Leadership Based Structure Improves Performance

by

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ABSTRACT

The U.S. Army Medical Command has been testing a leadership based structure to increase the performance of delivering construction and facility services in its system of $600M of construction and 26 major hospital facilities in the U.S. The organizational requirement was to minimize the management and oversight of contractors and simultaneously increase project performance. The research proposes that a leadership based structure can supplement the perception, preplanning, and risk minimization capability of a contractor's project manager, thus increasing the project performance (on time, within budget, and meeting expectations) and decreasing client management requirement. The projects were delivered in a best value and low price environment. The major impact of this research was that proactive management by contractors was more effective than traditional management such as direction, control, and inspection by client's professional representatives. The results based on data collection and date analyses validated that a leadership based structure can increase the performance of an organization and reduce its management requirement.

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Introduction

Construction Industry

The construction industry has had performance issues for the past twenty years (Butler, 2002; CIB, 2003; Egan, 1998; Herbsman et al., 1992; Russell, 1991). Construction projects have reported a high degree of risk; not being on time, not within budget, and not meeting the expectations of the client (CMAA, 2004; Post, 1998). Efforts to improve performance have included lean construction, partnering, construction management, and supply chain management (Sullivan et al., 2005). Another solution has been to implement increased project management (PM), direction, and control (Hwang & Liang, 2005; Gordon & Akinci, 2007; Cottrell, 2006). The solution, however, is not theoretically defendable, and has not produced evidence that it is capable of minimizing construction risk (Buckshon, 2007; ENR, 2005; ENR, 2006).

Importance of Leadership over Management

Since leadership has the ability to increase productivity, efficiency, and performance (Collins, 2001; Liker, 2004) which comes off smart thinking and vision, the construction industry is spending significant amount of money on research for creating successful leadership programs and trainings (Crain, 2007; MIT, 2003). Employees are pushed by the employers for leadership trainings and seminars (Toor, Ofori, 2008). There is a general agreement in the literature on four factors that covers the components of authentic leadership: balanced

processing, internalized moral perspective, rational transparency and self-awareness (Avolio et al., 2009). A survey of the American Council of Engineering Companies revealed that very few people view consulting engineers as community leaders while a large percentage of correspondents perceived them as technical consultants (Russell, Stouffler, 2003).

Leadership is about putting right people in right spot. It is about alignment of resources which can only be done if the leader is visionary (Olds, 2005).

Project Management Tools

The success of a construction project depends on a number of factors, such as project complexity, contractual arrangements, and relationships between project participants, the competency of project managers, and the abilities of key project members (Baker et at., 1983; Chua et at., 1999; Mohsini et al., 1992; Jaselskis et al., 1991). The majority of existing project performance measurement tools focusing on financial aspects such as the return on investment and profit per unit (Sanger, 1998) argue that financial parameters are useful, but there are inadequacies, such as lagging metrics (Boynton, Zmund, 1984; Ghalayini, Noble, 1996), a lack of strategic focus, and a failure to provide data on quality, relationships, and the environment (Hayes, Wheelwright, Clark, 1998; Johnson, Kaplan, 1987; Neely, 1999).

Role of a Contractor Project Manager

The most critical component in the traditional project management structure is the Project Manager (PM) (Sutterfield, Friday, 2007). The organization relies on the expertise, experience, and talent of the project manager to ensure high performance. Traditionally the project manager is responsible to:

- Create project schedule and milestones
- Create solutions and make decisions on critical issues
- Management of risk
- Supervise and direct the outsourced vendor
- Manage and document contract modifications (including change in specifications, scope adjustment, etc.)
- Coordination between the vendor and the clients (Sutterfield, Friday, 2007)

The above responsibilities are very demanding and effort seeking. In many cases the PM is also assisted by consultants, financial and legal advisers, additional workers, etc (Kashiwagi et al., 2008). PM's have also taken advantage of the advancements in technology and have complex scheduling and risk management programs to assist them in their roles (Kashiwagi et al., 2008).

Despite the assistance of project management on outsourced projects, organizations are still experiencing the following problems with outsourced services (Labrosse, 2007; Bresnen, 2007; Alaghbari and Kadir, 2007):

- Organizations are finding it difficult to relay their expectations and needs to the outsourced vendor.

- Services and goods received from outsourcing vendors are not satisfactory.
- It is becoming more difficult to find trained and experienced project managers that can instruct, direct, and supervise vendors.
- Problems are not identified until the project is in critical condition.
- There is a perceived inability to work and negotiate with the outsourced vendor.
- As organizations find themselves outsourcing more of their functions it has become increasingly imperative to find ways to increase project performance and minimize transaction costs.

US Army Medical Command/Problem Statement

US Army Medical Command (MEDCOM) facilities/construction group is a large organization, responsible for 26 different sites, and interfacing with many different organizations (COE procurement offices, Medical Command operations, and local post operations). MEDCOM is also located in three different continents. It serves over 5 million soldiers (active, retired, and their relatives) (active, retired, and their relatives) and civilian employees (U.S. Army Medical Department 2008). The organization deals with 250 plus projects with a scope of $600 million each fiscal year.

Hospital renovation projects are complicated due to numerous external factors that impact construction. On account of the critical nature of the function of the building, it is the objective of hospital construction and facility management groups to keep facilities maintained and operational during

renovations, with minimal impact to the patients and visitors. The ability to deliver a finished product on schedule and within budget plays an essential role in the stability and continuance of the building's operation (Kashiwagi et al., 2009). Despite these realities, the historical performance of hospital construction (new & renovation projects) has been very poor, with over 40 percent of recently completed projects exceeding their original schedule and budget goals (Carpenter 2008). MEDCOM has been facing similar issues as the other hospital construction industry.

The United States Army Medical Command (MEDCOM) has been facing problems pertaining to the overall performance of their organization in terms of on time, within budget and customer satisfaction (Kashiwagi et al., 2009). It is hard for MEDCOM to cope up with the growing requirements and limited resources. Under such circumstances they need a more efficient system as the resources are fixed. Also there is unnecessary management, control and direction. The organization requirement is to minimize the management and oversight of contractors and simultaneously increase the project performance (Kashiwagi et al., 2009).

Proposed Leadership Based Structure

Performance information risk management system (PIRMS) is a leadership based risk management system that utilizes leadership principles and processes to minimize the need of management/direction/control in an organization (Kashiwagi et al., 2009). It forces participants to take accountability

for their responsibilities. It also ensures pre-planning and risk mitigation before the project begins which carries on during the project. The advantages of using PIRMS are high customer satisfaction and high quality of work with minimal resources utilized (Kashiwagi et al., 2009).PIRMS is capable to increase the efficiency and productivity of an organization through the following:

- Aligning people and resources
- Transfer the risk and control to the experts which are vendors in this case
- Creating accountability
- Creating simple performance measurements
- Minimize client decision making.

The PIRMS process has three main tools:

1. Risk Management plan (RMP) – A document that identifies all risks that the contractor does not control, client concerns, and identifies how they will minimize the risk/concerns before the project begins.
2. Weekly Risk Report (WRR) – An excel spreadsheet that tracks any deviations to the original project cost, schedule, and quality expectations, throughout the project, through the documentation of risks.
3. Director's Report (DR) – The DR is an advanced excel sheet which compiles all the information from the weekly reports. It is able to report the performance of the overall system to the performance of each individual component (Kashiwagi, et al., 2009).

Hypothesis

Implementing PIRMS, in the U.S. Army Medical Command (MEDCOM) will result in increased performance by minimizing risk and increasing pre-planning on projects.

Methodology

Methodology is explained as under:

- PIRMS will be implemented in MEDCOM such that every project will have a risk management plan and weekly risk report. Risk Management plan will enforce pre-planning before the project start and weekly risk report will ensure risk mitigation throughout the project.
- Overall performance and individual performance numbers will be generated every week using the director's report. Performance information will be circulated throughout the organization, thus creating a transparent system.
- Project deviations will be compared over time in terms of on-time (days), within budget ($) and customer satisfaction to measure the overall performance change.
- Risk resolving time and number of risks will be compared over time to show the variation in accountability within the organization. An increase in accountability will enforce alignment of people and resources thus minimizing decision making.
- Time and cost of owner personnel will be measured over time to determine the level of management and control.

- Further, contractor and owner representatives will be surveyed to measure the overall satisfaction of the traditional management system and PIRMS.

Summary

This research documents that there is sufficient evidence to validate the hypothesis that a leadership based structure has the ability to improve performance of an organization. The methodology and data validation is further explained in the following chapters:

- Chapter 2 summarizes an extensive research on the current construction industry structure, its inefficiencies and the solutions being implemented to fix the inefficiencies. It also presents a comparison study between leadership based environment and management based environment.
- Chapter 3 explains the hypothesis of this research. It details out the case study, US army medical command (MEDCOM) and its organizational problems. It focuses on the theoretical aspect of PIRMS and its application in MEDCOM.
- Chapter 4 demonstrates the methodology of the research.
- Chapter 5 offers data analysis and results.
- Chapter 6 presents the conclusions, potential research opportunities and future recommendations.

Chapter 2

Literature Review

Current Construction Industry

Construction industry is plagued by numerous problems and issues today, resulting in low efficiency and inappropriate use of resources. Consequently, there are prolonged construction schedules, broken budgets and low customer satisfaction. Overall efficiency and productivity of construction as a whole has reduced in the last few years. (Georgy, 2005; Bernstein, 2003).

Construction industry is one of the most important industries for United States. It has a large contribution to gross domestic product (GDP) of nearly about 8.2% (Simonson, 2007). Construction industry is the second largest employer in the nation only to the U.S. Government, which includes the Armed Forces (Engineering Technology, 2004).

These numbers well define the fact that construction industry is an integral part of the country's progress; however, ironically, failure of the industry is also second highest as construction companies have a bankruptcy rate of 95 %. Surveys and studies indicate that between one-third and one-half of all projects are over budget or behind schedule and that more than one-third of owners of major new projects are involved in arbitration or litigation of contract claims. Almost three-quarters (72 percent) growth has been seen in the number of change orders (Molenaar, 2003).

Decreased Profit Margins

Based off of the latest construction BizStat report (2004), the total revenue for the Top 500 construction companies has fallen from $50.11 billion to $49.18 billion – down 1.8 percent from 2002. The IRS data showed that while the 624,000 corporations in construction had a net income of $32.5 billion, only 60 percent made profits. The averaged net margin was 1.7 percent and the average return on assets was at 5.1 percent. 15 percent of General building contractors failed or had a negative income (BizStats, 2002).

Failing Construction Companies

Every year, thousands of contractors, whether in business for two years or 20 years, face bankruptcy and business failure, leaving behind unfinished private and public construction projects. During 2005-2006, only 60% of the contractors were printable, 20% broke even, and 20% had negative net income. This reflects a poorly structured, inefficient environment, despite the abundance of available work (AGC, 2006). BLS, AGC and ENR report 79,000 start ups 81,000 failures in a single year. Construction companies fail faster from start-up to collapse of any other industry.

Customer Satisfaction Decreasing/Poor Quality Construction

In 2003, disbursement for poor and unfinished work increased by 28 percent, with the average disbursement being $9,600 - $4.8 million total. Although contractor licenses only increased by 3.6 percent, complaints rose 6.5 percent (Armendariz, 2004).

A survey by ENR in 2001 showed that although 96 percent of contractors claimed their project was a success, 42 percent of all projects were completed late, with 33 percent over budget. 13 percent ended with pending litigation. Post summed up (2001), "The overall quality of construction has deteriorated somewhat in the past 10 years and greatly in the past 25." The quality deficiency reflected in these statistics is not confined to the United States alone. All over the world, countries are struggling with the quality of construction that is being offered as acceptable. A survey executed by The British Property Federation revealed that (Egan, 1998) 1) "More than a third of major clients are dissatisfied with contractors' performance in keeping to the quoted price and to time, resolving defects, and delivering a final product of the required quality," and 2) "More than a third of major clients are dissatisfied with consultants' performance in coordinating teams, in design and innovation, in providing a speedy and reliable service and in providing value for money." This is a prevalent problem that is being addressed by organizations, task groups and conferences throughout the world (CIB, 2006).

Increasing Legal Issues

In an Engineering News Record survey, 13 percent of completed projects were on hold, waiting for the completion of claims and litigation (Post, 2001). As stated by one representative, "The sad and hard truth is that the bidding-and-building process in the U.S. has been corrupted by the manipulative practices of all the participants. Unfortunately, the last phase of most major or otherwise

complex construction projects has not been completion, but litigation" (Shearer, 2000).

Lack of Qualified People

The lack of skilled labor has been identified as the construction industry's most serious short-term problem and most "daunting challenge" (NDU, 2005). There is an insufficient amount of people attracted to the construction fields as there is insufficient incentive to remain in the construction industry. This shortage is only expected to increase over the next ten years (Winston and Scott, 2004). "A Construction Industry Institute study shows that 75 percent of contractors are experiencing labor shortage on schedule, and even on some complete crews; apprentices now make up the majority of workers. Home builders alone are reporting that it takes 3-6 weeks longer to build a house" (NDU, 2005).

The shortage of skilled labor, including craftsmen, engineers, and managers, is the most daunting challenge to the construction industry. As per the Bureau of Labor Statistics 2005, construction industry needs to recruit and train 240,000 workers each year, in contrast to current 50,000 new workers each year (NDU, 2005). There's a shortage of people with real qualified experience and it's extremely difficult to entice them when there are other attractive offers throughout the world (PM Editor, 2007). As the retention rate is low in construction, in order to retain experienced workers, a company must have attractive wages and benefits to match which in turn increases cost. In a highly

competitive field based on price, companies often must weigh the cost of quality versus the cost to maintain a high level of workers (ENR, 2003). Frequently, experienced craftspeople are exchanged for new hires that require a greater level of management and direction. In an environment with a high ratio of inexperienced to experienced personnel, more management is forced to increase. Instead of specialists directly completing a job; new hires/inexperienced complete jobs by taking multiple decisions for tasks that do not fall under their expertise. This process is repeated in the industry again and again resulting in decreased efficiency.

Professional Management Services Increasing

In 2000 construction managers held about 308,000 jobs. Also more than 100 colleges and universities offered 4-year degree programs in construction management. (Bureau of Labor Statistics, 2002-03) An ever increasing need for professional management services can be noticed. As owners grow in sophistication and increase demands, agency CM and PM firms are finding more opportunities (Tulacz, 2006). This increase in demand of third party experts is a result of the management problems faced by the industry pertaining to coordination and planning.

Construction Industry Quadrants

According to the research of Kashiwagi (2004), the construction industry can be divided into four separate quadrants, dependent on the competition and performance level exercised (See Figure 1): Price Based Sector, Quadrant I;

Value Based Sector, Quadrant II; Negotiated Bid Sector, Quadrant III; and the Unstable Market, Quadrant IV. The United States construction environment initially performed in a Quadrant III environment, but has since transformed to a Quadrant I and Quadrant II environment.

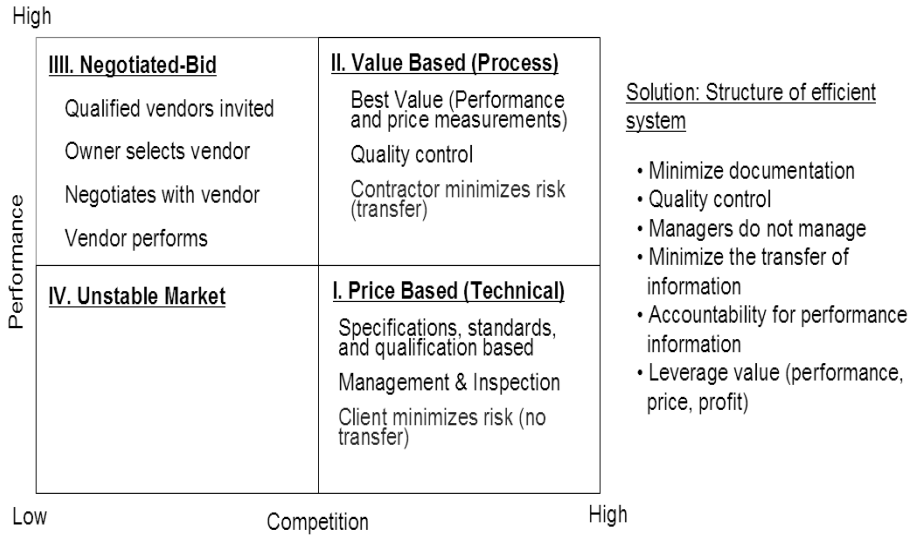


Figure 1: The Construction Industry Structure

Quadrant I: Price Based Sector

The majority of present day construction occurs in Quadrant I, the low-bid sector which is predominantly a price-based, commodity environment. A price-based environment is only optimal when the products and services involved are true commodities. In construction, minimum standards and requirements support a commodity mentality, where best value is the lowest price.

In addition to this, the low-bid Quadrant has the following inefficient characteristics:

- Specifications are issued by facility owners and their representatives.
- Projects are awarded to the lowest price alternative that "is perceived" to meet the specification.
- Usually there is low or no incentive for contractors to continuously improve and provide a higher performing facility system.
- The importance is placed on achieving the minimum requirements which leads to minimum quality and low performance.
- Generally associated with management and inspection.
- Effective partnering is difficult (Savre, 1995).
- Major motivation of contractors and manufacturers is "low cost" and minimal quality construction.
- The amount of regulations, specifications, standards, and data increases at an exponential rate but does not differentiate performance.

Quadrant II: Value Based Sector

Quadrant II represents the best-value or the performance sector. In this sector the contractor competes with other contractors based on performance and price. The best value alternative is awarded the project. As is illustrated in the construction industry figure, the selected contractor performs in terms of being on time, on budget, and meeting the performance expectations of the client. The contractor uses quality control to minimize the risk of nonperformance. This

sector maintains the highest level of efficiency. Any type of construction management performed by the client in this quadrant would be redundant.

Quadrant III: Negotiated Bid Sector

Negotiated bid sector was probably a more prominent quadrant before competition based quadrants came into picture. In this environment, project terms were negotiated and the construction was completed. Hiring was based on both performance (past history) and price (funding available). These designers and contractors had highly skilled personnel and craftspeople, and performed their own quality control.

Quadrant IV: Unstable Market

This is a self explanatory quadrant where the market is unstable. The following are features of Quadrant IV:

- There is no identification of performance. Level of performance does not have a consistent relationship with doing work or making a profit.
- Contractors with less performance can get paid more.
- No one has a competitive advantage.
- The environment is highly political.
- There is no real competition. There are bidders, but through political means, a contractor has the advantage.
- Performers have a difficult time competing.

The construction industry mainly has four kinds of procurement systems namely low-Bid/price-based, prequalified/low bid, negotiated bid, and best

value/qualifications based. Low bid is predominantly used throughout the construction industry. Figure 2 shows the comparison of percentage of the procurement methods used in the industry.

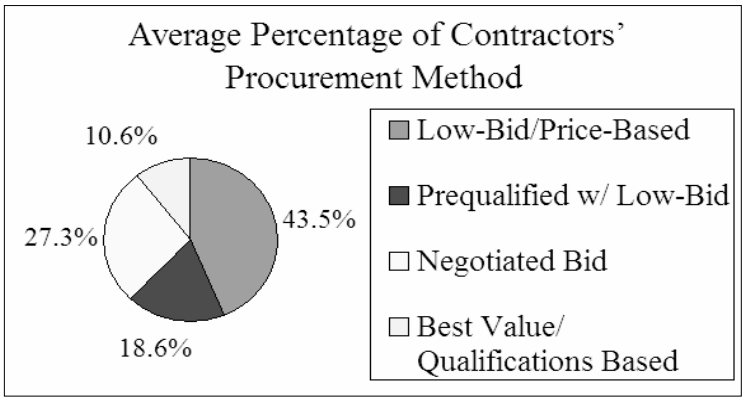


Figure 2: Comparison of percentage of the procurement methods

Negotiated bid sector was used more than price based initially but as competition and value became the focal point in outsourcing, the industry began to shift quadrants. Due to a lack of performance information, facility owners in the negotiated bid sector had difficulty in differentiating the "relative worth" of various alternatives. As a result, performance was disregarded and construction slipped into the price based sector, where price is the only measurable distinction involved.

Causes of Failure

Construction has become a commodity now instead of a value added service. There are a number of causes for the failure and low productivity of the construction. Financial difficulties faced by the contractor, too many change

orders by the owner, poor planning and scheduling of the project by the contractor, shortage of skilled labor (Sweis, 2007). Other major contributors to failure are unbalanced experience and lack of managerial experience. Many industry experts attribute contractor failure to poor management (Russell, 1991)

The Executive Leadership Program 2008, CII, which was attended by top industry professionals, concluded that the main causes for failure of contractors were the Management Issues:

- Communication breakdowns
- Changing vision, mission, & goals
- Poor leadership techniques
- Lack of owner leadership
- The client micro management
- Inadequate planning and poor follow through
- Workforce development
- Sub-par sub-contractor relations
- Alignment issues in the AEC processes
- Poor administrative coordination

Most project management problems occur at the communication level. Communication-effective or not- has a ripple effect, not just through the internal team but through customers, subcontractors, manufacturers and equipment providers as well (PM Network Editor, 2007).

Too much information is another cause for failure. Decision makers are

spending too much time processing marginally relevant information and too little time analyzing the context of data. A study commissioned by Reuters News Service in 1996 found that 40 percent of 1,300 business people surveyed in the United States, the United Kingdom, Australia, Hong Kong, and Singapore believed their ability to make important decisions was hindered by an overabundance of information (Denton, 2001). Abundant redundant information causes more decision making, which causes management issues.

Projects fall behind schedule and go over budget because of the lack of accountability for mistakes and holes and deletions in designs and estimates (Greengard, 2007). Many organizations are turning inwards, building accountability into project management processes. There must be a single person who is responsible for each deliverable (Angelo, 2003).

