collection and dissemination of information through the use of quality software and robust communications infrastructure. Through its efforts, the JMO-T ACTD has developed a consistent pattern of progression. From an initial state of uncoordinated, service-unique solutions to the building of an overall architectural framework, this architectural solution is being developed and refined by several different concepts. These concepts have been and will continue to be assessed for operational and technical feasibility throughout Demonstration II, which begins with Cobra Gold in April–May 2000 and FOAL Eagle in the Fall. The results from these operational and technical assessments will ultimately lead to the develo pment and insertion of an emerging JMO-T architecture, which will encompass the "run" phase of the JMO-T ACTD.

LESSONS LEARNED

Our re-engineering project with mobile telemedicine provided many insights into how the military actually deals with BPR on an enterprise-wide basis. The project uncovered the ideological methodologies used to guide BPR efforts and the technologies used to help implement mobile e-commerce applications for telemedicine. The military radically redesigned T&E processes to improve overall performance. At the same time, they used technology and data warehouse methods to decentralize data management for increased information sharing, easier access data by those who need it, and more timely delivery of data, products, and services. Thus, their BPR strategy uses an approach to process improvement with information technology and mobile e-commerce applications as a complementary support mechanism.

It is realized that JMO-T ACTD must continue to provide telemedicine service to its military personnel, improve strategic awareness of the battlespace, and provide excellent information services to commanders and end-users during times of both peace and war. The literature in BPR has not helped us in this regard. In addition, it provides little insight into the complexities of dealing with military re-engineering and information re-engineering simultaneously. Each branch of the armed forces has a different set of problems to deal with. Books and periodicals can only provide basic ideas; therefore, we believe that we must develop our own methodology for dealing with change and process improvement.

LESSON ONE

Military commanders, such as the CINC, should be knowledgeable and interact with the operations of JMO-T ACTD. The T&E members believe that all of the functional areas have a hands-on approach to IT. JMO-T ACTD used IT to redefine its business processes and adopt mobile e-commerce principles to telemedicine. They found that it is much easier to teach the CINC and top military commanders the fundamentals of technology than it is to teach technology people about strategic management of the battlespace. In addition, JMO-T ACTD also serves the medical needs of the military's internal personnel.

LESSON TWO

If business processes are dependent on timely, accurate, and complete information, business re-engineering should be approached with a strategy that includes information re-engineering. In the contemporary military environment, information is especially important because it is very information intensive; hence, T&E choose a dual strategy of business and information re-engineering as JMO-T ACTD's ideological approach to BPR.

LESSON THREE

BPR should be adopted based on a military need and not because "everyone else is doing it." T&E chose to redesign JMO-T ACTD processes because they were concerned about JMO-T ACTD's reputation with the top military commanders and the Senate Committees that fund their operations. Before re-engineering, no method for tracking soldier's medical care in the field or during medical evacuation existed. The costs associated with medical evacuations was prohibitive, both in terms of lives and money. Reengineering the process through JMO-T ACTDs adoption of mobile e-commerce technologies, allows for on site medical treatment without the fear of helicopter medical evacuations under enemy fire and/or during poor weather conditions. Medical evacuations lead to a long cycle time from receipt of the wounded in the field until they could reach proper medical care. Long cycle times translate into increased mortality and morbidity for military personnel. Because JMO-T ACTD allows "real time" treatment, T&E feels that telemedicine and mobile e-commerce technologies provides an edge for treating casualities. T&E believes that BPR has given the military that edge by decreasing cycle times and improving information sharing.

LESSON FOUR

T&E believes that JMO-T ACTD must develop an independent JTF capability package in order to lead the IT re-engineering effort. JMO-T ACTD clients are the entire military. Because the IT capability package manages information flow throughout the military battlespace, it must be able to work with military commanders and end-users to "show them the way." In other words, IT people in the JTF a data view of the entire military organization. They know how the information is distributed to all departments and operational areas and are in an ideal position to work with information users as changes in business processes occur. This is a full-time job that requires individuals who are dedicated to carrying out this mission.