Minimum Standards

Government has identified that specifications do not guarantee performance (ENR, 1999). Technical specifications diminish the value and need for experts (Butt et al. 2005). Figure 3 shows the difference in objectives of Contractor and Owner as a result. Minimum standards become the maximum performance level for the contractors thus lowering their performance.

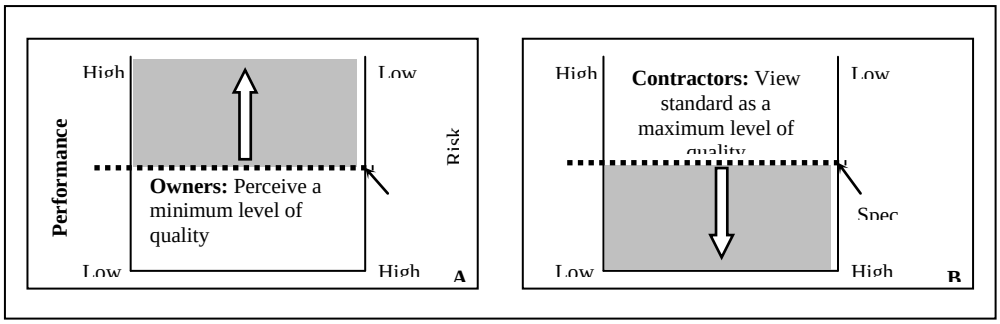


Figure 3: Effect of minimum standards:

Low Bid

Low bid delivery method which covers almost half of the industry is the third most significant cause for problems in the construction industry (Lo, 2006). The selection process for engineers, fabricators, materials suppliers and contractors, based on the low bid, encourages each one to compromise quality for price (Murray, 1993). It is solely based on price and biased information and not on performance.

Contractor selection is a multifaceted decision making process involving the consideration of multiple selection criteria which are mostly subjective in nature and difficult to gage. The selection of the lowest bidder is one of the major reasons for project delivery problems as contractors, when faced with a shortage of work; desperately quote a low bid price simply to remain in business with the expectation of compensating through claims (Singh, 2006). Low bid does not allow vendors to take responsibility of their work (Emery, 1995). Further third parties so called "experts" take away the accountability from the vendors.

The reason why low bid rules the construction industry is because of lack of awareness of owners. Lack of awareness and low bid mentality that stretches to

architects, engineers, general contractors and subs, is the source of problem that causes failure. The most dangerous issues caused by low bid are the potential eroding of qualified engineers, experienced managers, and skilled labor (FMI and CMAA Surveyors, 2007). Owners apply relentless pressure on the entire project team to cut prices to the bone while serving up five-star services (ENR Editor, 2006). This process itself creates an adversarial environment, promoting change orders, cost increases and potentially result in high cost at the end of construction (Marquardt, 2001).

Construction Industry Solutions

There have been various efforts in the construction industry to improve performance including continuous improvement, partnering, lean construction, and implementing different delivery systems. A number of procurement and project measurement tools have been introduced to further resolve the problem. The construction industry in general is characterized with high fragmentation, low productivity, cost and time overruns, and conflicts compared with other manufacturing industries (Xue at el., 2007). Attitude-related issues: such as narrow minded "win-lose" attitudes and short-term focus, arrogant attitudes, exclusion of the subcontractors and suppliers from the early involvement phases, lack of praise for good performance, and lack of understanding of the subcontractors and suppliers problems (Xue at el., 2007). Three types of solutions based on management, technical systems and procurement methods are currently used in the industry to solve the above problems.

Management Solutions

Industry has come up with a few management based solutions to solve the problem. Lean construction, supply chain management, partnering have been used lately to improve the overall productivity.

Lean construction is a "way to design production systems to minimize waste of materials, time, and effort in order to generate the maximum possible amount of value" (Koskela et al. 2002). New management thinking, like that of lean construction, has suggested many principles and techniques that can result in better labor and cost performance (Abdel-Razek at el., 2007). Many studies have attempted to improve construction labor productivity via different ways for examples: studying the factors affecting construction labor productivity (Thomas, 1991, 1992, 1995; Elshakour, 1994; Abdel-razek, 2004); measuring and evaluating labor productivity (Abdel-Razek , 1990, 1992; Hosny 1992; Halligan, 1994; Osman, 1996, Thomas 1997); modeling construction labor productivity (Abdel-Razek,1990; Adrian, 1976, 1987) and comparing labor productivity based on economic considerations or costs (Thomas, 1999).

Another attempt is supply chain management. This includes the market mechanism and the coordination flow. Supply chain has been used in construction for the past few decades, in this time developments were made in technology and culture, however, much research projects suggest that construction is still ineffective and many problems in CSC (construction supply chain) can be identified (Xue, 2007). However, an achievement considered is the internet-

enabled CSCM which is a tool that facilitates decision-making, increases flexibility, responsiveness and speed in operations.

Given the nature of modern construction projects where the involvement of a multitude of contracting parties' results in very high risks; partnering based on relationship agreements and cooperative teamwork is perceived to be an effective medium for managing conflicts between diverse participants (Rahman, Kumaraswamy, 2002). Although the theory behind relational partnering remains relatively simple, previous studies including Phua (2006) and Ngowi (2007) have shown that a lack of trust between parties and a difference in opinion on resolving disputes may jeopardize an otherwise successful project and cause an unwarranted market perception of the particular procurement process (Doloi, 2009).

The above solutions have been in use for a number of years now; however, in spite of the tools being used the industry has been declining as discussed before. Researchers in lean construction argue that traditional project management and design practices are obsolete (Koskela, Howell, 2008). They are built around the transformational input and output processes – they perform poorly in managing flow, or meeting client requirements (Koskela, 2000). Supply chain management facilitates decision-making which is a conflict in itself as decision making should not be a part of a process with substantive information. Partnering is based on relationships which is not consistent and is dependent on other external factors.

Technical Solutions

Project success has been related to the project manager's leadership competencies (Cheng, Dainty, Moore, 2005). Crawford (2001) linked project management competence, project performance, and organizational performance. An integral part of project manager's job is project performance measurement. Following are the performance tools created in the past few years:

- Australia: New South Wales Public Works Department, Australia launched a Project Performance Evaluation (PPE) framework, which covers parameters such as time, cost, quality, safety, contractual, communication, environment, and dispute resolution elements. The main purpose of PPE is to extend project performance measures to cover soft parameters, such as communication and dispute resolution (C21, 1999). However, PPE relies on manual collection, retrieval, and interpretation of the data provided by project participants. Such a process is time-consuming and expensive, especially for projects involving a large number of participants that are geographically distant from the project control unit (Cheung, at al., 2004).

- United Kingdom: Construction companies have implemented a number of performance measurement frameworks, such as KPI, the Balanced Scorecard, and the EFQM Excellence Model (Bassioni at al., 2004). Each looks at performance measurement from a different angle while they either overlap or complement one another. Key Performance Indicators (KPIs) was developed by the KPI working group under the UK Construction Industry Best Practice Program. The launching

of the KPIs was to develop an industry performance standard (DERT, 2000). However, KPIs have received significant criticism as they do not give insight into the means of improving performance and therefore have limited use for internal management decision making (Bassioni at al., 2004).

- PPMS: Another performance measurement tool is PPMS. It is a project monitoring tool that makes use of internet and database technologies to streamline monitoring process. The key performance measure categories are people, cost, time, quality, safety, client satisfaction, communication, environment and identifying performance indicators for each of the performance measure categories (Cheung, Suen, Cheng, 2004). The glitch in PPMS is it relies heavily on the internet and the database system which involves initial setup cost and constant monitoring and good security to prevent 'down-time' and hacking. (Cheung, Suen, Cheng, 2004).
- VIPs: Value improving practices (VIPs) and best practices (BIs) have been in use for over 20 years (Lozon, Jergeas, 2008) and their use in a variety of applications has been reported widely, but there is very little information available as to the level of awareness, understanding and use of these practices by industry practitioners (Lozon, Jergeas, 2008). Tools such as VIPs and BIs have not been able to prove their positive impact which is evident from the industry survey by Lozon and Jergeas which shows that the industry is not willing to endure the negative consequences of not using these practices (Lozon, Jergeas, 2008), thus have not been identified as effective tools.

Performance measurement is great tool to create accountability in the system, which could result in increased performance. However, the system of performance measurement needs to be simple, logical and low maintenance such that it is not just confined to technical experts or computer savvy individuals. Therefore, a need exists for a comprehensive or integrated performance measurement framework in construction which is simple and is capable of resulting in a positive change.

Procurement tools

Initial stages of construction are the most critical and are the deciding factor's for success of the projects. Hans E Picard in his journal "Industrial construction efficiency and productivity" says "*Our own research data obtained in over two decades of consulting on industrial construction projects, indicates systemic losses of productive time resulting in 30% to 40% excess labor cost due to factors such as status quo management, information systems that don't provide necessary information, and inefficient work processes".* PERT/CPM techniques are very common and widely adopted management tools, currently used in the process of project planning and control. These techniques have been widely accepted in the construction industry. However, despite the use of these techniques, construction projects have failed to achieve their defined objectives with respect to cost and time (Omar, 2009). Budget overruns and schedule delays also fall under the failure of initial project planning and risk mitigation. More than a third of major clients are dissatisfied with contractors' performance in keeping

to the quoted price and to time, resolving defects, and delivering a final product of the required quality (Senaratne, Sexton, 2009). More than a third of major clients are dissatisfied with consultants' performance in coordinating teams, in design and innovation, in providing a speedy and reliable service and in providing value for money (Senaratne, Sexton, 2009). Unexpected change, which occurs throughout the design and construction phase, hinders project success to a significant degree (Senaratne, Sexton, 2009). Project pre-planning and risk mitigation is contractor's responsibility however, according to Massimoluigi Casinell in his journal "Owner does more project management to mitigate risks to schedule delay" says *"to facilitate project start up, so critical for success, the owner should force and drive the contractor to make some critical choices during the study and preparation of the bid.* Success of a project is dependent on both the owner and the contractor. Owner needs to procure the right and capable contractor and contractor has the responsibility of providing the owner with great results. Procurement of the contractor plays a very important role as the process starts from hiring a contractor.

In the current low bid environment contractors are procured solely on the basis of their price. Industry is starting to realize that there should be more factors to indentify a suitable contractor for the project. The Dutch Economic Institute for the Construction industry (EIB) started a research on how to solve the problem of procurement. The recommendations are: (Zwaga, 2008)

1. Use past Performance PSC (2003)

2. Use Performance measurement in the selection procedure PSC (2003)

3. Ask for a Risk assessment plan, not only price

4. Ask for new ideas / solutions

5. Use an overall performance benchmark system to reduce the fail costs in the Construction Industry.

Further, Kumaraswamy (1996) used a performance-based scoring technique for rating each attribute on an interval scale and summing the individual scores to compute the final score for a contractor. The technique is simple to use, but depends on the subjective decisions of the experts. Additionally, it cannot accommodate attributes with dissimilar scales of measurement. The technique also fails to guarantee consistency in determining the attribute weights (Padhi, Mohapatra, 2010). Holt (1998) used cluster analysis to group the contractors having similar characteristics. The technique can handle the attributes with dissimilar scales of measurement, but it is not suitable to identify the most favorable contractor (Padhi, Mohapatra, 2010). Hatush and Skitmore (1998) and Lambropoulos (2007) have used multi-attribute utility technique to score the contractors. In this technique, the utility score of a contractor is determined by comparing the desired value of each attribute (set by the government) with its actual value as achieved by the contractor. The sum of the individual utility scores reflects the total utility score of the contractor. Thus, the technique has the ability to consider multiple attributes and past work performance. However, it cannot handle fuzzy data and does not work properly for group decision-making

problems (Padhi, Mohapatra, 2010). Lai et al. (2004) used multi-attribute analysis technique to score the contractors. A simple scoring technique in which the contractors are rated on an ordinal scale, it cannot capture the uncertainty of preference ratings of decision makers. Also, it does not check the consistency of scores for the attributes by decision makers (El-Sawalhi et al., 2007). Further, Lai et al. (2004) did not consider the attributes that were quantitative in nature problems (Padhi, Mohapatra, 2010).

History shows that best value costs the same or less than poor performance low bid work. A survey projects that 54 % owners received higher profits with best value (Guo, Yan 2006). Contractor makes a larger profit with best value through their efficiency; money they save is their profit- that is the contractor's incentive, not higher prices (HBI Editor, 2005). However a system needs to be in place for identifying and procuring the best value contractor.

Leaders and Leadership

One of the traits associated with all successful companies is leadership (Maxwell, 1998; Collins, 2001; Tichy, 2002; Buckingham, 2005; Welch, 2005; Price and Ritcheske, 2001; Kouzes and Posner, 2002). The need for leadership in an organization is augmented by the increased demand for labor in industry, especially the construction industry, and the scarcity of available workers.

With the expanding market, scarcity of workers, increasing skill gap, and high employee turnover rate, organizations desperately need good leadership to bring stability and growth to their systems. The shortage of leadership

capabilities has been identified as one of the biggest problem that is keeping organizations from becoming efficient, productive, and able to deliver quality products (HR Magazine, 2006; Greco, 1997; Delahoussaye, 2002).

Organizations are continually trying to increase their personnel's leadership skills. They are spending billions of dollars on leadership training programs, both the actual learning process as well as the implementation (Crain, 2007; MIT, 2003). The pressure for organizations to continually improve their leadership capabilities has led to the development of numerous leadership theories. Spending on leadership programs has increased dramatically (MIT, 2003; Crain, 2007). In 2000, when leadership program investments reached around $50 billion, five times more than a decade earlier, industry made it clear that it was headed in this direction (MIT, 2003). 23,004 books on leadership can be found at Barnes and Nobles if searched online.

Leadership is one of the most important subjects in management studies (Toor, Ogunlana, 2006). However, many authors have not been able to articulate the idea of leadership despite the large volume of research and literature on the area (Giritli at el., 2004; Kets de Vries, 1997). Particularly in the construction industry, not much work has been done on leadership (Odusami at el., 2003). Dulaimi and Langford (1999) argue that most studies on leadership in the construction industry concentrate on investigating the motivational factors and the personal characteristics of project managers. Few studies focus on leadership development in construction project managers. However, due to the changing

environment of the construction industry and increasing realization of people-side of project management, researchers have shown more interest during last few years. Toor and Ofori (2007), in their recent review of empirical work on leadership in construction, have shown that the number of publications in this area have consistently grown during the last decade. Out of total 44 publications, Toor and Ofori (2007) show that more than 50% have been published during the last decade. This shows a mounting interest of the research community in leadership in the construction industry (Toor, Ofori, 2008)

Unfortunately, after allocating a tremendous amount of time and resources into leadership programs, many companies are finding that there has been no evidence of permanent improvement (Zenger, 2000). A survey of 5,000 HR professionals showed that 65 percent of organizations that had implemented a leadership program were not satisfied with the results (Drew, 1999). Organizations are finding that creating or employing talented management is still a problem and leadership is still a scarcity (HR Magazine, 2006; ASTD, 2004).

A division president of a Fortune 500 company was quoted as saying, "We spend $120 million a year on this stuff, and if it all went away tomorrow, it wouldn't matter one bit (MIT, 2003). The question arises if leadership is being used why is it not showing results? Are we defining it wrong? What is effective leadership?

Edward Deming is considered one of the experts in the area of continuous improvement and leadership. In his book *Out of the Crisis* (Deming, 1982) he

explains the philosophy and reason for the success of many manufacturers, including Toyota.

Major points supporting no-influence *Out of the Crisis* (Deming, 1982):

1. Leader's role was not to focus on changing the individual, but adjusting the system to increase the individual's performance.

2. Leader's need to align individuals in the right position to maximize efficiency and productiveness.

3. Individuals have a constrained rate of growth and limited capabilities.

Further another famous name is James Allen. In his book *As a Man Thinketh,* James Allen (1900) proposes that it is impossible to prove that one person can influence or control another. However, he states: if a person has accountability; if the rule of life and the universe is logic; and if a person controls his/her own environment, destiny, and life, then, although it seems as if one person may influence or control another, it may actually be that the person being influenced chooses to be associated with the influencer and is actually doing what he/she wants to do. Allen proposes that a lack of information leads some to conclude that one person can influence or control another. Collins states, "First who….then what – Great people will always be great regardless of the role, people don't change much." He recognized that leaders don't increase performance through influence, they do it through recognizing who is able to do the job the best and creating an environment that attracts that person. Collins

(2001) recounts this story in his book, *Good to Great,* "….When Dick Cooley CEO of Wells Fargo began creating his team, in order to ensure success, he did the following: They hired outstanding people whenever and wherever they found them, often without any specific job in mind." "That's how you build the future," he said. "If I'm not smart enough to see the changes that are coming, they will. And they will be flexible enough to deal with them." Jim Collins' analysis of the most productive companies revealed that principles of no-influence were directly correlated to the companies' success (selection of the right people) and no evidence was found that individuals could be trained to become leaders (no influence principle). Buckingham and Coffman (1999), in their book *Break All the Rules*, which was based on in-depth interviews of over 80,000 managers in over 400 companies, stated that everyone is different, constrained differently, and should be treated differently. Leaders should quickly identify their subordinates' characteristics, keeping those with good qualities and immediately separating those with bad ones. After studying the greatest managers in the world, Buckingham and Coffman believe that a person cannot be influenced. People will be who they are regardless of external forces (i.e. quality of their leader, incentives, training, etc.). Honda's success was founded in its no-control, no influence philosophy. Its leadership philosophy was so different from other automobile manufacturers, especially the Japanese, that no one could explain how the organization became so successful. After being introduced to the Honda organization and seeing how visionary its culture was, Robert Shook was

reminded of *The Mary Gloster*, a nineteenth-century poem. He said, "Rudyard Kipling wrote: 'They copied all they could follow / But they couldn't copy my mind / and I left'em sweating and stealing / A year and a half behind.' Such is the heritage of Honda" (Shook, 1988).

With the above comments and discussions it can be concluded that leadership is not influence – it is merely the alignment of resources. This changes the traditional paradigm of leadership. It changes the belief that leaders are able to increase the capability of their workers through influence. It can be said that leadership does not increase the capability of their workers, but increases productivity of the entire group through aligning each individual in the proper place. A construction manager that can identify the talent of an employee to paint and the talent of another employee to weld will increase the quality of the construction group's work merely by having the employee that is good at painting, paint, and the employee that is good at welding, weld. Construction needs leaders that have the ability to foresee the capabilities of their people, so they can provide quality services to their clients and are more efficient and effective in their work.

With this thought in mind, how many leaders in our society have such traits? Henry Ford in his book 'my live my work', said *"the men of larger ability are less numerous than the men of smaller ability. It is the larger men who give the leadership to the community and enable the smaller men to love with less effort"* According to the study, a mere 14 percent of employees around the world

are highly engaged in their work, while 24 percent are disengaged. Everyone else is somewhere in the tepid middle. "*In other words, roughly 85% of those at work around the world-from Montreal to Munich, from Pittsburgh to Paris, and from Dublin to Delhi-are giving less of them than they could"*(Hamel, 2007). It is surprising to know that the literature on clinical versus statistical prediction suggests that humans in general, including purchasing managers, are often outperformed by relatively simple statistical formulas for such kinds of tasks (Snijders at al., 2003). The results also show that the formula outperforms the humans, and that experienced purchasing managers do not outperform freshmen students (Snijders at al., 2003). Ironically, formulas are not used as often as human expertise. Human experts take decisions (right or wrong) because of their lack of ability to predict. In real life, experts have learned to take decisions under time-pressure while taking into account many subtleties simultaneously. In such a ''messy'' situation, it could be argued, the real potential of the human expert will surface.

Formulas are often found to predict at least as good as or better than experts (Meehl, 1954, 1986; Dawes, 1971, 1979; Kleinmuntz, 1990; Dawes et al., 1993; Grove and Meehl, 1996; Grove et al., 2000; Snijders et al., 2003). One likely reason for this, as often mentioned in the literature, could be that humans in general are not that good at tasks where sound decision-making involves reliably storing, retrieving, and combining information (Tazelaar, Snijders, 2004). Generally, decisions in purchasing which can be applied to any field, are made in

a context where feedback is lacking, where it is not really clear which case characteristics are good predictors, where measurement of what could be the relevant case characteristics is often lacking, and where the outcome is not strictly deterministic but probabilistic instead (Tazelaar, Snijders, 2004). Therefore decision making is a result of confusion and not a part of a process. Dian Terry writes in his article 'More Decisions, More Complexity, More Data' says *"more and more people need to take more and more decisions with more and more data in less and less time. Hmm, sounds like these people need to automate some of this..."* The top five casualties of poor decision-making are customer loyalty, company reputation among customers, profits, company productivity and customer service.

To avoid such disasters disaster recovery planning process is required that can enforce pre planning and risk minimization such that decision making can be completely eliminated from the construction process. Construction industry can be made efficient by reducing the number of decisions and introducing dominant and useful data that leaves no room for a decision and shows obvious choices. More and more information causes confusion therefore use of dominant information becomes the need of the hour. Further chapters explain a similar planning process based on leadership principles which eliminate decision making and enforces pre planning and risk mitigation thus increasing the overall efficiency of construction.

Chapter 3

Case Study: U.S. Army Medical Command; MEDCOM

Large Public Organizations and Traditional Management Model

Government groups have problems delivering services on time, and on budget, and meeting the expectations of the client (Hutton and Solis, 2009; U.S. Postal Service, 2008; DOD, 2006; Christoff, 2005; Department of Homeland Security, 2008; Newell, 2009.) Government groups use concepts such as performance incentives but many times, are so bureaucratic, that they pay incentives even if the service provider does not perform (GAO, 2005).