LESSON FIVE

We feel that BPR projects require support from top commanders and those involved along the process path, to succeed. If top military management does not visibly support the BPR effort of JMO-T ACTD, politics will destroy the project. Most people are afraid of change, and given the opportunity to resist change, many will do just that. Moreover, changing the way that business is conducted will not be tolerated without top-level approval because top military officials are in charge. T&E believes that if those involved in the process are not part of the project, they will resist changes and most likely sabotage the BPR effort. After all, they are the ones who will most likely be affected by these changes.

LESSON SIX

T&E found that very few military personnel or officers know the overall military operational process; however, T&E believes that the JTF capability package must support an innovative approach to telemedicine improvement projects if it to serve all members of the military. T&E concluded, therefore, that top military management should form a JTF department and help it to gain knowledge about the military operations that it serves. The best strategy is to assign top military officers into the JTF department to add operational and strategic knowledge and experience.

LESSON SEVEN

T&E believes that it is important to choose a project that must work, so that its success can be sold to the rest of the company. Success is hard to resist. If a project is very successful, it will be much easier to get other departments and operational areas involved in BPR. Because the JMO-T ACTD project worked, it allowed the military to decentralize its information processing. Medical information processing was taking too long and negatively impacting soldier well-being; therefore, T&E took action and decided to embark on a major BPR project to rethink the existing medical information and inventory system and to decentralize medical treatment in the battlespace. This was a critical process and a risky venture, but the military had no choice. The JMO-T ACTD project succeeded because the potential for excellent results far outweighed the risk.

DISCUSSION AND CONCLUSIONS

This research focused on developing a holistic model of transformation. The model synthesizes current thinking on transformation into a holistic model and also explains the integrative influence of vision on the other four components of the model. The model was tested by T&E on the JMO-T ACTD. JMO-T ACTD has developed a very successful training program and is very aware of the importance of planned change. Top military officials are actively involved in change and are committed to people development through learning. The model served an applied purpose by allowing us to see how well the military organization fit current theory. The model also fit a theoretical purpose by organizing a holistic, comprehensive framework. Accordingly, we have organized and synthesized the literature into five interrelated components that act as a fundamental guide for research. The model also helped us to identify a theoretical link and apply it to the internal operations of mobile e-commerce and telemedicine in the military.

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The views expressed in this paper are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of the Navy, Department of Defense, or the U.S. Government.

APPENDIX-ACRONYMS

ACTD	Advanced Concept Technology Demonstration
AE	Aeromedical Evacuation
AEF	Air Expeditionary Force
AELT	Aeromedical Evacuation Liaison Team
AFB	Air Force Base
AFFOR	Air Force Forces
ALE	Automatic Link Establishment
AMC	Air Mobility Command
AoA	Analysis of Alternatives
AOR	Area of Responsibility
ARFOR	Army Forces
ASMB	Area Support Medical Battalion
ASTS	Air Medical Staging Squadron
ATH	Air Transportable Hospital
BAS	Battalion Aid Station
BDU	Battle Dress Utilities
CG-1	KB Prime
CIA	Care in the Air
CINC	Commander-in-Chief
CJTF	Commander Joint Task Force
COA	Course of Action
COI	Critical Operational Issue
COIC	Critical Operational Issues Criteria
CONOPS	Concept of Operations
COP	Common Operating Picture
COTS	Commercial-off-the-shelf
CPX	Command Post Exercise
CRTS	Casualty Receiving Treatment Ships
CSH	Combat Support Hospital
CSI	Command System, Incorporated
CSS	Combat Service Support
C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
DAMA	Demand Assigned Multiple Access
DC	Direct Current
DC II	Desert Care II
DEPMEDS	Deployable Medical Systems
DNBI	Diseases and Non-Battle Injuries
DoD	Department of Defense
DII COE	Defense Information Infrastructure, Common Operating Environment