Large public organizations suffer from the bureaucratic practices. The following are characteristics of large government organizations: (Kashiwagi, 2010)

1. Silo operations where each function is in a different silo and the objective of the silo supersedes the objective of the organization. Silos include designers and project integrators who create the projects and requirements, procurement/contracting, project management who manage the delivery of services, and the end user.

2. Each silo has its own rules, and its rules override the objectives of the organization. .

3. There is a chain of command hierarchy where multiple approvals are required.

4. Decision making is one of the mechanisms of the bureaucracy.

5. Decision making creates a political environment where who you know may be more important than what you know.

6. Difficult to get innovation or change approved unless it is in the best interest of silo oriented personnel.

7. No transparency of performance of any of the personnel or the silo.

U.S. Army Medical Command (MEDCOM); a large government organization, is used as a case study for this research. It is an organization that is delivering approximately $600M a year in construction renovation and maintenance projects at 26 different sites located in the United States, in Europe, and one in Korea. MEDCOM must use the Corps of Engineers (COE) to do its procurement, construction management, and contract administration. The LGO uses an indefinite delivery, indefinite quantity (IDIQ) contract to deliver design and construction services. The LGO being used as a case study has had a history of traditional problems such as: (Kashiwagi, 2010)

1. Having project cost and time deviations.

2. Inability to make the contractors accountable.

3. Inability to get accurate and current information on what was the cause of deviations.

4. Inability to measure the performance of construction.

U.S. Army Medical Command Introduction - Organizational Structure

The United States Army Corps of Engineers (COE) and Army Medical Command (MEDCOM) work together to meet the hospital construction requirements of the military bases located across the United States and oversees. The U.S. Army Medical Command (MEDCOM) is a major command that provides command and control of the Army's fixed-facility medical, dental and veterinary treatment facilities, providing preventive care, medical development and training institutions. MEDCOM serves over 5 million soldiers (active, retired, and their relatives) and civilian employees (U.S. Army Medical Department 2008). The organization deals with 250 plus projects with a scope of $600 million each fiscal year.

There are a number of critical components that interact to achieve the organization's objectives:

1. The Corps of Engineers (COE) - procurement agents of MEDCOM services. They report to the FM, FD, and MEDCOM.
2. Project Integrator - Staff to help coordinate and manage the delivery of both maintenance and repair projects and new MILCON construction projects. They are tasked to ensure the requirements are turned into projects, and the projects have drawings/specifications.
3. Quality Assurance Personnel (QA) - Makes sure vendor has a quality control program/risk management program while delivering contracted

construction/facility work or services. (They are cross matrixed as they report to the project integrator, the COE, the FM, and the MEDCOM.)

4. Facility Manager (FM) - Responsible to deliver construction, maintenance and repair projects, services, and maintain the hospital at a site. Reports to the FD, and on site operational commander.
5. Facility Directors (FD - regional) - Responsible for hospital facilities in a regional geographical area and report to both MEDCOM (staff and the regional operational) and administrative commanders.
6. Hospital users including doctors, nurses, and hospital and post commanders.
7. IDIQ contractors - IDIQ contractors which are prequalified by the COE and compete among each other for special projects. The Indefinite Delivery, Indefinite Quantity (IDIQ) process has other advantages such as the IDIQ contractors are specialist in their fields (Kashiwagi, at al., 2009). Figure 1 shows the organizational chart for MEDCOM organization.

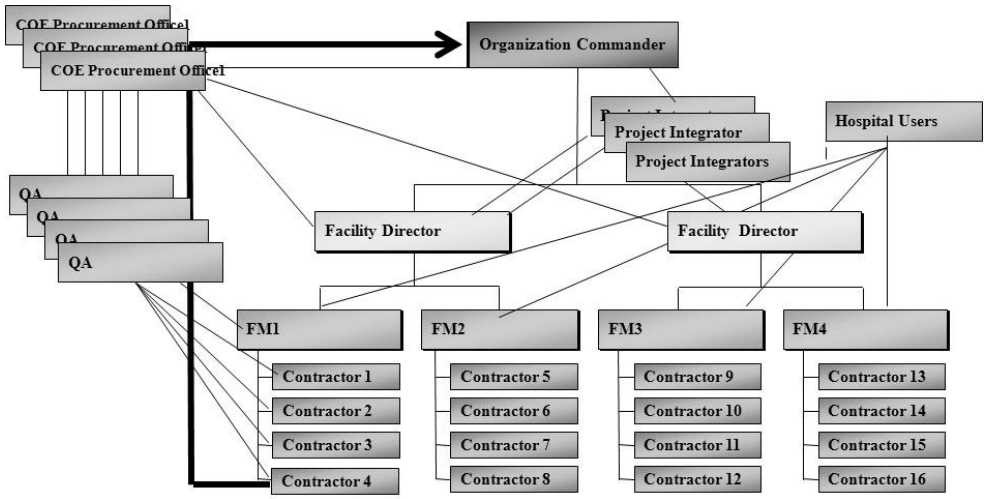


Figure 4: MEDCOM Organizational Structure

MEDCOM's initial system was designed in the following way: Facility identified the need of their users and submitted a request to their respective region. Region then forwarded the request to MEDCOM. MEDCOM after analyzing the project and funding sent the details to the CEO for procurement. COE procured the best value contractor. Contractor created the work plan (WP) and submitted it to receive the notice to proceed (NTP) for construction. During the construction process, the QA, FM, PM, and PI, tracked the construction process and performed management and inspection functions in order to ensure a quality product. The project was closed when the final inspection was done. The organizational structure was management based with emphasis on control and direction.

Figure 5 depicts MEDCOM structure with individual organizations such as procurement; facility etc in their silos and layers of management.

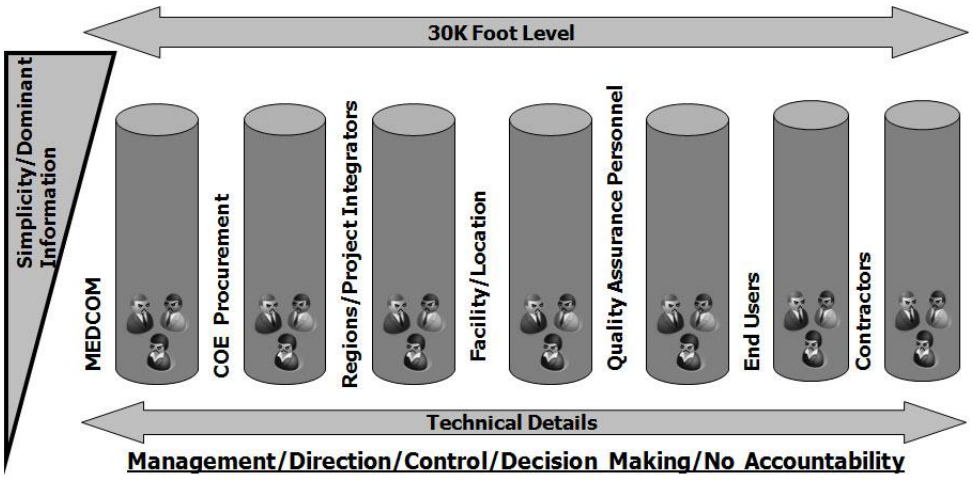


Figure 5: MEDCOM Management Structure

Organizational Objectives and Goals

The active involvement of the United States in Iraq and other international military efforts has been increasing the United States Army Medical Command's (MEDCOM) effort for building and maintaining quality medical facilities (Kashiwagi et at., 2009). Previously, MEDCOM was tasked with caring for soldiers hurt in conflicts with shorter durations. MEDCOM staffing levels and facility requirements could be accomplished in spurts and using fewer resources and facilities. The Iraqi conflict changed that (Kashiwagi et at., 2009). Two major factors: first, the war was prolonged into a duration which overcame the short term capability of understaffed MEDCOM personnel support and facilities (despite the normal plan of working overtime); and secondly, the technology used in the war caused injuries that disabled servicemen for longer periods of time, forcing MEDCOM to become a more permanent function/facility for a higher number of troops. With current limited resources available it was pertinent that the ones available were used to the optimal. Projects needed to be delivered on time, within budget, and meet the quality expectations such that they were more efficient and effective in delivering and maintaining facilities.

Consequently, MEDCOM wants to decrease its management and increase its performance (on time, within budget and customer satisfaction) and efficiency. After analyzing the problems and their results MEDCOM has come up with the following objectives and goals for the organization:

- Decrease cost and time deviations
- Minimize need for management
- Create an environment of accountability
- Increase pre-planning, risk management, and quality control performed by the vendors
- Ensure quality construction and client satisfaction

Hypothesis

Implementing a risk management system; PIRMS in MEDCOM can supplement the perception, preplanning, and risk minimization capability of a contractor's project manager, thus increasing the project performance (on time, within budget, and meeting expectations). In additional can minimize change orders and budget overruns. The major impact of this research is that proactive management by contractors may be much more effective than traditional management such as direction, control, and inspection by client's professional representatives. This research will be a deductive based research study that uses MEDCOM as a case study.

MEDCOM was introduced to the risk management system, Performance Information Procurement System (PIPS) in 2004. Performance Information Procurement System is a best value procurement tool with a 98% success rate of high performance in the industry (Chong, 2007). However, as it was a procurement tool and COE already had a procurement method, PIPS was not accepted and highly resisted. PIPS was further modified to suit the needs of

MEDCOM and Performance Information Risk Management System (PIRMS) was developed which was a post award risk management system.

For the last five years, the U.S. Army Military Command (MEDCOM) has been experimenting with a methodology to measure their organization with PIRMS. It minimizes the amount of information to dominant data and requires the participant at most risk, and least bureaucratic to document the information. The system is able to use the vendors (who are all external to the US MEDCOM system) to provide the information that can measure the inner workings and participants of MEDCOM. The foundation of the information system is the transfer of risk and control to the vendors. Performance information can minimize risk, decision making, and project deviations, and increase customer satisfaction. PIRMS can take a contractor's project manager who may be reactive (lacks pre-planning and risk mitigation), and transform him to be proactive by enforcing pre-planning and risk mitigation before the start of the project thus eliminating decision making from the process. The main objective of PIRMS would be to create transparency in the organization and create information that would motivate the supply chain to improve their performance.

Chapter 4

Methodology: Performance Information Risk Management System (PIRMS)

PIRMS is a risk management model that utilizes leadership principles and processes to minimize the need for management by direction and control. Handling of risk is a major factor in any project. High performance/expert design firms and their personnel have minimal or no technical risk. The only risk they have is risk that they do not control (risk that is brought by other participants, mainly the client in the form of over-expectations, items outside of the scope, decision making at the wrong time during the process, and the changing of expectations). High performers/experts see the project from beginning to end, before they compete for a project, and know the risk that they do not control before they accept the project. Figure 6-7 shows the comparison of management (traditional) based model and the leadership based model.

PIRMS is the leadership based process that identifies scope, pre-plans the project and minimizes risks before the project starts. PIRMS can be used in both price based and best value environments. It is able to achieve efficiency and performance through the following (Kashiwagi, Malhotra, Kashiwagi, 2009):

1. Aligning people and resources in their correct positions and roles to maximize the productivity of the group.
2. Consolidating the responsibility of a project solely to the vendor, instead of dividing it between all the players (project manager, site personnel, etc.). This can be done because the structure forces the vendor to identify and

minimize the risk that vendor does not control that could impact the project, as well as documents all unforeseen problems that occur and how they should be minimized.

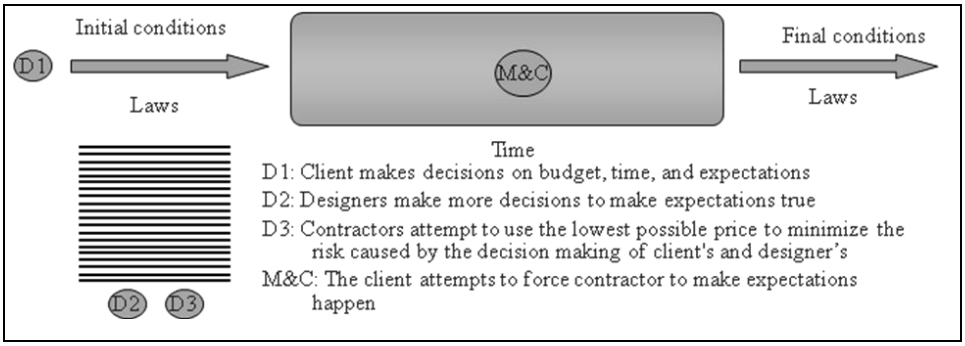
3. Quantifying and updating simple performance measurements directly related to the cost, schedule, and quality of the project weekly.

4. Encouraging the client to rely on the expertise of the vendors to make decisions and solve problems.

5. Requiring vendors to show dominant information to minimize client decision making.

6. Having the vendor record all documentation and allowing the client's representative to check the documentation for accuracy.

7. Selecting the best value vendor and transferring risk and control to the vendor.



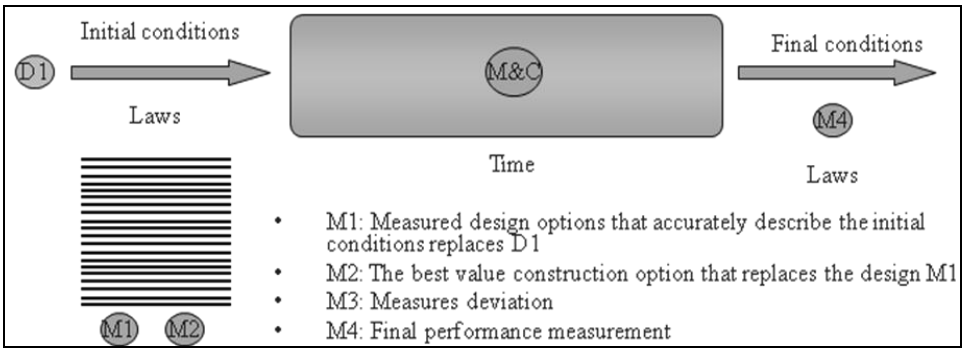


Figure 6-7**:** Traditional Management Model: New Risk Model; PIRMS

As a result of using PIRMS in the most optimal way, contractors are able to:

1. Minimize risk before they start a project by putting the right people (experts) on the project who know how to do the project based on experience.
2. Identify the scope of the project, a baseline schedule, what the project will cost, and the solution of the project before project award.
3. Identify what risks may affect the project due to client over-expectations, client nonperformance, problems caused by other participants (permitting, review bodies, client related individuals) potential unforeseen conditions (defined by the scope and baseline schedule).
4. High performance vendors maximize their profit by finishing ahead of schedule.
5. High performance vendors are motivated by profit (finishing ahead of schedule and meeting client expectations of time, cost, and quality) (Kashiwagi, 2009).

Development of PIRMS

MEDCOM was introduced to PIPS, performance information procurement system in 2004. PIPS is a best value procurement system based on a leadership structure with a 98% of success rate pertaining to high performance. However, MEDCOM being an extremely bureaucratic organization, highly resisted PIPS especially the procurement department as they felt they were unable to control the procurement anymore.

Year 2004: MEDCOM was not convinced that PIPS could add dominant value to their best value procurement system. The organization was unable to identify that the main payoff of PIPS was in the risk management and the change of paradigm. Therefore, procurement side of PIPS was omitted and pressure was laid on the main issues of delivering construction and other services: changing the paradigm, forcing contractors to plan ahead, and transferring risk and control to the contractor.

Year 2005: PIPS was modified to suit the client's satisfaction and PIRMS was created. By taking it outside of procurement, and making it an engineering risk management system, it minimized the resistance of the procurement offices. Thus a paradigm shift was introduced. Performance information that was previously considered proprietary, and only used by the COE contracting office, was actually being used by the MEDCOM management, engineers and contractors as a part of their risk management system. It also gave MEDCOM the accountability and control of their own construction program.

Year 2006: PIRMS was added to the contractual language and was made a technical requirement by the contracting office. Director's Report, an excel sheet compiling the performance information of the organization was developed.

Year 2007: First IDIQ (indefinite delivery indefinite quantity) contractor understood the PIRMS concepts and adopted the system to optimize their own operations. Through their implementation, WRR was further optimized. Risk management plan used by the contractors was identified to be incorrect and was redefined as the identification of risk that the contractor did not control, and the method that the contractor would manage and minimize the risk.

Year 2008: MEDCOM officially implemented the risk management plan (RMP.) The transition also required educating contracting offices, and project management personnel, and the 26 hospital facility managers and facility directors.

Year 2009: Four out of six IDIQ contractors pursued their own training to implement PIRMS using its WRR and RMP. In 2009, contractors stressed and pushed PIRMS utilization more than the owner. MEDCOM looking at the change introduced PIRMS to their construction wing, MILCON.

The PIRMS Process - Theory

PIRMS is based off a leadership based model outlined by Information Measurement Theory, IMT. IMT is a set of deductive logic models which predict future results based on relative measurements. The major concepts and principles are as follows (Kashiwagi, 2004):

Decision Making

1. Decision making requires an individual to use their subjective bias and experience to solve a situation where they have insufficient information to predict an outcome.
2. Decision making brings risk.
3. Decision making is minimized when the decision maker has accurate information.
4. Dominant information is the information that will minimize the need for decision making.
5. It is difficult for one organization/person to control the actions of another individual.
6. People and organizations are predictable with enough information.
7. Past performance and future capability to perform on unique events can be predicted.
8. Experienced personnel can identify future activities in an event before it happens. They can identify and prioritize risk and they will have a plan to minimize the risk before it happens.

Experts

1. It is difficult for one organization to control another even if there is a contract.
2. Risk is minimized by hiring an expert vendor, not through management and inspection.
3. Experts cost less, not more, because they are more efficient and have no risk.
4. Experts do not have to be managed.
5. Experts can tell you what will happen before it happens.
6. Experts will accept technical risk, because they are experts in the technical area and therefore can minimize the risk with their expertise.
7. Experts think ahead to minimize risk.
8. Experts maximize profit and minimize risk that they do not control by using dominant information.
9. Experts minimize the need for relationships and transactions by communicating the essential information.
10. Experts take control of their own project, and minimize risk that they do not control by preplanning and accurately describing the risk they do not control to the client.

PIRMS creates an information environment by using 3 major tools: Risk Management Plan (RMP), Weekly Risk Report (WRR) and Director's Report. It uses dominant information that minimizes disagreements. As the information produced is simple and non technical, it does not force the owner to make

unnecessary decisions. PIRMS allows everyone to clearly define their tasks, thus bringing accountability in the system.

Weekly Risk Report

The Weekly Risk Report is a contractor generated document that is submitted at the end of every work week from the commencement of a project to its conclusion. It records any risk issues that have developed and will affect the project's performance (budget, schedule, and customer satisfaction), the risk's impact to the project, person responsible for the risk, and what is being done to minimize the risk. The document is cumulative and serves as a record detailing the project problems from their inception to resolution. It creates a baseline for the project and measures deviations so forth. Because the deviations being measured and the person responsible reported, WRR creates accountability thus forcing pre planning and risk management and mitigation. This report is distributed to all individuals involved on the project as well as the MEDCOM Director.

The Weekly Risk Report clearly identifies the reason a project is behind schedule or over budget and the entity that is responsible for the issue. The report is distributed directly from the contractor to all individuals involved, regardless of rank. This eliminates the manipulation of information, pinpoints the source of the problem, and places immediate attention on that individual and the action that is required for the resolution of the issue. As a result of the dominant information being passed, minimal external management is needed (Kashiwagi, at al, 2009).

Weekly Risk Report is a simple excel sheet with the following worksheets:

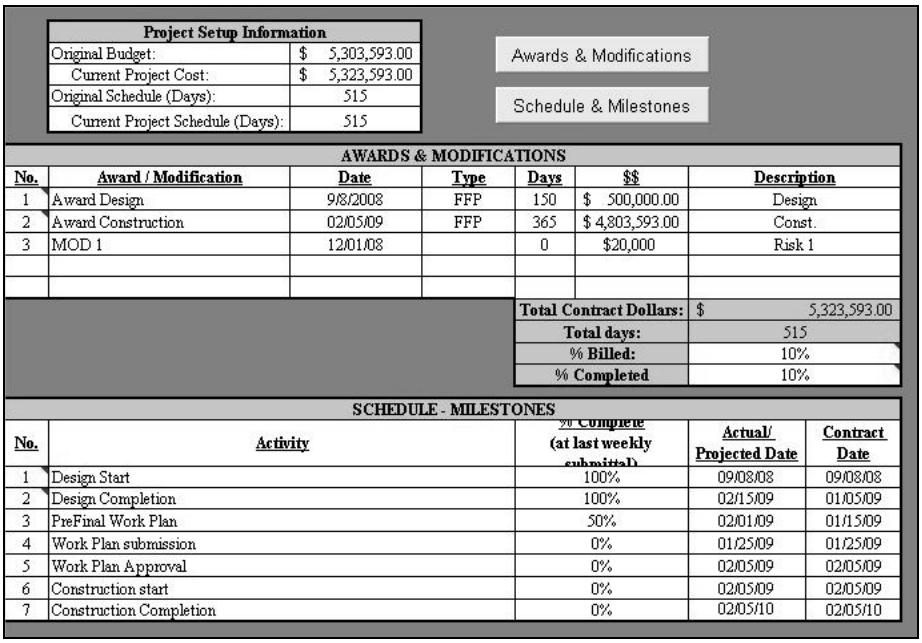
1. Project Setup: It documents the setup information of the project such as time, money, location, contractor/designer and client personnel involved along with their contact information.

Project Setup Information	
Project ID / Task Order:	123456
Project Title:	ABC
Location:	Ft. Bliss, TX (WBAMC)
Region:	SRMC
Contractor:	XYZ
Designer/Architect	PQR
Project Schedule/Budget	
Project Phase:	SI, WP & Construction (C)
Notice to Proceed Design Date:	09/08/08
Planned Design Completion Date:	2/5/2009
Planned Final Completion Date:	2/5/2010
Contract Duration (days):	365
Design Cost:	$ 500,000.00
Award Cost:	$ 4,803,593.00
Risk Management Plan (RMP)	Yes
(NTP Date should reflect earliest phase; Original completion date should be the contractor's estimate of the **total** project completion - not only the current phase(s); Award cost should compile all phase contracts (FFP\L)	

Contact Information	
Contracting Office:	CHPPM
CO Phone:	111-111-1111
Facility Manager:	FM 1
FM Phone:	111-111-1111
Project Manager:	PM 1
PM Phone:	111-111-1111
MEDCOM:	MEDCOM 1
MEDCOM Phone:	111-111-1111
QA Rep.:	QA 1
QA Phone:	111-111-1111
QA Email:	QA@client.com
Contractor POC:	CON POC 1
Contractor POC Phone:	111-111-1111
Contractor POC Email:	poc@contractor.com
Designer/Architect POC:	Designer POC 2
D/A POC Phone:	111-111-1111
D/A POC Email:	poc@Designer.com

Figure 8: Weekly risk Report, Project Setup Sheet

2. Schedule & Budget: This worksheet tracks cost and schedule deviations. There are two parts on this sheet. Awards and modifications as well as schedule and milestone. Awards and modifications as the name suggest tracks the modifications and change orders on the project with their impact on cost and days. Every modification/change order has a corresponding risk which is reported on the risk sheet. Schedule and milestone breakdowns the major milestones/deadlines of the project and tracks their deviations.



Project Setup Information	
Original Budget:	$ 5,303,593.00
Current Project Cost:	$ 5,323,593.00
Original Schedule (Days):	515
Current Project Schedule (Days):	515

Awards & Modifications

Schedule & Milestones

AWARDS & MODIFICATIONS

No.	Award / Modification	Date	Type	Days	$$	Description
1	Award Design	9/8/2008	FFP	150	$ 500,000.00	Design
2	Award Construction	02/05/09	FFP	365	$ 4,803,593.00	Const.
3	MOD 1	12/01/08		0	$20,000	Risk 1

Total Contract Dollars:	$ 5,323,593.00
Total days:	515
% Billed:	10%
% Completed	10%

SCHEDULE - MILESTONES

No.	Activity	% Complete (at last weekly submittal)	Actual/ Projected Date	Contract Date
1	Design Start	100%	09/08/08	09/08/08
2	Design Completion	100%	02/15/09	01/05/09
3	PreFinal Work Plan	50%	02/01/09	01/15/09
4	Work Plan submission	0%	01/25/09	01/25/09
5	Work Plan Approval	0%	02/05/09	02/05/09
6	Construction start	0%	02/05/09	02/05/09
7	Construction Completion	0%	02/05/10	02/05/10

Figure 9: Weekly Risk Report, Schedule and Budget Sheet

3. Risk Sheet: Risk is defined as an unforeseen problem with an impact on budget, schedule, or owner satisfaction. The contractor reports such problems on the risk sheet with a plan to minimize the risk. Once a modification is issued the risk is considered resolved and a modification is added on the schedule and budget sheet. Risk page is also utilized to document critical information of the project. The documentation also brings clear accountability. The contractor is required to list a plan to minimize each of the identified risks. This forces the contractor to accept risk for the project and encourages them to look ahead, plan, and predict what risks may be encountered in the future. The owner does not have the opportunity to reclaim the risk, as the only decision they are required to make is the rating of the risks. Following things are reported on this sheet:

- Date the risk was identified
- Type of risk
- Plan to get the risk resolved
- Planned resolution date
- Actual date resolved
- Impact to cost and time
- Responsible party which is the owner, contractor, or unforeseen (O,C,U)
- Risk rating: Risk rating is the rating given by the owner representative on the plan that the contractor makes for resolving the risk. By giving this rating, the owner representative who is generally the QA also confirms the accuracy of the information provided on the WRR. Risk rating along with the impact on $ and days generates a risk number for the project which signifies the risk factor of the project. All projects are prioritized as per the risk number on the director's report and the top 10 projects with the highest risk number are highlighted. Highlighted projects are sent to the owner higher ups every week and thus the disputes and problems tend to get resolved faster as the people involved in the projects are questionable. Contractors can use this tool to get their risks resolved faster. They can increase the risk number by decreasing the risk rating of the risks. The main purpose of the risk sheet is to get the problems and disputes resolved as soon as possible and risk

rating is an excellent tool for the same. Risk rating is inversely proportional to the risk number. Risk number is directly proportional to the problems on the project

Objectives of risk sheet:

- Documentation
- Allocation of accountability
- Current risk status
- Owner rating and Verification

A NEGATIVE impact and a POSITIVE impact to the critical path cannot be identified in the same risk.									
No	Date Entered	Risk Items	Plan to Minimize Risk	Planned Resolution Date	Actual Date Resolved	Impact Days to Critical Path (Calendar)	Impact to Cost	Owner/ Contractor/ Unforeseen Risk	Risk Rating (1-10)
0	3/17/2006	Select the Risk Item (Area of Risk) from the Dropdown Menu or enter your own.	**Risk A Plan:** 1) Problem background - why is this an unexpected project risk? If this was due to the Owner, was it the COE, Facility, or Project Manager? 2) What will be done to minimize this? 3) Who is responsible for the plan? 4) What kind of impact will this have?	3/17/2006	3/18/2006	0	$ 10,000	O	5
1	10/3/2008	Design Changes by Facility	1) 10/3/2008 Facilty has requested design changes for room 1. 2) Meeting with contractor, facility manger and designer to get the design changed on 10/10/2008 3) Owner 4) Cost impact of 20,000, no time impact	11/15/2009	12/1/2008	0	$20,000	O	10
2									
3									
4									

Figure 10: Weekly risk Report, Risk Sheet

4. Report Sheet: Report sheet is a one page summary and the final document of the project. It compiles all the information from the previous sheets in one page.

5. RMP sheet: This sheet contains the risk management plan created by the contractor before the projects starts. Next section explains the risk management plan.

Risk Management Plan

The RMP is a compilation of ALL risks (obtained from risk assessment plans, client, other parties and the contractor) and solutions to each risk identified between the NTP and Site Investigation. All risks should be prioritized from the greatest impacting risk to the least impacting risk. Risks and concerns can be added to the RMP sheet at any point in the project.

The list of risks should also include:

1. Any risks or concerns identified by other users/parties.
2. Any actions requiring client participation or approval, outside regulatory participation, or factors outside the control of the Vendor. Each action must have a due date and a minimization plan.

Director's Report

The Director's Report is an excel sheet that compiles the 250+ project weekly reports that are received weekly to gain a definitive overview of the organization. The performance numbers are complied in terms of number of projects, current budget, schedule, change orders/modifications, the percent of projects on time and within budget and other critical measurements. The report then ranks or prioritizes all of the projects according to their degree of risk which comes off the risk number from the WRR. The report is designed in such a way that it can compare the performance information of all the entities such as facility/location, COE, contractor, region, and the individuals in a specific role

such as project integrator, project manager, quality assurance engineer, and facility manager. This report is compiled every week and sent to all the owner representatives. Contractors are also able to review their performance compared to other contractors every week.

The Director's Overview allows the Director or the head of the organization to easily identify where problems are occurring in the organization. Instead of trying to address all the problems within the organization, the Director is able to isolate the projects with the highest risk impact and devote primary attention to them. The information distributed from the overview allows the Director to pass information to each individual regarding their current status in relationship to the whole. This provides an automated system that allows everyone in the organization to understand the strengths, weaknesses, and areas of improvement in the organization. Thus minimize internal decisions and management resources requirements on a weekly basis.

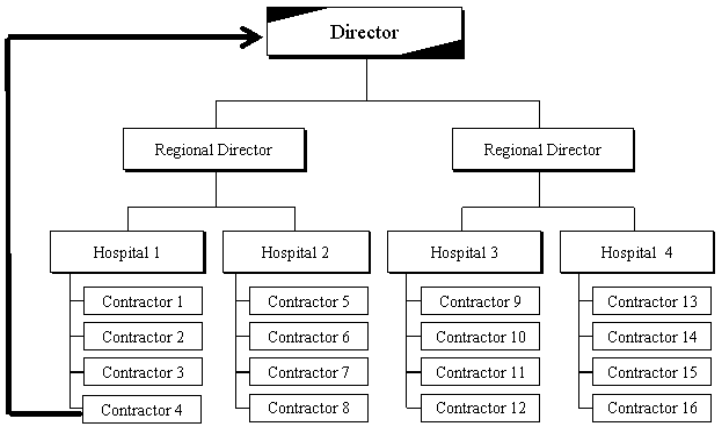


Figure 11**:** Director Report Structure

Table 1: Overall Performance Information (Division overview)

DIVISION OVERVIEW	3/5/2010
Original projects budget	$815,960,012.18
Current estimated cost	$848,148,825.51
Estimated cost over budget	$32,188,813.33
% estimated cost over budget	3.94%
PROJECT OVERVIEW	
Total Number of Projects	270
% projects on time	48%
# of jobs delayed	140
% projects on budget	65%
# of Jobs Over Awarded Budget	94
# of projects missing owner ratings	34
AVERAGE PROJECT	
Project budget	$ 3,022,074.12
% Over Awarded Budget	3.94%
% over budget due to owner	2.80%
% over budget due to contractor	0.02%
% over budget due to unforeseen	1.13%
Average length of project	473
% Delayed	19.99%
% Delayed due to owner	13.70%
% Delayed due to contractor	1.00%
% Delayed due to unforeseen	5.29%
# of risks	1.62
# owner generated risks	1.09
# of overdue risks	0.61
Owner Rating	9.09
Risk number	2.78
Total Weekly Reports Missing	3
Total % Missing Weekly Reports	1.1%
Total % missing RMP	24%

Table 2: Contractor Performance Information

CONTRACTOR OVERVIEW 03/05/2010	CON A	CON B	CON C	CON D	CON E
Total Awarded Budget	$ 52,432,079	$ 395,002,693	$ 206,981,697	$ 68,655,517	$ 82,209,365
Current Cost	$ 54,069,589	$ 405,491,064	$ 214,005,111	$ 71,348,878	$ 88,734,993
Over Budget	$ 1,637,509	$ 10,488,370	$ 7,023,414	$ 2,693,361	$ 6,525,628
PROJECT OVERVIEW					
Total Number of Projects	7	146	57	16	36
% Projects On Time	14%	61%	44%	31%	17%
# of Jobs Delayed	6	57	32	11	30
% Projects On Budget	14%	75%	58%	63%	47%
# of Jobs Over Awarded Budget	6	37	24	6	19
AVERAGE PROJECT					
# of Risks per Job	3.86	1.17	1.46	3.63	2.47
Owner Generated Risks	2.86	0.84	1.33	1.69	1.19
Number of overdue risks	1	1	1	0	1
% Over Awarded Budget	3.12%	2.66%	3.39%	3.92%	7.94%
% over budget due to Owner	1.14%	1.94%	3.14%	2.86%	7.30%
% over budget due to Contractor	0.01%	0.03%	0.00%	0.52%	-0.41%
% over budget due to Unforseen	1.98%	0.69%	0.25%	0.54%	1.05%
# of Days Delayed	380	67	84	128	161
# of days delayed due to Owner	313	51	78	35	75
# days delayed due to Contractor	4	4	0	39	13
# days delayed due to Unforseen	63	13	6	54	74
Owner Rating	9.68	9.05	8.58	9.59	9.73
Risk Number	**2.89**	**2.84**	**3.31**	**1.96**	**1.99**
% Projects missing	0%	2%	0%	0%	0%
% Projects with no RMP	0%	33%	0%	50%	0%

Top 10 Sheet

Director's report has a top 10 worksheet which contains the high risk projects prioritized by the risk number generated from the weekly report. Risk number as discussed in the previous section is calculated by a combination of a number of factors such as risk rating, over budget, and over schedule. Highlighting these projects helps in getting their issues resolved faster as this worksheet is seen by the top management at the client side.

Table 3: Top 10 Risk Projects

TOP 10 RISK RANKING PROJECTS					
No.	Project	Location	Risk #	Contractor	# of weeks on Top 10
1	Project A	Location 1	16.74	Contractor 1	10
2	Project B	Location 2	11.27	Contractor 2	1
3	Project C	Location 3	10.72	Contractor 1	3
4	Project D	Location 4	10.13	Contractor 1	9
5	Project E	Location 5	9.68	Contractor 2	12
6	Project D	Location 6	9.61	Contractor 1	4
7	Project F	Location 7	9.02	Contractor 3	6
8	Project G	Location 8	8.80	Contractor 1	12
9	Project H	Location 9	8.50	Contractor 4	20
10	Project I	Location 10	8.11	Contractor 1	2

The process is operated as follows: (Kashiwagi, Sullivan, Kashiwagi, 2009)

1. Contractors generate a WRR for every project as soon as they receive an award (NTP).
2. Contractors identify and document in a risk management plan (RMP) all concerns and risks that they do not control, with the plan to manage and minimize them.
3. Contractors put a milestone schedule on all activities.

4. Contractors update the WRR every week, identifying any deviations from the schedule and cost, with their respective reasoning.

5. The owner representative generally QA, checks the accuracy of the WRR. Incase of any discrepancy identified by the owner, contractors rectifies the WRR.

6. The data from the WRR compiles into the Director's report which generates performance numbers for all components. This information is sent out to the contractors and the client.

7. The information produced by the Director's Report is analyzed quarterly.

8. After the project is completed, the owner/client rates the contractor and fills a close out survey. The close out survey may be used as past performance information for procuring the contractors again for a new project. Fig 12 shows the PIRMS loop.

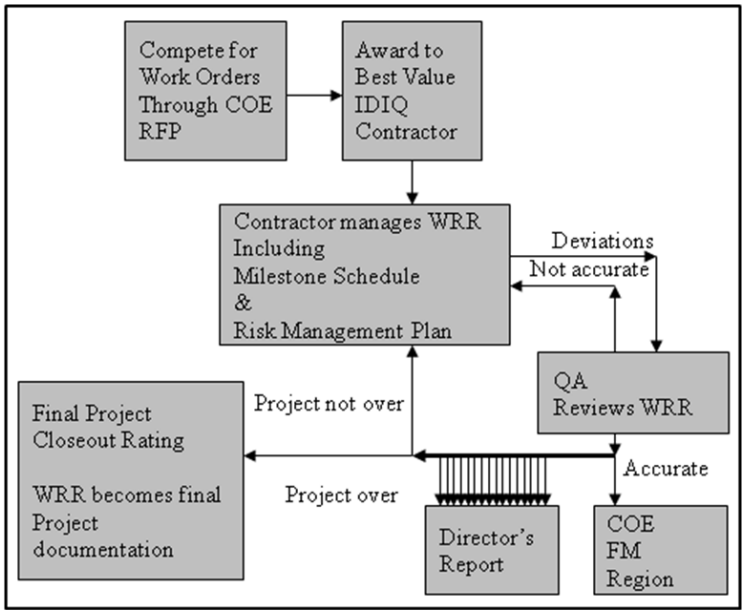


Figure 12: PIRMS Process Loop

Value added by PIRMS

PIRMS is able to add value to an organization as follows:

- Accurate performance information in terms of cost, time, and customer satisfaction
- Improves performance of projects
  - Projects running system improve % over budget, and % on-time, % customer satisfaction.
- Increases accountability of all parties
  - Weekly report can be used anywhere to document performance
  - Any deviation is documented thus problem areas are identified
- Minimized effort
  - Requires minimal work from owner staff
  - Contractors require minimal management from owner representative
  - Top 10 list shows where to exert efforts
- Transparent and simple
  - Information can be gathered and collected quickly (on any aspect of the system)
  - PIRMS does not take a lot of technology and communication; it is user friendly and requires low maintenance.

PIRMS clearly defines the roles of the participants. The role of the owner's representative is to:

1. Do quality assurance.
    - Quality assurance, is defined by PIRMS as:
        i. Ensuring that the contractor is turning in a weekly report.
        ii. Ensures that the weekly report is accurate and updated.
2. Relay to the contractor facility's concerns

The role of contractor is to:

1. Deliver quality design and construction work
2. Identify and minimize risk that they do not control
3. Identify and document the deviations on the project in terms of cost and time.

PIRMS uses dominant information/simplistic structure that minimize disagreements. Dominant information is defined as "simple, timely, and easily understood by all parties." It is not technical, it is not late, and it does not force the client/buyer to make decisions.

PIRMS Application in MEDCOM

MEDCOM is an organization that works with multiple groups with their respective roles. Each group has their set of responsibilities. Major groups as discussed in chapter 3, are the Corps of engineers; Facility, Regions, and IDIQ Contractors. The end users/doctors/nurses decide their requirement and inform the facility. Facility forwards their request to the region. Region sends the request to MEDCOM. MEDCOM after analyzing the requirement and funding sends the

details to the Corps of Engineers, who set up an initial scope and invites IDIQ contractors to bid on the projects. The best value contractor is selected and creates a WRR and RMP before the project start.

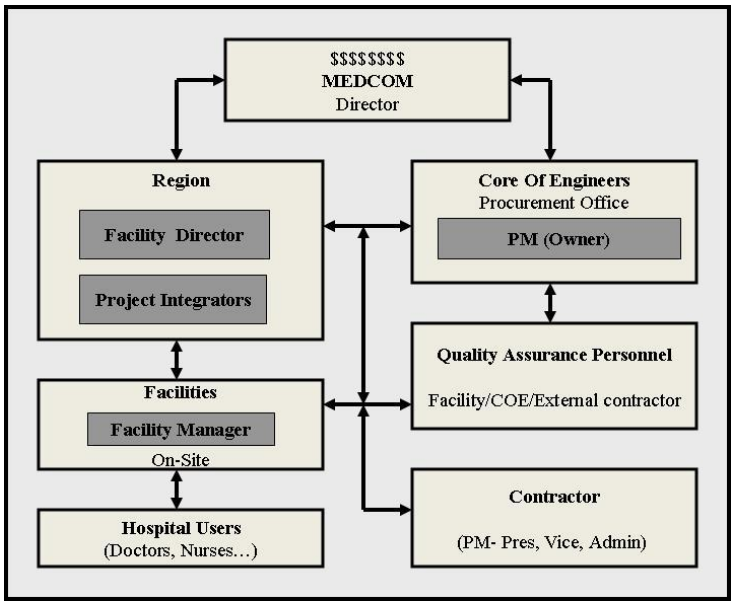


Figure 13: MEDCOM Operational Loop

PIRMS was developed at Arizona state university by a research group, 'Performance Based Studies Research Group'. This research group acts as a best value consultant for MEDCOM and generates performance numbers from the weekly reports and analysis them. All the on-going weekly reports every week are sent to PBSRG by the contractors after being reviewed by the owner representative. Reports are compiled in a director's report and further used for generating useful and dominant information. Figure 14 shows the MEDCOM, MRMP process from NTP to close out.

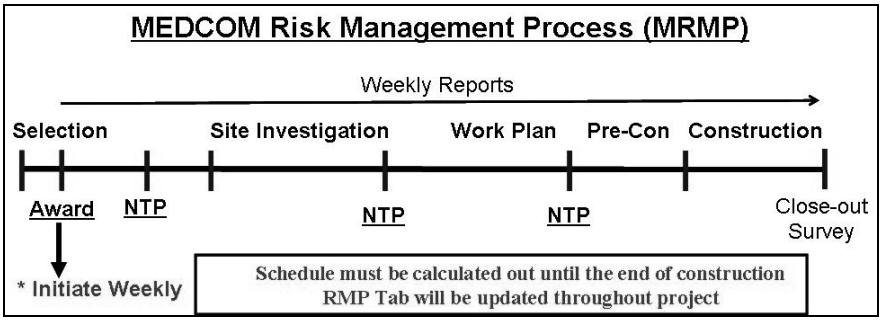


Figure 14: MRMP process NTP to close out

PIRMS or MEDCOM Risk Management Process in MEDCOM can be divided in to two phases; on-going project performance cycle (fig. 15) and completed project performance cycle (fig. 17).

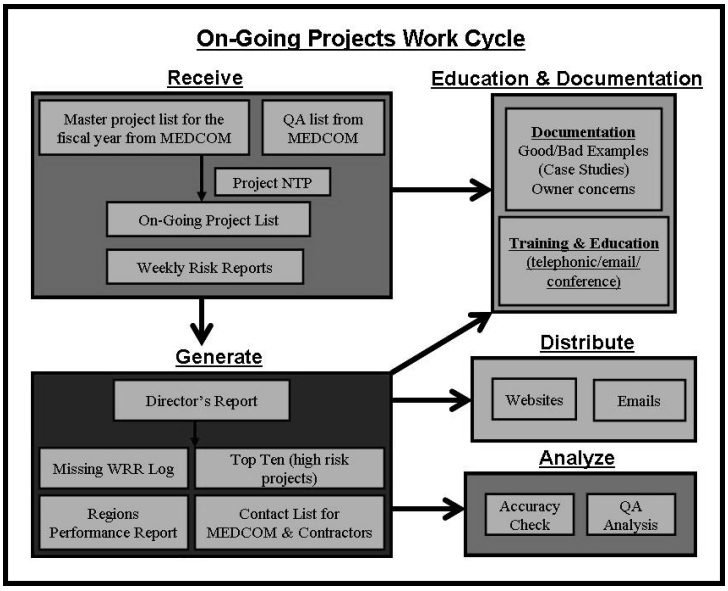


Figure 15: PIRMS: On-going Projects Work Cycle

On-going Projects Work Cycle

On-going project information is generated from the WRRs, sent every week for the on-going projects (approximately 300 projects each fiscal year). At the beginning of the fiscal year, MEDCOM creates a project list for the upcoming

year with details such as procured contractor, awarded cost, awarded time etc. This list is considered as the on-going project list and is tracked and updated throughout the year by PBSRG. Contractors also send their list of projects to PBSRG, which is used as a cross check. During the year as the projects receive their notice to proceed (NTP), contractors start sending their weekly reports with the necessary updates. Missing weekly reports throughout the on-going process are tracked and contractors are penalized for the same.