ECOC	Enhanced Combat Operations Center
E-IPT	Engineering Integrated Product Team
ELB	Extending the Littoral Battlespace
EMEDS	Expeditionary Medical Service
EMT	Emergency Medical Treatment
ENT	Ear, Nose, and Throat
EUT	End User Terminal
FBE-E	Fleet Battle Experiment - Echo
FH	Fleet/Field Hospital
FMSS	Field Medical Surveillance System
FSMC	Forward Support Medical Company
FST	Forward Surgical Team
FTP	File Transfer Protocol
FTX	Field Training Exercise
FY	Fiscal Year
GICOD	Good Idea Cut-Off Date
GOTS	Government-off-the-shelf
GPS	Global Positioning System
GUI	Graphical User Interface
HF	High Frequency
HM	Hospital Corpsman
HMMWV	High-Mobility Multipurpose Wheeled Vehicle
HQ	Headquarters
ICU	Intensive Care Unit
IM	Information Management
INMARSAT	International Maritime Satellite
IPT	Integrated Product Team
ISDN	Integrated Services Digital Network
JHSS	Joint Health Service Support
JINC	Joint Internet Controller
JMedSAF	Joint Medical Semi-Automated Forces
JMeWS	Joint Medical Workstation
JMO-T	Joint Medical Operations-Telemedicine
JSIMS	Joint Simulation Systems Acquisition Program
JTF	Joint Task Force
JTTP	Joint Tactics, Techniques, and Procedures
JV 2010	Joint Vision 2010
kb	kilobyte
Kbps	Kilobytes per second
KB 99	Kernel Blitz 99
LAN	Local Area Network
LDET	Lightweight Data Entry Tool
MARFOR	Marine Forces
MASF	Mobile Air Staging Facility
MB	Megabyte
Mbps	Million bits per second
MCM	Military Command
MEDEVAC	Medical Evacuation
MEF	Marine Expeditionary Force
MES	Medical Equipment Sets
MeWS	Medical Workstation
MHS	Military Health System
MHz	Megahertz
MIEP	Medical Information Engineering Prototype
MILNET	Military Network
mm	millimeters

MMS	Medical Messaging Service
MOE	Measures of Effectiveness
MOP	Measures of Performance
MTF	Medical Treatment Facility
M&S	Modeling and Simulation
MSEL	Master Scenario Events List
M3B	Mobile Medical Monitor (B)
NAVFOR	Navy Forces
NIPRNET	Unclassified Internet Protocol Router Network
NRL	Naval Research Lab
OR	Operating Room
OTH	Over-the-Horizon
PACOM	Pacific Command
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PIC	Personal Information Carrier
P-IPT	Performance Integrated Product Team
PROFIS	Professional Filler System
PM 99	Patriot Medstar 99
PW 99	Pacific Warrior 99
RF	Radio Frequency
RFTA	Reserve Forces Training Area
SAIC	Science Applications International Corporation
SATCOM	Satellite Communications
SC	Surgical Company
SINCGARS	Single-Channel Ground and Airborne Radio System
SPAWAR	Space and Warfare
SSC SD	Systems Center, San Diego
STP	Shock Trauma Platoon
TAMC	Tripler Army Medical Center
TCAS	Team Care Automation System
TCEA	Theater Clinical Encounter Application
TCP/IP	Transmission Control Protocol/Internet Protocol
T&E	Test and Evaluation
T&E-IPT	Test and Evaluation Integrated Product Team
TMCS	Theater Medical Core Services
TMIP	Theater Medical Information Program
TTT	Theater Telemedicine Team
T2P2	Theater Telemedicine Prototype Program
UHF	Ultra-high frequency
USAF	U.S. Air Force
USFK	U.S. Forces, Korea
UW	Urban Warrior
VHF	Very High Frequency
VTC	Video Teleconference