All the weekly risk reports are combined in a director's report to measure any deviations on the projects and further analyzed such that the following overall objectives are achieved:

- *Risk Mitigation: Information of the projects with high risk*. These are the projects which need attention as they highly impact time, cost or customer satisfaction. As director's report gives limited information with respect to the risk on project, a top 10 form is created for further details. This top 10 form gives the necessary details such as :
- Causes of the risks and their impact / Entity at risk
- Action performed on the project to resolve the risk/dispute
- Duration of the projects being high risk
- Optimal solution or whom to contact to resolve the risk/dispute. Table 4 shows an example of the top 10 form. This document is distributed throughout the organization every week and acts as a great tool to minimize risk.

Table 4: Top 10 Form

Rank	Top 10 Projects	Location	Risk #	Contractor	Appearance Date	Actions Performed	# of weeks on top 10	NTP of the Project	Completion Date
5	**Example Project**	**WRAIR**	**10.00**	**JJK**	**3/17/2006**	**1. Why is this project on the top 10 list 2. What is being done to decrease the risk on the project Log of all actions taken on the project**	**5**	**4/11/2008**	**Mobile**
1	Project A	Location A	42.63	CON A	10/18/2007	1) 12/8/2008 Incomplete drawings caused additional scope. 2) Time extension requested, approved 7/16/2009. Action on modification still awaited. no action taken till 1/22/2010	**58**	10/18/2007	10/18/2010e
2	Project B	Location B	35.10	CON B	9/19/2008	1) a. Gov't has not approved abatement b. Awaiting MOD for hazardous materials c. approval to change subcontractors. 2) a. 11/20/9 Waiting on Government MOD b. 11/20/9 Waiting on Government response. c. Request was submitted on 8/12/2009.	**16**	9/19/2008	7/2/2009

- *Performance Information/Accountability:* Individual performance lines are created such as regional performance lines, facility performance lines etc to motivate entities to perform better and create accountability.
- *Efficient Communication:* Director's report is also capable of combining all the contact information from the weekly report to one spread sheet. The contact list has information for MEDCOM, COE, regions, individual facilities and contractors in one spread sheet which facilitates faster communication (table 5).

Table 5: Contact List & Education Documentation

Contact Information for MEDCOM							Education								
#	Name	Position	Office #	Cell #	Fax #	Email	By Telephone			By Email			By Training Seminars		
1	Contact A	MRR, Program Manager	1234	1234	123	contactA@us.army.mil	Date	Date	Date	Date	Date	Date	Date	Date	Date
							PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG Personnel
2	Contact B	Colonel, Asst. Chief of Staff for Installations	5678	5678	124	contactB@us.army.mil	Date	Date	Date	Date	Date	Date	Date	Date	Date
							PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG Personnel
3	Contact C	Major	91011	91011	125	contactC@us.army.mil	Date	Date	Date	Date	Date	Date	Date	Date	Date
							PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG Personnel
4	Contact D	M & R Facility Concepts	121314	121314	126	contactD@us.army.mil	Date	Date	Date	Date	Date	Date	Date	Date	Date
							PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG Personnel
5	Contact E	MEDCOM Director	151617	151617	127	contactE@us.army.mil	Date	Date	Date	Date	Date	Date	Date	Date	Date
							PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG P	PBSRG Personnel

- *Transparent Organization*: One of the objectives of PIRMS is to create a transparent environment such that there is less confusion and more accountability. To achieve this objective, performance information generated

every week is circulated and published on PBSRG and army websites. It also acts as a motivational factor for improvement as all entities are able to compare their performance with their competition. Performance numbers are also sent through email in some cases such as individual performance lines for regions and facilities. Army website is updated every week with Director's report and top 10 weekly risk reports.

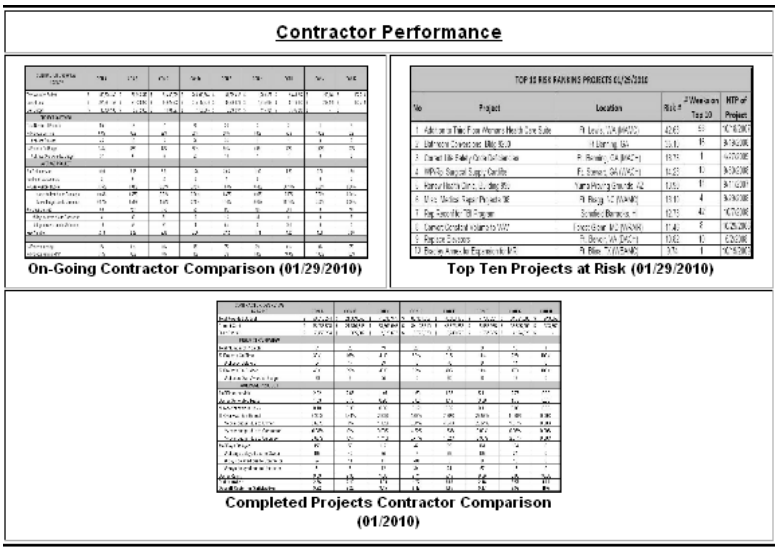
PBSRG website is updated under two sections:

1. MEDCOM Performance

- Weekly Update
  - Director's report
  - All weekly reports
  - On-going projects - contractor performance lines
  - List of top 10 projects
- Monthly Update
  - Accuracy analysis on on-going projects
  - Contractor performance lines (completed projects)
  - Time to resolve risk (completed projects)
  - Project performance compared – project with RMP/without RMP (completed projects)

2. CONTRACTOR Performance.

All the performance information under this section is coded and similar to the MEDCOM performance webpage. Figure 16 shows the contractor performance webpage on the PBSRG website.



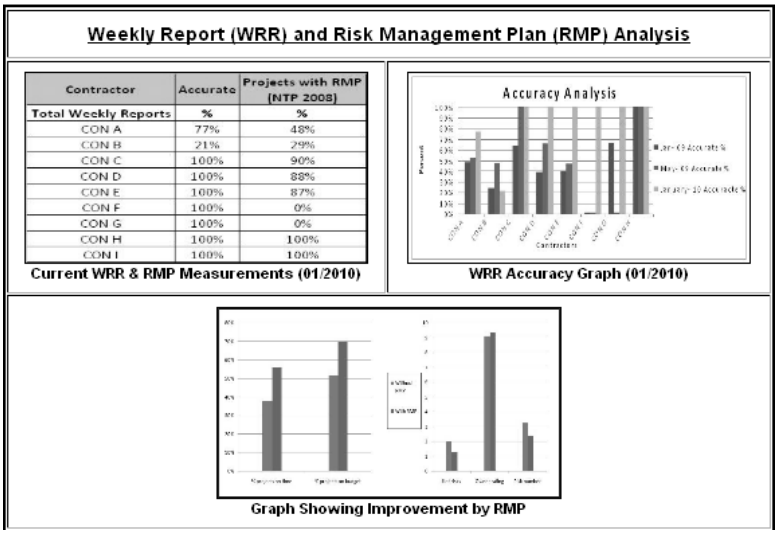


Figure 16: PBSRG Website: Contractor Performance Webpage

- *Accurate Information*: Since, WRR is a contractor generated document, its validation is a critical step to ensure accurate information. The QA representatives are responsible for validating the WRR every week. To make

sure QA's are doing their job, PBSRG remains constantly in touch with the QA's to get feedbacks on the WRR information. Additionally, PBSRG does accuracy analysis on the WRR by comparing schedule, modifications and risks.

- *Training and education* is a very important element of PIRMS. Contractors and MEDCOM personnel are given training continuously through seminars and tele-conferences. For training purposes successful and unsuccessful projects are documented throughout the year and are presented as examples at seminars every so often. This documentation helps in educating the organization about the dos and don'ts. Table 5 above shows the education documentation template.

Completed Projects Work Cycle

Another aspect of PIRMS is completed project performance information. For every completed project there is a close out survey rated by the government representative and a final weekly risk report sent by the contractor. All completed weekly reports are compiled in a completed director's report. Completed projects are then analyzed and performance is compared over years. Overall performance is measured and compared in % on time, % within budget and customer satisfaction. The objective of performing analysis on the completed projects is to measure the overall progress over years. MEDCOM is able to see the performance improvement or decline of their facilities, regions and contractors which helps them to put right efforts in the right place and most significantly

shows the benefits, if any, of using PIRMS in their organization. Figure 17 shows the completed project performance cycle. Following are the analysis done on the completed projects:

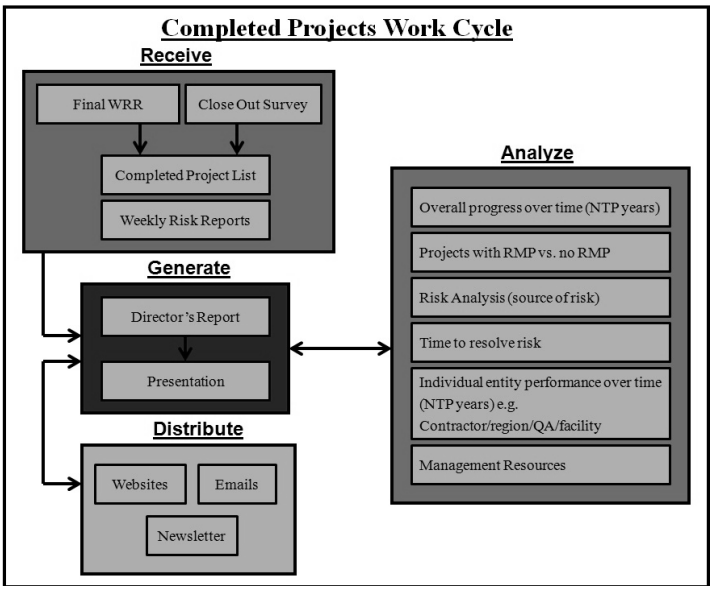


Figure 17: PIRMS: Completed Projects Work Cycle

- *Overall Progress over Years:* Overall performance over years is measured by comparing the following over the NTP years:
    - Percent projects on time
    - Percent projects within budget
    - Percent over schedule impact on original schedule
    - Percent over budget impact on original cost

The above information can be generated automatically by a slight modification in the director's report. This information is generated every month and added to the latest presentation. Table 6 shows the template for the overall performance progress.

Table 6: Overall Performance Progress Measurement Template

Project Overview	**NTP 2006**	**NTP 2007**	**NTP 2008**	**% Improvement**
Total Number of Projects				
Original projects budget				
% projects on time				
% projects on budget				
Average Overview	**NTP 2006**	**NTP 2007**	**NTP 2008**	**% Improvement**
% Over Awarded Budget				
% Over budget due to owner				
% Over budget due to contractor				
% Over budget due to unforeseen				
% Delayed				
% Delayed due to owner				
% Delayed due to contractor				
% Delayed due to unforeseen				

To measure the progress over years, performance analysis is also done on the projects with RMP. RMP was introduced in 2008 and since then PBSRG has put efforts to educate contractors on the benefits of RMP and its optimal use. To measure the improvement in performance and to motivate the contractors to use RMP for every project, comparative analysis is done on the projects with RMP and without RMP. Table 7 shows the template for the analysis. Again these numbers are automatically generated by tweaking the director's report.

Table 7: Project Performance with/without RMP

Project Overview	**Without RMP**	**With RMP**	**% Improvement**
Total Number of Projects			
Original projects budget			
% Projects on time			
% Projects on budget			
Average Overview	**Without RMP**	**With RMP**	**% Improvement**
% Over Awarded Budget			
% Over budget due to owner			
% Over budget due to contractor			
% Over budget due to unforeseen			
% Delayed			
% Delayed due to owner			
% Delayed due to contractor			
% Delayed due to unforeseen			

- *Pre-planning & Risk Mitigation*: Increased use of WRR and RMP is an indication of increased pre-planning and risk mitigation. As a result, utilization of WRR and RMP is measured over time. In addition, contractor's capability of identifying risks at the beginning of the project is analyzed over time by comparing risk occurrence and their impact on projects with RMP and without RMP.
- *Risk Analysis; Source of Risk & Risk Type:* Risk analysis gives the information pertaining to the type of risks and source of risk. Risks from all the completed WRRs are compiled in a spread sheet and the risk description is analyzed to categorize the type and source of risk. As every individual group with MEDCOM had a discrete role, categorizing risk is possible. For example facility is responsible for on site operations, therefore, any risk pertaining to

the scope of work, addition or change, is the responsibility of the facility. Similarly any contractual problem is put under the COE. Complete analysis on all the projects gives the details about the source of problem. MEDCOM is able to know where to apply more effort to solve the future problems with this information. Risk Analysis also increases the accountability in the organization as the source of problem shows the responsible entity and their impact on dollars and days. Table 8 shows the template for risk analysis. Here, risks are compiled using a formula and are read manually to put in categories.

Table 8: Risk Analysis Showing Source of Risk and Risk Type

No.	Common Risks	% Risk Occurrence	% Impact (risk days)	% Impact (risk $$)
1	Modification in design/specs/scope			
2	Change in schedule			
3	Contractor generated			
4	Sub-contractor issue			
5	Additional scope of work			
6	Delay in approval			

- *Dispute/Concern and Risk Resolving Time*: MEDCOM being a large government organization is very bureaucratic as explained in chapter 3; which causes huge delays in solving disputes and concerns. One of the major objectives of PIRMS is to reduce the time to resolve disputes and concerns and with time mitigate them completely. Tools such as top 10 form, comparative performance lines and risks analysis showing source of risk and their dollar and days impact are very useful in bringing down the time to resolve risk. To check the progress over years to resolve risk, all the risks

from all the weekly reports for one NTP year are accumulated in a spread sheet and average number of days to resolve a risk is calculated. To calculate the days; the date the risk was identified and the date it was resolved are subtracted. This table is updated every six months.

Table 9: Risk Resolving Time

Year	Days to Resolve Risk
Year 1	
Year 2	
Year 3	

- *Individual Entity Performance Lines:* Comparative individual performance lines are created for QA's, contractors, regions and in some cases facilities. Progress for all of the above entities is compared over NTP years. High and low performing entities are highlighted. Positive performance progress over years shows the increased alignment of resources in the areas of their expertise. Table 10 shows the template used for QA performance lines.

Table 10: QA Performance Analysis

Quality Assurance Overview	QA 1	QA 2	QA 3	QA 4
Facility/Location	Location A	Location C	Location C	Location D
Region				
Total Number of Projects				
Total Awarded Budget				
Current Cost				
Project Overview	**QA 1**	**QA 2**	**QA 3**	**QA 4**
% Projects On Time				
% Projects On Budget				
% Delayed				
% Over Awarded Budget				

- *Management Resource:* Further, information generated by the director's report helps in analyzing the management resources used by MEDCOM. The resource analyzed regularly is the QA. QA representatives are third party non government entity extracting millions of dollars from MEDCOM. Consequently, it is of utmost importance to decrease the number of QAs hired each year. Under the previous misaligned management environment, QA performed quality control and quality assurance on projects which increased their scope of work resulting in increased number of QAs on board. With the new paradigm shift, contractor being the expert does the quality control and QA strictly, quality assurance. As a result QAs are able to oversee more projects than before consequently decreasing the number of QA representatives and cost to MEDCOM.

Resources used by PBSRG

To create the entire analysis and performance matrix at Performance Based Studies Research Group a program manager (full time), project manager (part time) and four analysis experts (part time) are appointed. Program manger is the overall head and holds seminars and educational sessions. Project manager coordinates with the contractors, quality assurance engineer and the facility mangers and manages operations within PBSRG. Analysis experts perform the analysis using raw data from the weekly reports. PIRMS is a simple process which generates the performance information in a very inexpensive way using

Microsoft excel. Most of the analyses are generated automatically by using macros in excel.

Weekly Process at PBSRG

- Thursday: The Contractor updates the WRR and sends it to the QA for validation
- Friday: QA sends back the validated WRR with his/her concerns if any
- Friday through Monday: Contractor circulates the WRR to MEDCOM and other groups including PBSRG
- Tuesday: At PBSRG:
  - All the reports are compiled in the director's report
  - Top 10 high risk projects highlighted on the Director's report
  - Top 10 form is created
  - Director's report is run for individual regions
- Wednesday:
  - Performance information is circulated to MEDCOM, other government groups and contractors.
  - Individual performance lines is created as requested by MEDCOM
- Thursday:
  - Contact list is updated
  - Education & Training (PBSRG contacts QA and contractor PM's for education and training)

MEDCOM personnel and contractor PM's are contacted to follow up with the progress of the top 10 projects

- Friday:
  - Documentation
  - Completed projects updated
  - Accuracy analysis for on- going project reports

During the week and throughout the year analysis is done on the on-going and the completed projects and performance information is updated and presented at educational meetings and training seminars.

Chapter 5

Data Analysis & Results

Chapter 4 explained the PIRMS process and its application in MEDCOM. It also described the steps of collecting data weekly, monthly and yearly. The data collected using the methodology in chapter 4 will be analyzed in chapter 5 to validate the hypothesis. The objective is to show that there is sufficient evidence to suggest that PIRMS has the capability to increased performance in MEDCOM. Data was analyzed as follows:

1. Completed projects over $300K were divided into years 2006 through 2008 based on their notice to proceed.
2. Project performance progress was compared for the years 2006-2008.
3. Since the variation in project cost, project duration and project type was huge, analysis was based on average values.

Increased Receptivity of PIRMS

Optimal use of a leadership structure is dependent on its receptivity which comes from the understanding of its benefits. There has been an increase in voluntary participation by IDIQ contractors who are delivering the services to learn the leadership based structure/process PIRMS. Constant request for education and training has been received from the contractors. Contractor attendees at the PIRMS/best value conference have increased by 3 times since 2006 and for the owner representatives by 4 times. Due to extensive system-wide education of information environment, awareness of benefits of PIRMS has been

increased by leaps and bounds. Five out of seven IDIQ contractors are pursuing their own training to implement the WRR and RMP. Table 11 shows the increase in the number of participants and contractor training requests.

Table 11: MEDCOM/Contractors Participation

Best Value Conference Attendees	**Year 06'-07'**	**Year 08'-09'**
Entity	**# of Representatives**	
IDIQ contractors	23	79
Client	9	37
Certification Program	**Year 06'-07'**	**Year 08'-09'**
Certified best value contractors	0/7	2/7
Awareness & Best Value Education/Training	**Year 06'-07'**	**Year 08'-09'**
Contractors requesting education/training	2/7	5/7

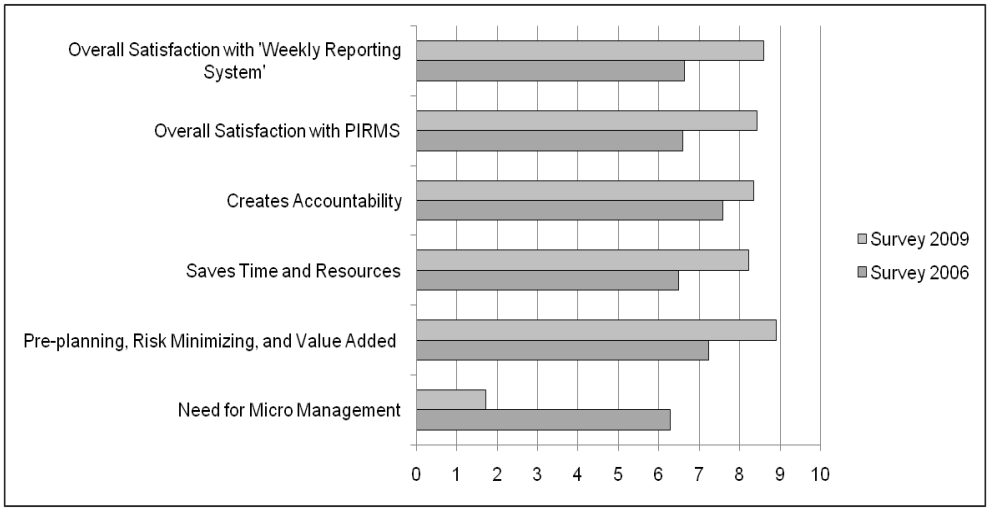
(Kashiwagi 2009)

Another momentous step is the increased testing by MEDCOM personnel in trying out the leadership based structure/processes. MEDCOM is implementing PIRMS on their new construction (MILCON), which is a multi billion dollar industry. This is a testimony of the receptivity and fondness of this leadership structure.

Additionally, MEDCOM personnel and contractor personnel are able to identify the difference in the results by rating the capability to produce performance of the two environments. In 2006, a survey was conducted by PBSRG to measure the effectiveness of PIRMS and evaluate the results of education as well as the change of industry perception. The survey was distributed and completed by the contractors and project integrators (owner representatives) involved in the MEDCOM system. In 2009, a similar survey was conducted on

both the contractors and the owners to evaluate the increase in the understanding of the benefits of PIRMS. Comparison shows, overall satisfaction with the leadership structure PIRMS has increased by 30%. The perception of need for micromanagement has changed with a 250% agreement on reduced micromanagement with increased use of PIRMS. Weekly risk report shows an increased satisfaction by 30%. Table 12 shows the comparison ratings of 2006 and 2009 survey results.

Table 12: Survey Comparison 2006 & 2009



The 2009 survey shows 45% of the user group is highly satisfied with the RMP and 60% with the WRR. Low satisfaction of RMP is due to its low awareness which is a result of its recent introduction in the PIRMS process. Areas where PIRMS score dominantly high are risk identification before the project start; pre-planning and value added; and time and resource saving. Table 13 shows the 2009 survey results for PIRMS, 10 signifies high satisfaction and 1 implies low satisfaction.

Table 13: Survey Results for WRR & RMP 2009

S.No	Risk Management Plan	Average Ratings
1	Resolves Disputes and Concerns	8
2	Increases Contractor Accountability	7
3	Minimizes Risks, Surprises and Problems	7
4	**% People Satisfaction (Score 9 and above)**	**45%**
S.No	**Weekly Reporting System**	**Average Ratings**
1	Resolves Disputes and Concerns	9
2	Increases Contractor Accountability	8
3	Creates Dominant Information	9
4	Minimizes Risks, Surprises and Problems	9
5	Reduces Management	8
4	**% People Satisfaction (Score 9 and above)**	**60%**

An increased ability of the contractor's PM in documenting risk, and measuring deviation from project baselines in projects (%WRR, %RMP) is another confirmation of increased receptivity of the PIRMS process. In 2006, 55% of the projects had WRR as compared to 2009 which has 100% projects with weekly reports. For the first time, the party pushing PIRMS are the contractors, and not MEDCOM or the COE.

Increased Validation of the Data

In 2009, 50% of the QA's contacted, were using and validating the WRRs. In 2010, 70% of the QA's contacted, are using and validating the WRRs with high satisfaction rating for the overall system.

Increased Performance of the Projects over Time

The prime evidence of the success of PIRMS is the increase in the performance over years. In these years, there is a noticeable decrease in deviation on projects. Deviations are measured in terms of percent projects on time, percent project within budget, additional cost and additional days.

The results show, since 2006, there is a 3% progress in the projects on time and 23% progress in the projects within budget. Additional cost and additional days have reduced by an average of 35%. Table 14 shows the overall performance progress from NTP 2006 to NTP 2008. On an average there is a 51%progress in the performance since 2006.

Table 14: Overall Performance Progress over Years

Project Overview	**NTP 2006**	**NTP 2007**	**NTP 2008**	**% Progress**
Total Number of Projects	78	76	79	-
Original projects budget	$144,527,987	$94,928,381	$81,137,199	-
% projects on time	32%	21%	33%	3%
% projects on budget	42%	51%	52%	23%
Average Overview	**NTP 2006**	**NTP2007**	**NTP2008**	**% Progress**
% Over Awarded Budget	**7.80%**	**5.37%**	**5.45%**	**30%**
% Over budget due to owner	6.24%	3.69%	5.07%	19%
% Over budget due to contractor	-0.08%	0.16%	0.00%	-
% Over budget due to unforeseen	1.64%	1.52%	0.38%	77%
% Delayed	**43.11%**	**43.71%**	**25.94%**	**40%**
% Delayed due to owner	27.01%	34.92%	23.23%	14%
% Delayed due to contractor	3.47%	1.48%	-1.09%	132%
% Delayed due to unforeseen	12.62%	7.32%	3.80%	70%

Since 2008, RMP is made mandatory for all projects; however, till date only 70% of the on-going projects and about 20% of the completed projects have RMPs. With the increase in the number of projects with RMP since 2008, there has been a significant decrease in the overall deviations. Projects with RMP show 29% less deviation as compared to projects without RMP. Projects on time and within budget have increase by an average of 19%. Contractor's impact on the deviations has reduced by 100% which shows their increased ability to pre-plan and minimize risk. A significant change can be seen under the impact of unforeseen risks which implies the increased vision of the contractors on the projects. Average number of risks on a project has reduced by 11%.

Table 15 shows the performance comparison between projects with and without RMP. To perform this analysis a project was considered to have a RMP if its WRR started with risks mentioned on the RMP attachment. Even though the analysis is complete in itself, RMP utilization has a potential for future research. Research can be done on the risks mentioned in the RMP with respect to their occurrence during the project.

Table 15: Project Performance with/without RMP

Project Overview	**Without RMP**	**With RMP**	**% Progress**
Total Number of Projects	185	48	-
Original projects budget	$237,076,935	$ 83,516,632	-
% Projects on time	28%	31%	11%
% Projects on budget	46%	58%	27%
Average Overview	**Without RMP**	**With RMP**	**% Progress**
% Over Awarded Budget	**7.34%**	**4.07%**	**45%**
% Over budget due to owner	5.69%	3.77%	34%
% Over budget due to contractor	0.02%	0.00%	106%
% Over budget due to unforeseen	1.63%	0.30%	82%
% Delayed	**39.58%**	**34.12%**	**14%**
% Delayed due to owner	27.26%	32.84%	-20%
% Delayed due to contractor	2.44%	-1.77%	172%
% Delayed due to unforeseen	9.87%	3.05%	69%
Average # of risks per project	2.24	2.00	11%

Increased Pre-Planning and Risk Mitigation

Increased use of WRR by 80% and RMP by 200% indicates an increase in pre-planning and risk mitigation in MEDCOM. Additionally, the number of risks has reduced by 11% as shown in table 15. A detailed risk analysis on the completed projects with/without RMP shows remarkable increase of pre-planning and risk mitigation (table 16). An increased ability of contractors to identify and mitigate risks is evident from the results.

Table 16: Risk Analysis for Projects with/without RMP

No.	**Causes of risk**	**Impact on days (%)**		**Impact on $$ (%)**	
		With RMP	**Without RMP**	**With RMP**	**Without RMP**
1	Modification in design/specs/scope	8.08%	19.74%	10.65%	46.18%
2	Change in schedule	3.53%	11.22%	0.04%	0.08%
3	Contractor generated	0.63%	4.64%	0.00%	0.42%
4	Sub-contractor related	0.27%	3.67%	0.00%	4.83%

Increased Contractor Performance

Increase in individual performance of the entities over time is a substantiation of increased alignment of resources within the organization. Entities are capable to perform higher under the circumstances where they are the experts. PIRMS enforces alignment of these experts which results in higher individual performance. To measure the increase, contractor performance was compared over years. An analysis was done on individual contractor's performance over NTP years 2006 through 2008. Their performance was also correlated with their ability to create risk management plans for their projects. Results show with the increased use of RMP deviations on projects are reduced by a significant amount. Additionally, their affect on over schedule and over budget is reduced by 14%. Results show better aligned contractors. Table 17 shows the analysis.

Table 17: RMP Analysis on Individual Contractors

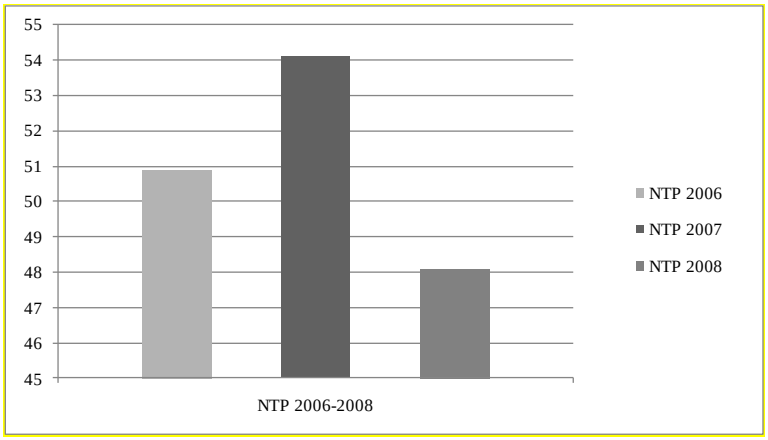
Contractor View	**% Increase 2006-2008**			
	Contractor A	**Contractor B**	**Contractor C**	**Contractor D**
% Projects on time	12.0%	0%	0%	20.0%
% Projects on budget	9.4%	27.8%	20.0%	55.0%
% Over awarded budget	5.3%	0%	0%	2.9%
% Delayed	26.3%	8.9%	27.1%	10.7%
% Projects with RMP	43.2%	63.9%	55.0%	100.0%

Decrease in Time to Resolve Risk

Average time to resolve risks has reduced by 6% since 2006 and 11% since 2007. It took an average of 51 days to resolve a risk in 2006 which has

reduced to 48 days in 2008 (table 18). Supporting evidence is the reduced number of risks by 11%.

Table 18: Time to Resolve Risk



Decrease in Management

MEDCOM's objective in utilizing PIRMS was to reduce management. With WRR in place, all actions and decisions are documented thus creating an environment of accountability. In this accountable environment resources are forced to align in the areas of their expertise. Alignment reduces the need for management as experts don't need directions to perform their work. The effect can be seen by the reduced need for QA management in MEDCOM. Since 2006, number of projects per QA has increased by 44% as shown in table 19. With the increase in number of projects per QA there is an overall decrease in the number of QA's hired which has further reduced the dollars spent on them. Due to lack of information on the QA cost the reduced management in dollars cannot be presented in this research and opens avenues for future research.

Table 19: Projects per QA Progress

Data	NTP 2006	NTP 2007	NTP 2008	% Progress
# of projects per QA	1.45	1.31	2.1	44%

Increased Dominant Information for Future Improvement

PIRMS has the capability of creating dominant information which can be used as a tool to improve future performance. MEDCOM is able to witness the following information now:

- A complete project list of on-going and completed projects with all the necessary information on the projects
- Contact list of all the participants; contractor representatives & MEDCOM personnel
- High and low performing individuals. Table 20 shows high performing QAs.

Table 20: High Performing QA's

Quality Assurance Overview	QA 1	QA 2	QA 3	QA 4
Facility/Location	Location A	Location B	Location C	Location D
Region	Region A	Region B	Region C	Region D
Total # of projects	2	2	1	1
Total awarded budget	$2,953,258	$861,669	$486,231	$199,841
Project Overview	**QA 1**	**QA 2**	**QA 3**	**QA 4**
% Projects on time	100.00%	50.00%	100.00%	100.00%
% Projects on budget	50.00%	100.00%	100.00%	100.00%
% Delayed	-31.96%	2.33%	0.00%	0.00%
% Over awarded budget	8.36%	0.00%	0.00%	0.00%
General Overview	**QA 1**	**QA 2**	**QA 3**	**QA 4**
% Risk management plan	100%	100%	100%	100%
% of accurate weekly	0%	0%	100%	100%

- Individual performance lines of various entities and as requested

- A newsletter every six months showing the progress and the latest information on the overall performance
- A website with the latest performance information every week

The results of the above discussion and data analysis validate the hypothesis that a leadership based structure has the capability to improve performance of an organization by increasing the capability of their personnel to pre-plan and minimize risk on their projects. There is a decrease in budget and schedule over runs as shown in the data analysis results. It can also be stated that PIRMS is able to increase the accountability of the organization as the number of risks and the time to resolve risk have reduced significantly. In this accountable environment resources are now more aligned in the areas of their expertise. The fact that alignment reduces the need for directions and control signifies a decrease in management which is supported by the reduced QA cost. To conclude the organization that was management based now has more traits of a leadership based organization with high performance results. The process will continue to create a performance information environment that is able to generate clear, timely, accurate and dominant information, such that need for decisions will be reduced and eradicate with time, as the data will drive the organizational operations and become self-regulatory consequently making the organization more efficient.

Chapter 6

Conclusions & Future Recommendations

Conclusion

It can be concluded from the results that a leadership based structure has the ability to increase the project performance (on time, within budget, and meeting expectations) of an organization. Results show that the overall performance of MEDCOM has increased with the increased use of PIRMS. The structure motivates the contractors to voluntarily learn the system of leadership characteristics. PIRMS is capable of increasing the risk minimization capability of the contractor's project managers thus increasing pre-planning and risk mitigation on projects which results in increased overall performance. Hence, proactive management is more effective than the traditional management, direction, control and inspection by client's professional representatives. This is a "win-win" characteristic that is found in leaders.

Potential Research and Future Recommendations

This research has potential research opportunities. Since the application of PIRMS is fairly new and the optimal use of PIRMS is still in progress, research can be continued till the PIRMS is used to its optimal. Certain useful analysis could not be performed due to lack of information from the contractors and MEDCOM as mentioned in chapter 5, which can be completed as future research. Following are the potential research options suggested:

- Performance for projects with and without RMP was compared in chapter 4; however, more research can be done on the risks mentioned in the RMP and their occurrence during the project.
- Top 10 form being fairly new needs more research. Time to resolve risk using the top 10 form can be analyzed over time.
- QA cost analysis could not be performed due to lack of information from MEDCOM; it also has a potential for future research.

As a future recommendation this process can be analyzed in more extensive testing, in different situations, and in different industries to check the consistency of results.

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APPENDIX A

SURVEY 2006 & 2009

Survey 2006

NO	CRITERIA FOR EFFICIENCY	SCALE	INITIAL REPORTING SYSTEM	PIPS WEEKLY REPORTING SYSTEM
1	Identifies and prioritizes projects according to risk	(1-10)	1	10
2	Clarifies the functions of the organization	(1-10)	1	5
3	Minimizes owner risk	(1-10)	1	8
4	Provides information that assists in leading the organization	(1-10)	1	8
5	Reduces confusion	(1-10)	1	10
6	Transfers risk to the contractor and forces the minimization of risk	(1-10)	1	10
7	Encourages planning ahead	(1-10)	1	10
8	Allows the comparison of employees through performance numbers	(1-10)	1	10
9	Requires continual self-assessment	(1-10)	5	10
10	Minimizes excess information flow between all entities	(1-10)	1	10
11	Easy to integrate into the procurement/ management system	(1-10)	1	10
12	Requires minimal time to maintain	(1-10)	1	10
13	Places each entity at risk for their respective responsibilities	(1-10)	1	10
14	Discourages owner management	(1-10)	1	10
15	Provides current division statistics (#Projects, Award $$, #On Time, #On Budget, etc.)	(1-10)	1	10
16	Supports competition in the organization	(1-10)	1	8
17	Does not promote relationships	(1-10)	10	10
18	Advocates a performance environment (projects are finished on time, within budget, with high quality)	(1-10)	1	8
19	Overall Satisfaction Level	(1-10)	1	10
	AVERAGE		**1.68**	**9.31**

** Ratings are based on a scale of (1-10).
10 = Agreement to the criteria.
1 = Disagreement to the criteria

Survey 2009

Following was the survey used in 2009 to evaluate the PIRMS process.

Conference Questionnaire

Individual Name: _____ **Organization:** _____

Designation: _____ **Email Address:** _____

Have you run best value PIPS or participated in best value PIPS before? Yes _____ No _____

How many years have you been exposed to PIPS: _____ (number of years) less than I year: _____ first time during the conference _____

How many PIPS education sessions have you attended? _____

Are you a client/buyer or client representative _____ or a contractor/vendor _____, or professional _____

The following survey rates the capability of the traditional delivery model against the new proposed best value PIPS model. Please rate the questions 1 – 10 with the following rating definition: For (1-10) questions, a '10' represents that you strongly agree a'1' represents that you strongly disagree, a '5' represents that you don't know.

No	Criteria	UNIT	Old System	New Risk Model
1	Identifies risk to project performance before the project begins.	(1-10)		
2	Minimizes the need to direct, supervise, and manage the vendor.	(1-10)		
3	Maximizes the amount of pre-planning, risk minimizing, and value added by the vendor, before the project starts.	(1-10)		
4	Requires contractor to minimize risk that they do not control.	(1-10)		
5	Minimizes the amount of time required to supervise and manage the contractor.	(1-10)		
6	The process documents performance measurements, which create accountability for all parties involved.	(1-10)		
7	Allows the contractor to deliver construction for a lower cost at a higher profit.	(1-10)		
8	Demands an accountable milestone schedule at the beginning of projects	(1-10)		
9	Overall performance and satisfaction with the process (if used)	(1-10)		

No	Criteria	Unit	Risk Management	Weekly Report
1.	Increases ability to resolve disputes and concerns.	(1-10)		
2.	Increases ability to relay important project information.	(1-10)		
3.	Prompt support from critical players (Owner, Contractor, User, procurement/contracting, etc.)	(1-10)		
4.	Minimizes the need and amount of time it takes to manage the contractor.	(1-10)		
5.	Forces the contractor to take greater control and accountability over the project.	(1-10)		
6.	Minimizes surprises and problems.	(1-10)		
7.	Increases ability to minimize risks on projects	(1-10)		

SUGGESTIONS & COMMENTS *(Please add any additional comments you may have concerning the process)*

Questions were interpreted as follows:

Criteria (WRR & RMP)
Increases ability to resolve **disputes and concerns**.
Increases ability to relay important project information. **Dominant info**
Forces the contractor to take greater control and **accountability** over the project.
Prompt support from critical players (Owner, Contractor, User, procurement/contracting, etc.)
Increases ability **to minimize risks** on projects
Minimizes surprises and problems.
Minimizes the need and amount of time it takes to manage the contractor. **Resources (Micromanagement)**
Criteria
Identifies risk to project performance before the project begins.
Minimizes the need to direct, supervise, and manage the vendor.**(Micromanagement)**
Maximizes the amount of **pre-planning, risk minimizing, and value added** by the vendor, before the project starts.
Requires contractor to minimize **risk** that they do not control.
Minimizes the amount of time required to supervise and manage the contractor. **Saves Time and Resources**
The process documents performance measurements, which create **accountability** for all parties involved.
Allows the contractor to deliver construction for a lower cost at a higher profit.
Demands an accountable milestone schedule at the beginning of projects **pre-planning**

Accuracy Check on Weekly Risk Reports

For accuracy analysis all the ongoing projects in 2009 were checked for their reported schedule, modifications and risks every few months. Schedule, modifications and risks were cross checked as in the following table. For every entry that was reported incorrect, the weekly report was considered inaccurate.

File Name	Risks Reported	Schedule	Risks not reported as MOD/ MOD not reported as risks	RMP Attached	Accurate
Project A	Reported Correct	Does not match Project Setup	Incomplete	N	N
Project B	Reported Correct	Incomplete	Incomplete	N	N
Project C	Reported Correct	Reported Correct	Reported Correct	Y	Y
Project D	Reported Correct	Incomplete	Incomplete	Y	N
Project E	Incomplete	Reported Correct	Incomplete	Y	N
Project F	Incomplete	Reported Correct	Incomplete	Y	N

APPENDIX B

COMPLETED PROJECTS DATA; JANUARY 2009-SEPTEMBER 2010

The data analysis was based on the completed projects divided by their NTP years. All projects more than $300K for these NTP years were considered for the analysis. Projects that started with a RMP are shown as 1 under the RMP column below:

Completed Projects NTP 2006

Completed Projects NTP 2007

Project Title	Notice to Proceed Date	Original Completion Date	Duration (Calendar Days)	Awarded Cost	Over budget	Percent Over Budget	Days Delayed	Percent Over Schedule	Total Risks (Whether or not it affects schedule/Budget)	# of Owner risks affecting cost/schedule	# of Unaddressed/Overdue Risks	Days delayed due to owner	Additional Cost due to owner	Percent Over budget due to owner	Percent delayed due to owner
Reconfiguration of Temporary Emergency Departm	7/13/2007	8/31/2007	49	$ 369,144.35	$ 94,958.64	26%	106	216%	1.00	1	0	106	$ 94,958.64	26%	216%
Traumatic Brain Injury Clinic	9/22/2007	8/31/2008	344	$ 649,990.38	$ -	0%	542	158%	4.00	1	0	60	$ -	0%	17%
FAP/SWS Building	4/13/2007	4/30/2008	383	$ 689,988.95	$ (511.25)	0%	199	52%	4.00	3	0	199	$ (511.25)	0%	52%
Urgent Care Expansion	9/26/2007	8/31/2008	340	$ 381,628.08	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%
New Integrated Medicine Clinic	9/30/2007	3/31/2009	548	$ 728,311.63	$ -	0%	-40	0%	1.00	0	0	0	$ -	0%	0%
Replacement of Emergency Generators	9/30/2007	10/31/2009	762	$ 4,795,442.21	$ -	0%	0.00	0%	4	0.00	0	0	$ -	0%	0%
Laser Eye Surgey Procedure Room	9/13/2007	6/1/2008	262	$ 366,822.06	$ 43,476.18	12%	151	58%	7.00	4	1	120	$ 43,476.18	12%	46%
Renew Pathology Clinic (Bldg 300)	9/30/2007	11/15/2007	46	$ 383,000.00	$ -	0%	321	698%	2.00	2	0	321	$ -	0%	698%
Emergency Generator	1/29/2007	9/16/2007	230	$ 756,510.62	$ -	0%	132	57%	5.00	0	0	0	$ -	0%	0%
Modify In-Patient & Oncology Pharmacies, Bldg 9	10/10/2007	10/30/2008	386	$ 1,177,847.94	$ 108,224.03	9%	121	31%	3.00	3	0	121	$ 108,224.03	9%	31%
Repair Family Practice Waiting Area	8/15/2007	2/29/2008	198	$ 344,181.28	$ 42,703.46	12%	0	0%	2.00	1	0	0	$ 42,703.46	12%	0%
Outfitting of Dental Clinic	4/12/2007	12/31/2007	263	$ 946,969.84	$ 177,280.00	19%	0	0%	1.00	0	0	0	$ -	0%	0%
Install Power Reliability & Capacity Monitoring Sys	9/17/2007	3/14/2008	179	$ 507,433.12	$ -	0%	30	17%	2.00	0	0	0	$ -	0%	0%
Outfitting of Kamish Clinic	4/12/2007	12/31/2007	263	$ 663,162.46	$ 64,990.00	10%	0	0%	1.00	0	0	0	$ -	0%	0%
Replacement of Emergency Generators, Bldg 137	8/17/2007	10/31/2009	806	$ 9,100,588.58	$ 69,976.00	1%	218	27%	5.00	3	0	218	$ 69,976.00	1%	27%
Plumbing in Chiller and Reheat Rooms	9/30/2007	8/31/2008	336	$ 351,378.37	$ 49,291.50	14%	197	59%	1.00	1	0	197	$ 49,291.50	14%	59%
WP/Repair/Replacement of Six ATS in G1B	9/30/2007	10/31/2008	397	$ 796,004.14	$ 131,036.00	16%	205	52%	3.00	2	0	365	$ 131,036.00	16%	92%
Replace Chiller #4, Building 137	9/30/2007	8/31/2008	336	$ 601,834.70	$ 13,570.03	2%	242	72%	3.00	3	0	242	$ 13,570.03	2%	72%
Repair MEP Systems Bldg. 1412	10/16/2007	12/23/2008	434	$ 2,092,525.57	$ 60,565.79	3%	185	43%	8.00	4	0	238	$ 60,565.79	3%	55%
Building 1262 Addition	10/16/2007	6/23/2008	251	$ 348,529.40	$ 17,235.30	5%	123	49%	3.00	1	0	93	$ 17,235.30	5%	37%
Repair Lab Suite 609	10/15/2007	9/29/2008	350	$ 733,852.95	$ 7,496.30	1%	0	0%	1.00	1	0	0	$ 7,496.30	1%	0%
Modify C-Section OB/GYN #2 for LDR #8	10/29/2007	8/3/2008	279	$ 577,859.09	$ 30,052.18	5%	300	108%	10.00	6	0	300	$ 5,186.91	1%	108%
Renovate Bldg. 9923A	9/28/2007	11/1/2008	400	$ 1,777,764.00	$ 540,928.00	30%	265	66%	5.00	2	0	120	$ -	0%	30%
Construct Admin. Addition to Command Group, B	9/25/2007	9/19/2008	360	$ 815,784.64	$ -	0%	310	86%	4.00	1	0	100	$ -	0%	28%
Repair Preventative Medicine	9/21/2007	10/1/2008	376	$ 387,007.00	$ -	0%	211	56%	6.00	1	0	211	$ -	0%	56%
Exterior Repairs, Bldg 9900	9/29/2007	9/10/2009	712	$ 591,656.00	$ -	0%	64	9%	2.00	0	0	0	$ -	0%	0%
Renew & Expand Pediatric Clinic	9/30/2007	4/17/2009	565	$ 2,057,324.00	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%
Emergency Lighting and Power Upgrade	9/24/2007	5/26/2008	245	$ 480,871.88	$ -	0%	60	24%	2.00	1	0	60	$ -	0%	24%
UPGRADE HVAC CONTROLS, AHU 9 A&B AND	10/19/2007	4/27/2008	191	$ 357,963.80	$ -	0%	159	83%	1.00	1	0	159	$ -	0%	83%
Modify Computer Room	12/11/2007	3/26/2008	106	$ 668,357.61	$ 123,454.63	18%	212	200%	2.00	2	0	212	$ 123,454.63	18%	200%
Convert Four-Bed Rooms into Two- Bed Rooms	10/24/2007	39576	$ 197.00	716242.31	6017991%	1/0/1900	18300%	0.93	200%	1	1	169	6017991%	8%	0.85786802
Mis. Medical Facility Repair Projects 07 AMEDD (	9/24/2007	12/18/2008	451	$ 2,060,010.00	$ 104,384.92	5%	190	42%	6.00	4	0	256	$ 104,384.92	5%	57%
SID Modernization	9/30/2007	5/25/2008	238	$ 394,581.00	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%
FY06 DHP Pkg T-70,Veterinary Clinic Renov.	4/5/2007	12/31/2007	270	$ 1,048,173.44	$ 45,888.00	4%	543	201%	8.00	4	0	242	$ 45,888.00	4%	90%
FY06 DHP Pkg T-68, 2C Eye Clinic	4/23/2007	2/15/2008	298	$ 534,449.94	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%
Investigate Electrical Risers in Bldg 2	10/18/2007	5/15/2008	210	$ 2,824,742.61	$ -	0%	262	125%	4.00	1	0	77	$ -	0%	37%
Warrior Transition Brigade PCC	7/30/2007	9/15/2007	47	$ 1,000,000.00	$ -	0%	45	96%	1.00	1	0	45	$ -	0%	96%
Repair of Lamination Room	12/17/2007	7/30/2008	226	$ 389,707.80	$ -	0%	191	85%	4.00	1	0	152	$ -	0%	67%
Renew Health Clinic, Building 990	9/11/2007	8/28/2009	717	$ 3,487,008.74	$ 283,271.80	8%	287	40%	5.00	$ 3.00	0	387	$ 283,271.80	8%	54%
Convert Constant Volume to VAV AHU 9	7/25/2007	4/20/2008	270	$ 1,498,642.17	$ -	0%	817	303%	7.00	3	0	817	$ -	0%	303%
Repair Elevators 1-7	5/30/2007	3/17/2008	292	$ 1,208,340.89	$ -	0%	127	43%	1.00	0	0	0	$ -	0%	0%
Emergency Generator Replacement	5/30/2007	10/31/2008	520	$ 1,169,205.66	$ -	0%	5	1%	1.00	0	0	0	$ -	0%	0%
Misc. Projects 07	9/26/2007	5/28/2009	610	$ 754,132.00	$ 5,710.58	1%	48	8%	8.00	0	0	0	$ -	0%	0%
Repair & Renew Bldg. 691	9/30/2007	1/15/2010	838	$ 5,389,776.00	$ 400,307.76	7%	181	22%	6.00	3	0	181	$ 400,307.76	7%	22%
Construct Rollup Connections for Boilers & Chillers	8/23/2007	1/30/2008	160	$ 393,104.64	$ 92,902.00	24%	810	506%	4	4.00	0	810	$ 92,902.00	24%	506%
CHPPM-Collatral Area Addition Bldg E-1930	9/28/2007	10/31/2008	399	$ 794,308.00	$ -	0%	60	15%	2.00	2	0	60	$ -	0%	15%
Shell Space Area Build-Out	4/20/2007	9/30/2008	529	$ 1,540,077.00	$ -	0%	122	23%	4.00	2	0	37	$ -	0%	7%
Paint Failure Repairs and Fire Stopping	10/16/2007	6/2/2008	230	$ 400,000.00	$ (53,012.96)	0%	319	139%	10.00	1	0	319	$ (53,012.96)	-13%	139%
1425 Freezer Repository	10/25/2007	1/17/2009	450	$ 818,269.27	$ -	0%	242	54%	27.00	1	0	5	$ -	0%	1%
Repairs to Building 1430	10/24/2007	1/16/2009	450	$ 1,010,978.16	$ 39,358.47	4%	54	12%	9.00	1	0	0	$ 39,358.47	4%	0%
Renew Records Room	10/1/2007	3/20/2009	536	$ 832,830.88	$ 45,000.00	5%	81	15%	7.00	1	0	81	$ 45,000.00	5%	15%
Retrofit existing lighting fixtures	4/26/2007	4/25/2008	365	$ 403,483.88	$ 36,775.22	9%	-84	0%	2.00	0	0	0	$ -	0%	0%
EMS System Upgrade and Calibration	2/5/2007	9/30/2007	237	$ 887,936.66	$ 40,552.58	5%	76	32%	3.00	2	0	76	$ 40,552.58	5%	32%
Smoke Detectors	10/9/2007	1/5/2009	454	$ 899,073.34	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%
FY07 Pkg T-63 Replace ATS - I, C1, C2	10/30/2007	10/29/2008	365	$ 402,480.00	$ -	0%	40	11%	1.00	1	0	40	$ -	0%	11%
Replace AHUs 12, 13 & 15	10/29/2007	4/26/2008	180	$ 324,937.68	$ -	0%	181	101%	2.00	0	0	0	$ -	0%	0%
Repair AHUs 10 & 11	10/29/2007	4/26/2008	180	$ 329,103.36	$ -	0%	153	85%	1.00	1	0	153	$ -	0%	85%
Repair Chillers 3, 4 & 5	11/2/2007	11/1/2008	365	$ 482,017.18	$ -	0%	-37	0%	1.00	0	0	0	$ -	0%	0%
Seal Building Perimeter	8/15/2007	2/5/2009	540	$ 2,832,745.22	$ 148,914.24	5%	400	74%	6	2.00	0	228	$ 148,914.24	5%	42%
Install Patient Room PTAC's	11/2/2007	11/1/2009	730	$ 871,538.99	$ -	0%	124	17%	2.00	0	0	0	$ -	0%	0%
Red/Blue/Well Baby Clinic	11/26/2007	11/25/2008	365	$ 2,805,498.57	$ 180,035.38	6%	72	20%	3.00	1	0	0	$ 92,399.02	3%	0%
Replace Roof Riva Ridge	10/29/2007	10/29/2008	366	$ 529,556.60	$ 29,237.25	6%	7	2%	2.00	1	0	7	$ -	0%	2%
Replace Roof Connor TMC	10/30/2007	10/29/2008	365	$ 584,264.31	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%
Repair Elevators	10/26/2007	12/14/2008	415	$ 2,343,895.14	$ -	0%	326	79%	2.00	1	0	326	$ -	0%	79%
Billy Johnson Dental Clinic	9/28/2007	7/21/2008	297	$ 1,999,165.65	$ 699,064.67	35%	283	95%	8.00	5	0	262	$ 699,064.67	35%	88%
OR #7 Repairs	9/21/2007	8/11/2008	325	$ 1,125,517.90	$ 88,183.96	8%	185	57%	7.00	3	0	173	$ 88,183.96	8%	53%
2nd Floor Building 1022	10/29/2007	10/28/2008	365	$ 2,238,941.00	$ 195,974.30	9%	185	51%	5.00	2	0	178	$ 195,974.30	9%	49%
Fire Protection Standpipe System	10/30/2007	10/29/2008	365	$ 1,402,017.86	$ (15,708.11)	0%	62	17%	3.00	1	0	93	$ (15,708.11)	-1%	25%
Replace Soil Piping	10/26/2007	2/23/2008	120	$ 429,958.86	$ -	0%	-22	0%	1.00	0	0	0	$ -	0%	0%
Replace OR ECS	10/4/2007	5/31/2008	240	$ 333,311.94	$ -	0%	20	8%	1.00	1	0	20	$ -	0%	8%
WRESP	10/4/2007	6/1/2008	241	$ 2,012,684.77	$ 435,023.97	22%	173	72%	5.00	2	0	143	$ 191,618.87	10%	59%
Relocate SICU	7/25/2007	8/30/2007	36	$ 480,703.63	$ -	0%	229	636%	4.00	1	0	229	$ -	0%	636%
Repair B080 and Mezzanine Bldg. #54	10/12/2007	5/4/2008	205	$ 652,113.00	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%
Pysical Therapy/Ortho Clinic	11/19/2007	8/20/2009	640	$ 4,015,198.00	$ 143,898.00	4%	50	8%	10.00	1	0	50	$ 143,898.00	4%	8%
CHPPM #2 Laboratory Restoration Bldg. 2630	11/16/2007	4/30/2008	166	$ 2,761,812.00	$ 383,942.00	14%	78	47%	2.00	0	0	0	$ -	0%	0%
Soldiers & Family Member Assistance Center	8/13/2007	1/14/2008	154	$ 1,016,111.17	$ 133,450.19	13%	166	108%	7.00	7	0	166	$ 133,450.19	13%	108%

Project Title	# of Contractor Risks affecting cost/schedule	# of Unrated risks	# of Unaddressed/Overdue Risks	Days Delayed due to contractor	Additional Cost due to contractor	Contractor satisfaction Rating	Percent Over budget due to contractor	Percent Delayed due to contractor	# of UF risks affecting cost/schedule	# of Unaddressed/Overdue Risks	Days delayed due to UF	Additional Cost due to UF	Percent Over budget due to UF	Percent delayed due to UF	Contractor	RMP
Reconfiguration of Temporary Emergency Departm	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Traumatic Brain Injury Clinic	0		0	0	$ -	10	0%	0%	1	0	482	$ -	0%	140%	Contractor E	0
FAP/SWS Building	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Urgent Care Expansion	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
New Integrated Medicine Clinic	0	1	0	-40	$ -	10	0%	-7%	0	0	0	$ -	0%	0%	Contractor E	0
Replacement of Emergency Generators	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contractor E	1
Laser Eye Surgey Procedure Room	3	0	0	31	$ -	5	0%	12%	0	0	0	$ -	0%	0%	Contractor E	0
Renew Pathology Clinic (Bldg 300)	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Emergency Generator	0	0	0	0	$ -	10	0%	0%	1	0	132	$ -	0%	57%	Contractor E	0
Modify In-Patient & Oncology Pharmacies, Bldg 9	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Repair Family Practice Waiting Area	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Outfitting of Dental Clinic	0	1	0	0	$ -	10	0%	0%	1	0	0	$ 177,280.00	19%	0%	Contractor E	0
Install Power Reliability & Capacity Monitoring Sys	1	0	0	14	$ -	5	0%	8%	1	0	16	$ -	0%	9%	Contractor E	0
Outfitting of Kamish Clinic	0	1	0	0	$ -	10	0%	0%	1	0	0	$ 64,990.00	10%	0%	Contractor E	0
Replacement of Emergency Generators, Bldg 137	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	1
Plumbing in Chiller and Reheat Rooms	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
WP/Repair/Replacement of Six ATS in G1B	0	1	0	-160	$ -	10	0%	-40%	0	0	0	$ -	0%	0%	Contractor E	0
Replace Chiller #4, Building 137	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor E	0
Repair MEP Systems Bldg. 1412	2	1	0	-53	$ -	6.7	0%	-12%	0	0	0	$ -	0%	0%	Contractor A	0
Building 1262 Addition	0	1	0	0	$ -	10	0%	0%	1	0	30	$ -	0%	12%	Contractor A	0
Repair Lab Suite 609	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Modify C-Section OB/GYN #2 for LDR #8	0	0	0	0	$ (1,000.00)	10	0%	0%	1	0	0	$ 25,865.27	4%	0%	Contractor A	0
Renovate Bldg. 9923A	1	0	0	90	$ -	10	0%	23%	1	0	55	$ 540,928.00	30%	14%	Contractor A	0
Construct Admin. Addition to Command Group, B	2	1	1	210	$ -	10	0%	58%	0	0	0	$ -	0%	0%	Contractor A	0
Repair Preventative Medicine	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Exterior Repairs, Bldg 9900	0	0	0	0	$ -	10	0%	0%	1	0	64	$ -	0%	9%	Contractor A	0
Renew & Expand Pediatric Clinic	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Emergency Lighting and Power Upgrade	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
UPGRADE HVAC CONTROLS, AHU 9 A&B AND	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Modify Computer Room	0	0	0	0	$ -	0	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Convert Four-Bed Rooms into Two- Bed Rooms	0	1	0	0	0	0%	0%	0	0	0	$ 14.00	0%	0%	7%	Contractor A	0
Mis. Medical Facility Repair Projects 07 AMEDD (	0	1	0	-66	$ -	10	0%	-15%	0	0	0	$ -	0%	0%	Contractor A	0
SID Modernization	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
FY06 DHP Pkg T-70,Veterinary Clinic Renov.	0	1	0	0	$ -	10	0%	0%	1	0	301	$ -	0%	111%	Contractor A	0
FY06 DHP Pkg T-68, 2C Eye Clinic	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Investigate Electrical Risers in Bldg 2	1	1	0	185	$ -	10	0%	88%	0	0	0	$ -	0%	0%	Contractor A	0
Warrior Transition Brigade PCC	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor A	0
Repair of Lamination Room	0	1	0	0	$ -	10	0%	0%	1	0	39	$ -	0%	17%	Contractor A	0
Renew Health Clinic, Building 990	0		1	-100	$ -	10	0%	-14%	0	$ -	0%	$ -	0%	0%	Contractor A	1
Convert Constant Volume to VAV AHU 9	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor B	1
Repair Elevators 1-7	0	1	0	0	$ -	10	0%	0%	1	0	127	$ -	0%	43%	Contractor B	0
Emergency Generator Replacement	0	0	0	0	$ -	10	0%	0%	1	0	5	$ -	0%	1%	Contractor B	0
Misc. Projects 07	0	0	0	0	$ -	10	0%	0%	1	0	48	$ 5,710.58	1%	8%	Contractor B	0
Repair & Renew Bldg. 691	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor B	0
Construct Rollup Connections for Boilers & Chillers	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contractor B	1
CHPPM-Collatral Area Addition Bldg E-1930	0	1	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor D	0
Shell Space Area Build-Out	1	1	0	23	$ -	10	0%	4%	1	0	62	$ -	0%	12%	Contractor D	0
Paint Failure Repairs and Fire Stopping	0	4	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor D	0
1425 Freezer Repository	7	27	0	201	$ -	10	0%	45%	7	0	36	$ -	0%	8%	Contractor D	0
Repairs to Building 1430	0	9	0	0	$ -	10	0%	0%	2	1	54	$ -	0%	12%	Contractor D	0
Renew Records Room	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor D	0
Retrofit existing lighting fixtures	1	2	0	-84	$ 36,775.22	10	9%	-23%	0	0	0	$ -	0%	0%	Contractor D	0
EMS System Upgrade and Calibration	0	3	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor D	0
Smoke Detectors	0	1	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor D	0
FY07 Pkg T-63 Replace ATS - I, C1, C2	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor F	0
Replace AHUs 12, 13 & 15	0	2	0	0	$ -	10	0%	0%	1	0	181	$ -	0%	101%	Contractor C	0
Repair AHUs 10 & 11	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor C	0
Repair Chillers 3, 4 & 5	0	0	0	-37	$ -	10	0%	-10%	0	0	0	$ -	0%	0%	Contractor C	0
Seal Building Perimeter	0	0	0	0	$ -	10.0	0.0%	0.0%	1	0	172	$ -	0%	32%	Contractor C	1
Install Patient Room PTAC's	1	0	0	124	$ -	10	0%	17%	0	0	0	$ -	0%	0%	Contractor C	0
Red/Blue/Well Baby Clinic	2	0	0	72	$ 87,636.36	10	3%	20%	0	0	0	$ -	0%	0%	Contractor C	0
Replace Roof Riva Ridge	1	1	0	0	$ 29,237.25	10	6%	0%	0	0	0	$ -	0%	0%	Contractor C	0
Replace Roof Connor TMC	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor C	0
Repair Elevators	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor C	0
Billy Johnson Dental Clinic	1	0	0	21	$ -	10	0%	7%	0	0	0	$ -	0%	0%	Contractor C	0
OR #7 Repairs	1	0	0	12	$ -	8	0%	4%	0	0	0	$ -	0%	0%	Contractor C	0
2nd Floor Building 1022	0	0	0	0	$ -	10	0%	0%	1	0	7	$ -	0%	2%	Contractor C	0
Fire Protection Standpipe System	0	0	0	-31	$ -	10	0%	-8%	0	0	0	$ -	0%	0%	Contractor C	0
Replace Soil Piping	0	0	0	-22	$ -	10	0%	-18%	0	0	0	$ -	0%	0%	Contractor C	0
Replace OR ECS	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor C	0
WRESP	0	3	0	0	$ -	10	0%	0%	3	0	30	$ 243,405.10	12%	12%	Contractor C	0
Relocate SICU	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor C	0
Repair B080 and Mezzanine Bldg. #54	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor G	0
Pysical Therapy/Ortho Clinic	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor G	0
CHPPM #2 Laboratory Restoration Bldg. 2630	0	0	0	0	$ -	10	0%	0%	2	0	78	$ 383,942.00	14%	47%	Contractor G	0
Soldiers & Family Member Assistance Center	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contractor G	0

Completed Projects NTP 2008

Project Title	Notice to Proceed Date	Original Completion Date	Duration (Calendar Days)	Awarded Cost	Over budget	Percent Over Budget	Days Delayed	Percent Over Schedule	Total Risks (Whether or not it affects schedule/Budget)	# of Owner risks affecting cost/schedule	# of Unaddressed/Overdue Risks	Days delayed due to owner	Additional Cost due to owner	Percent Over budget due to owner	Percent delayed due to owner	# of Contractor Risks affecting cost/schedule	# of Unrated risks	# of Unaddressed/Overdue Risks	Days Delayed due to contractor	Additional Cost due to contractor	Contractor satisfaction Rating	Percent Over budget due to contractor	Percent Delayed due to contractor	# of UF risks affecting cost/schedule	# of Unaddressed/Overdue Risks	Days delayed due to UF	Additional Cost due to UF	Percent Over budget due to UF	Percent delayed due to UF	Contractor	RMP
Replace Auxiliary Steam Boiler	9/29/2008	2/12/2009	136	$ 316,453.20	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	0	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Repair Elevator 25	10/15/2008	9/30/2009	350	$ 333,670.12	$ 9,348.86	3%	65	19%	3	2.00	0	92	$ 9,348.86	3%	26%	0	0	0	-27	$ -	10.0	0.0%	-7.7%	0	0	0	$ -	0%	0%	Contracotr A	1
Fire Damper Evaluation & Repair	9/29/2008	12/31/2008	93	$ 367,112.05	$ -	0%	181	195%	1.00	1	0	181	$ -	0%	195%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Cooling Towers 1 & 2 Support Systems	10/9/2008	7/31/2010	660	$ 371,479.42	$ -	0%	-163	0%	4	0.00	0	0	$ -	0%	0%	0	3	3	-163	$ -	10.0	0.0%	-24.7%	0	0	0	$ -	0%	0%	Contracotr A	1
Repair HVAC Building 9782	10/16/2008	7/13/2009	270	$ 377,420.45	$ -	0%	332	123%	4	2.00	0	352	$ -	0%	130%	0		0	-20	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr A	0
FSH Temporary Parking	5/28/2008	7/27/2008	60	$ 394,192.59	$ 113,370.49	29%	61	102%	2.00	2	0	61	$ 113,370.49	29%	102%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Wk & Rpr/Replace CMS Dumbwaiters	9/30/2008	8/31/2009	335	$ 434,039.76	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Simulator Radiation Therapy in G1D111	10/8/2008	8/31/2009	327	$ 435,530.25	$ 123,931.12	28%	0	0%	1.00	1	0	0	$ 123,931.12	28%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Upgrade Labs & Classrooms	7/15/2008	1/3/2009	172	$ 445,479.76	$ 19,767.45	4%	30	17%	1.00	1	0	30	$ 19,767.45	4%	17%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
WP/Rpl Surgical Supply Cartlifts	9/30/2008	5/13/2009	225	$ 452,168.02	$ 42,402.21	9%	263	117%	2.00	1	0	263	$ 42,402.21	9%	117%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
PAD, ADMISSIONS & LOGISTICS FLOORING REPAIR	10/15/2008	5/23/2009	220	$ 476,127.31	$ -	0%	65	30%	2.00	1	0	65	$ -	0%	30%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair Volume Dampers Bldg 650	9/8/2008	8/4/2009	330	$ 495,533.15	$ -	0%	50	15%	1.00	0	0	0	$ -	0%	0%	1	0	0	50	$ -	10	0%	15%	0	0	0	$ -	0%	0%	Contracotr A	0
WP&Repair Psychiatry 4D Corridor	10/7/2008	12/31/2009	450	$ 498,122.21	$ -	0%	-31	0%	2	0.00	0	0	$ -	0%	0%	0	1	0	-31	$ -	10.0	0.0%	-6.9%	0	0	0	$ -	0%	0%	Contracotr A	1
Install Elevator and Shaft	10/7/2008	9/11/2009	339	$ 509,873.23	$ -	0%	70	21%	1.00	0	0	0	$ -	0%	0%	0	1	0	0	$ -	10	0%	0%	1	0	70	$ -	0%	21%	Contracotr A	0
REPAIR ACCESS CONTROL SYSTEM	2/4/2008	8/2/2008	180	$ 509,997.77	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair AHU #2 & #3	11/12/2008	1/11/2009	60	$ 541,488.95	$ 91,818.01	17%	317	528%	5.00	5	0	317	$ 91,818.01	17%	528%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair/Renew QC Lab B-40	10/15/2008	10/31/2009	381	$ 565,288.27	$ -	0%	0	0%	0	0.00	0	0	$ -	0%	0%	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr A	1
Repair & Minor Construction of the Traumatic Brain Injury Clinic	8/8/2008	11/15/2008	99	$ 609,353.94	$ 68,446.16	11%	0	0%	1.00	1	0	0	$ 68,446.16	11%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair HVAC Controls in Bldg. 3611	9/29/2008	10/29/2009	395	$ 684,066.81	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	0
CONSTRUCT TBI AUGMENTED REHAB BUILDING	10/10/2008	4/8/2009	180	$ 711,973.58	$ 22,686.15	3%	236	131%	5.00	3	0	176	$ 22,686.15	3%	98%	0	1	0	0	$ -	10	0%	0%	1	1	60	$ -	0%	33%	Contracotr A	0
CONSTRUCT TBI FACILITY	10/10/2008	4/8/2009	180	$ 719,895.64	$ 11,967.00	2%	236	131%	4.00	2	0	176	$ 11,967.00	2%	98%	0	1	0	0	$ -	10	0%	0%	1	1	60	$ -	0%	33%	Contracotr A	0
Repair Security Fence and Gates	10/22/2008	4/20/2009	180	$ 793,716.97	$ 2,977.35	0%	100	56%	2.00	1	0	55	$ -	0%	31%	0	0	0	0	$ -	10	0%	0%	1	0	45	$ 2,977.35	0%	25%	Contracotr A	0
WP/Const-New ANAM Facility	5/1/2008	2/25/2009	300	$ 824,877.57	$ 8,459.30	1%	49	16%	2.00	1	0	0	$ 8,459.30	1%	0%	1	0	1	49	$ -	7	0%	16%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair BSL4 Clin Lab Sterilzers	9/8/2008	4/23/2009	227	$ 858,321.84	$ 98,934.53	12%	176	78%	6.00	2	0	46	$ 99,934.53	12%	20%	2	2	1	130	$ (1,000.00)	10	0%	57%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair & Seal Exterior of Wings F, G & H	10/7/2008	8/31/2009	328	$ 890,899.82	$ -	0%	0	0%	7.00	0	0	0	$ -	0%	0%	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Rep/Repl Liquid Oxygen Tank	9/8/2008	10/31/2009	418	$ 917,295.58	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Wp-Rpr Elec Sys Panelboards	9/30/2008	9/30/2009	365	$ 923,220.80	$ 12,549.00	1%	212	58%	6.00	1	0	212	$ 12,549.00	1%	58%	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
X-Ray Apparatus in Angiography	5/12/2008	8/31/2009	476	$ 1,016,699.00	$ -	0%	-87	0%	1.00	0	0	0	$ -	0%	0%	0	1	0	-87	$ -	10	0%	-18%	0	0	0	$ -	0%	0%	Contracotr A	0
Rpr Exterior of Bldgs 1412 & 1414	10/17/2008	8/26/2009	313	$ 1,035,435.21	$ 178,071.00	17%	79	25%	2.00	1	0	79	$ 178,071.00	17%	25%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Repair Lab 119 & 120 Blding 1412	10/10/2008	10/10/2009	365	$ 1,418,991.64	$ 246,254.03	17%	97	27%	11.00	1	0	97	$ 246,254.03	17%	27%	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Condenser cooling wateer Sys.	10/7/2008	7/3/2009	269	$ 1,436,248.58	$ 12,412.95	1%	167	62%	4.00	3	0	167	$ -	0%	62%	0	0	0	0	$ -	10	0%	0%	1	0	0	$ 12,412.95	1%	0%	Contracotr A	0
Rpr Proj -Genomics Ctr, Bldg 1425	9/22/2008	7/26/2009	307	$ 1,479,222.71	$ 260,531.48	18%	270	88%	11	3.00	0	211	$ 261,531.48	18%	69%	1	0	0	59	$ (1,000.00)	10.0	-0.1%	19.2%	0	0	0	$ -	0%	0%	Contracotr A	1
Sea Level Aquifer P/T System	5/16/2008	8/9/2009	450	$ 2,389,548.77	$ -	0%	127	28%	2.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	2	0	127	$ -	0%	28%	Contracotr A	0
Repair Bldg 9920	9/25/2008	4/28/2010	580	$ 3,222,569.39	$ -	0%	0	0%	0	0.00	0	0	$ -	0%	0%	0		0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr A	0
WP Prep & Repair of Nurse Call System	5/2/2008	11/9/2009	556	$ 3,257,003.20	$ -	0%	-18	0%	1.00	0	0	0	$ -	0%	0%	0	1	0	-18	$ -	10	0%	-3%	0	0	0	$ -	0%	0%	Contracotr A	1
Repair Bldg 9921 A & B	10/10/2008	1/5/2010	452	$ 4,028,368.74	$ 234,455.43	6%	97	21%	2.00	1	0	143	$ 234,455.43	6%	32%	0		0	-46	$ -	10	0%	-10%	0	0	0	$ -	0%	0%	Contracotr A	0
Repair Elec.Distr. System	10/8/2008	4/8/2010	547	$ 5,319,460.00	$ -	0%	83	15%	1.00	1	0	83	$ -	0%	15%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr A	1
Replace the VCT Flooring Bldg. 412	11/4/2008	3/4/2009	120	$ 316,686.00	$ -	0%	0	0%	4.00	0	0	0	$ -	0%	0%	0	1	1	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr B	0
Add/Alter Medical Warehouse	10/29/2008	6/5/2009	219	$ 384,395.00	$ -	0%	165	75%	2.00	1	0	165	$ -	0%	75%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr B	1
Repave/Restripe Main Parking Lot	10/31/2008	6/25/2009	237	$ 471,028.86	$ -	0%	-88	0%	3.00	0	0	0	$ -	0%	0%	0	0	0	-88	$ -	10	0%	-37%	0	0	0	$ -	0%	0%	Contracotr B	0
2nd Fl Sprinkler Installation	10/30/2008	6/22/2009	235	$ 635,781.00	$ -	0%	-130	0%	1.00	0	0	0	$ -	0%	0%	0	0	0	-130	$ -	10	0%	-55%	0	0	0	$ -	0%	0%	Contracotr B	1
Renew Ambulatory Surgical Center	9/24/2008	6/2/2009	251	$ 649,933.00	$ -	0%	42	17%	6.00	1	1	42	$ -	0%	17%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr B	0
Case Manager (WTU) Facility	10/29/2008	10/20/2009	356	$ 707,846.96	$ -	0%	120	34%	1	1.00	0	120	$ -	0%	34%	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr B	1
Case Manager Administration Facility	11/4/2008	11/4/2009	365	$ 715,001.53	$ -	0%	120	33%	1	1.00	0	120	$ -	0%	33%	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr B	1
Addition to Bldg. 306	10/28/2008	12/8/2009	406	$ 1,028,807.00	$ 547,992.00	53%	60	15%	4	2.00	1	60	$ 547,992.00	53%	15%	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr B	1
Exhaust Ductwork Systems	11/17/2008	12/17/2009	395	$ 1,148,399.00	$ -	0%	0	0%	2.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr B	1
SS, WP & Repair of Bldg. 1150	10/30/2008	11/28/2009	394	$ 2,317,476.53	$ 247,020.00	11%	-71	0%	3.00	0	0	0	$ -	0%	0%	0	1	0	-120	$ -	10	0%	-30%	2	1	49	$ 247,020.00	11%	12%	Contracotr B	1
WP & Repair Atrium Galss	10/30/2008	9/15/2009	320	$ 2,368,301.00	$ -	0%	60	19%	1.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	1	0	60	$ -	0%	19%	Contracotr B	1
WP & Repair Bldg. 21	10/16/2008	11/11/2009	391	$ 2,476,386.00	$ -	0%	224	57%	4	4.00	0	224	$ -	0%	57%	0		0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr B	1
Repair RR Bldg 2480	9/29/2008	9/29/2009	365	$ 656,435.36	$ -	0%	17	5%	4.00	1	0	10	$ -	0%	3%	0	0	0	0	$ -	10	0%	0%	1	0	7	$ -	0%	2%	Contracotr D	1
Repair Building 53, AFIP	9/16/2008	1/20/2009	126	$ 719,971.78	$ -	0%	72	57%	3.00	0	0	0	$ -	0%	0%	2	1	0	48	$ -	5	0%	38%	1	0	24	$ -	0%	19%	Contracotr D	1
Repair Elevators	9/30/2008	9/30/2009	365	$ 785,067.50	$ -	0%	0	0%	1.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr D	1
Signage	9/29/2008	9/29/2009	365	$ 2,471,921.72	$ -	0%	191	52%	19	14.00	0	191	$ -	0%	52%	0	0	0	0	$ -	10.0	0.0%	0.0%	0	0	0	$ -	0%	0%	Contracotr D	1
Roof & Exterior Wall Repairs	9/29/2008	6/26/2009	270	$ 4,720,867.77	$ 83,594.54	2%	93	34%	20.00	1	0	0	$ 83,594.54	2%	0%	1	20	0	60	$ -	10	0%	22%	10	0	33	$ -	0%	12%	Contracotr D	1
T-88 PUBLIC HEALTH NURSING	9/12/2008	6/18/2009	279	$ 334,360.00	$ 112,507.00	34%	41	15%	6.00	4	0	7	$ 101,103.00	30%	3%	0	0	0	0	$ -	10	0%	0%	1	0	34	$ 11,404.00	3%	12%	Contracotr F	0
LDR Storage Conversion, 6F	10/16/2008	6/24/2009	251	$ 474,170.00	$ 13,754.00	3%	179	71%	3.00	3	0	179	$ 13,754.00	3%	71%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr F	0
Install Concrete Pads - Training Area 24	9/29/2008	9/20/2009	356	$ 643,652.00	$ 72,528.00	11%	-66	0%	5.00	1	1	0	$ 72,528.00	11%	0%	0	5	0	-66	$ -	10	0%	-19%	0	0	0	$ -	0%	0%	Contracotr H	0
Correct Electrical Deficiencies	10/16/2008	4/30/2009	196	$ 300,200.00	$ 46,539.93	16%	81	41%	6.00	6	0	81	$ 46,539.93	16%	41%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	0
Repair Wards 45B & 45C	8/1/2008	1/28/2009	180	$ 321,474.92	$ -	0%	30	17%	1.00	0	0	0	$ -	0%	0%	1	0	0	30	$ -	9	0%	17%	0	0	0	$ -	0%	0%	Contracotr C	0
Technical Services Branch Office	10/14/2008	6/11/2009	240	$ 375,890.31	$ -	0%	-27	0%	1.00	0	0	0	$ -	0%	0%	0	1	0	-27	$ -	10	0%	-11%	0	0	0	$ -	0%	0%	Contracotr C	1
HQ Interior Suite	9/24/2008	5/22/2009	240	$ 390,950.22	$ 99,675.17	25%	124	52%	3.00	2	0	124	$ 99,675.17	25%	52%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	1
Acute Care Clinic	10/2/2008	6/29/2009	270	$ 486,230.99	$ -	0%	0	0%	0.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	1
Repair Ward 73 & 74, Building 2	8/14/2008	2/10/2009	180	$ 510,770.05	$ 96,279.03	19%	109	61%	3.00	1	0	0	$ 96,279.03	19%	0%	1	0	0	60	$ -	10	0%	33%	1	0	49	$ -	0%	27%	Contracotr C	0
Repair Drainage	10/15/2008	4/13/2009	180	$ 511,423.97	$ -	0%	32	18%	1.00	0	0	0	$ -	0%	0%	1	0	0	32	$ -	10	0%	18%	0	0	0	$ -	0%	0%	Contracotr C	0
Repair Multiple Wards Bldg 2	4/8/2008	6/30/2008	83	$ 587,676.96	$ 11,778.82	2%	-38	0%	3.00	2	0	30	$ 11,778.82	2%	36%	0	0	0	-68	$ -	10	0%	-82%	0	0	0	$ -	0%	0%	Contracotr C	0
Elec. & Mech. Bldg. 178	10/14/2008	7/11/2009	270	$ 594,406.93	$ -	0%	48	18%	1.00	0	0	0	$ -	0%	0%	0	0	0	0	$ -	10	0%	0%	1	0	48	$ -	0%	18%	Contracotr C	1
Replace 81 Fire Doors	9/24/2008	6/21/2009	270	$ 599,716.43	$ 125,636.52	21%	317	117%	7	2.00	0	60	$ 125,636.52	21%	22%	4	0	0	241	$ -	10.0	0.0%	89.3%	1	0	16	$ -	0%	6%	Contracotr C	1
Tele-Psychological/TBI Building	8/1/2008	1/28/2009	180	$ 645,535.35	$ 63,625.87	10%	0	0%	1.00	1	0	0	$ 63,625.87	10%	0%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	0
SERMC Personnel Bldg.	10/14/2008	4/12/2009	180	$ 657,366.33	$ 4,990.65	1%	22	12%	2.00	1	0	0	$ 4,990.65	1%	0%	1	0	0	22	$ -	10	0%	12%	0	0	0	$ -	0%	0%	Contracotr C	1
Install Fire Seals in Utility Chases	3/14/2008	3/14/2009	365	$ 721,439.54	$ -	0%	-36	0%	1.00	0	0	0	$ -	0%	0%	0	0	0	-36	$ -	10	0%	-10%	0	0	0	$ -	0%	0%	Contracotr C	0
Replacement Facility TMC #14	2/15/2008	2/14/2009	365	$ 766,878.05	$ 34,739.92	5%	27	7%	2.00	0	0	0	$ -	0%	0%	0	0	0	-39	$ -	10	0%	-11%	1	0	66	$ 34,739.92	5%	18%	Contracotr C	0
Linear Accelerator	9/29/2008	8/31/2009	336	$ 772,636.90	$ 57,421.45	7%	157	47%	5.00	2	0	196	$ 57,421.45	7%	58%	0	0	0	-39	$ -	10	0%	-12%	0	0	0	$ -	0%	0%	Contracotr C	1
FY08 Restroom Repairs	10/16/2008	6/25/2010	617	$ 925,600.00	$ -	0%	49	8%	3.00	2	0	28	$ -	0%	5%	1	0	0	21	$ -	10	0%	3%	0	0	0	$ -	0%	0%	Contracotr C	0
Lab V1	10/15/2008	7/12/2009	270	$ 1,281,163.60	$ 248,352.61	19%	271	100%	6	3.00	0	324	$ 248,352.61	19%	120%	0	0	0	-53	$ -	10.0	0.0%	-19.6%	0	0	0	$ -	0%	0%	Contracotr C	1
Lab 211	10/15/2008	7/12/2009	270	$ 1,307,859.47	$ 257,476.24	20%	143	53%	3.00	3	0	143	$ 257,476.24	20%	53%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	1
Restrooms Bldg. 2	10/8/2008	9/13/2009	340	$ 1,354,636.66	$ (34.00)	0%	290	85%	3	1.00	0	150	$ (34.00)	0%	44%	0		0	0	$ -	10.0	0.0%	0.0%	1	0	140	$ -	0%	41%	Contracotr C	1
Bernheim DC	9/30/2008	9/25/2009	360	$ 1,748,235.92	$ 380,184.00	22%	287	80%	3.00	2	0	287	$ 380,184.00	22%	80%	0		0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr C	1
Boiler Control - WRAMC	5/30/2008	9/26/2008	119	$ 1,035,884.57	$ 263,803.61	25%	26	22%	5.00	4	0	26	$ 257,803.61	25%	22%	1	1	0	0	$ 6,000.00	10	1%	0%	0	0	0	$ -	0%	0%	Contracotr G	0
Repair M077 & M087	6/17/2008	2/12/2009	240	$ 1,153,587.57	$ 99,345.65	9%	62	26%	2.00	1	0	62	$ 99,345.65	9%	26%	0	0	0	0	$ -	10	0%	0%	0	0	0	$ -	0%	0%	Contracotr G	0

Risks Analysis with/without RMP

To identify the source of risk the following template was used. All risks from the completed projects were compiled and put in the categories mentioned in the table and further analyzed.

S.No	Type or Risks	Responsible Party
1	Approvals (Time) / Dr. Checks / NTP / RFP	COE
2	Delay in Review / Testing / Seismic	External government entity
3	SOW - Scope of Work (additional / change / reduction)	Facility
4	Relocation	User/Facility
5	Design related issues / Modification in design / Specs	Facility / External government entity
6	Revision in work plan / Incomplete work plan	Facility / COE
7	Site conditions	Unforeseen / Contractor / User / Facilities
8	Funding related issues	MEDCOM
9	Wrong/missing information in as built drawings	Facilities / External government entity
10	Change in scope due to unknown existing condition	Unforeseen
11	Inclement weather	Unforeseen
12	Delay in material order & delivery	Facility /Contractor
13	Co-ordination issue with sub	Facility /Contractor
14	Contractor generated / quality check / delay in submittal, close out	Contractor
15	Not described	Unknown

Contractor Improvement (2006-2008)

To analyze the improvement contractors made over years their performance was compared from 2006 through 2008. Performance numbers of 2008 & 2006 were subtracted to calculate the improvement in performance.

Contractor View	2006	2008	% Progress 2006 - 2008	2006	2008	% Progress 2006 - 2008	2006	2008	% Progress 2006-2008	2006	2008	% Progress 2007-2008
	Contractor A	Contractor A		Contractor B	Contractor B		Contractor C	Contractor C		Contractor D	Contractor D	
Total Number of Projects	31	37		9	12		5	20		4	5	
% Projects On Time	26%	38%	12.0%	44%	42%	-2.8%	60%	25%	-35.0%	0%	20%	20.0%
% Projects On Budget	42%	51%	9.4%	56%	83%	27.8%	20%	40%	20.0%	25%	80%	55.0%
Project Risks Statistics	**Contractor A**	**Contractor A**		**Contractor B**	**Contractor B**		**Contractor C**	**Contractor C**		**Contractor D**	**Contractor D**	
Total % Over Budget	9.19%	3.89%	5.3%	5.62%	6.01%	-0.4%	4.79%	9.60%	-4.8%	3.82%	0.89%	2.9%
% over budget due to Contractor	-0.30%	0.00%	-0.3%	0.00%	0.00%	0.0%	0.00%	0.00%	0.0%	0.00%	0.00%	0.0%
Total % Delayed	52.78%	26.47%	26.3%	22.51%	13.61%	8.9%	62.12%	34.98%	27.1%	35.68%	25.02%	10.7%
% delayed due to Contractor	3.09%	-0.90%	4.0%	-1.16%	-9.16%	8.0%	26.65%	2.67%	24.0%	-0.83%	7.24%	-8.1%
% RMP	0%	43%	43.2%	11%	75%	63.9%	0%	55%	55.0%	0%	100%	100.0%

Time to Resolve Risk

To calculate the time to resolve risk, all the risk from all the completed project's weekly reports were compiled. Further, the date the risk was entered and the date it was resolved are subtracted to calculate the days to resolve the risk. An average of each NTP year was compared to show the progress over years.

Project Title	NTP	Contractor	Date Entered	Risk Item	Planned Resolution Date	Actual Date Resolved	Days to resolve Risk
Project A	7/25/2006	Contractor A	3/6/2008	Approval	7/30/2008	7/30/2008	Date Entered - Actual Date Resolved
Project B	7/2/2008	Contractor B	6/13/2008	SOW change	9/30/2008	7/20/2008	Date Entered - Actual Date Resolved
Project C	1/25/2007	Contractor B	5/22/2007	Approval	6/8/2007	6/7/2007	Date Entered - Actual Date Resolved
Project D	12/5/2007	Contractor A	5/11/2007	NTP	6/22/2007	6/21/2007	Date Entered - Actual Date Resolved
Project E	10/9/2006	Contractor D	11/20/2007	SOW added	12/28/2007	12/28/2007	Date Entered - Actual Date Resolved

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