Logistics Management Institute

Assessment of the Program and Project Management Processes
U.S. Army Corps of Engineers
Great Lakes and Ohio River Division

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July 2001

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The U.S. Army Corps of Engineers is responsible, through its Directorate of Civil Works, for the planning, design, construction, and operation of civil works projects. Through its Directorate of Military Programs, it also manages the design and construction of major facilities and infrastructure to support the Army and other DoD and international programs. Two years ago, USACE adopted a customer-focused program and project management philosophy to ensure the timely delivery of cost-effective, quality products and services. This report conveys the results of a task to evaluate how effectively the Corps' Great Lakes and Ohio River Division has implemented that philosophy and to identify areas in which the LRD and its subordinate districts could improve. The study compared the LRD business processes to those consistent with the tenets of project management endorsed by the Project Management Institute and best-in-class firms and organizations using modern project management business practices. The study found many examples of sound, and sometimes innovative, project management practices within the LRD. However, they vary significantly among LRD's seven districts. The report identifies and recommends practices that offer the LRD opportunities for improving project delivery performance and increasing customer satisfaction.

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Executive Summary

The U.S. Army Corps of Engineers (USACE) is responsible, through its Director-
ate of Civil Works, for the planning, design, construction, and operation of civil
works projects, including those done in conjunction with state and local govern-
ments. Through its Directorate of Military Programs, it also manages the design
and construction of major facilities and infrastructure to support the Army and
other DoD and international programs. In 1999, the Corps performed construction
valued at more than $6 billion for its customers.

Two years ago, USACE adopted a customer-focused program and project man-
agement PPM philosophy to ensure the timely delivery of cost-effective, quality
products and services. Its policy guidance—Engineer Regulation (ER) 5-1-11,
Program and Project Management, designed to integrate its project management
processes—prescribes this philosophy but provides considerable latitude for each
district in implementing its own project management business processes.[1]

The Corps' Great Lakes and Ohio River Division (LRD), headquartered in Cin-
cinnati, asked the LMI to evaluate how effectively it has managed implementation
of ER 5-1-11 and to identify areas where the LRD and its subordinate districts
could improve. In response, we compared the LRD business processes to those
consistent with the tenets of project management endorsed by the Project Man-
agement Institute PMI and best-in-class firms and organizations utilizing modern
project management business practices.

Although we found many examples of sound, and sometimes innovative, project
management practices within the LRD, we found that the LRD's project man-
agement business processes and practices vary significantly among the seven dis-
tricts. We identified and recommended practices that offer the LRD opportunities
for improving the efficiency and effectiveness of its project management to im-
prove project delivery performance and increase customer satisfaction.

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[1] U.S. Army Corps of Engineers, Program and Project Management, ER 5-1-11 (Washington,
DC: 27 February 1998).

Our key recommendations are as follows:

♦ Clarify and promulgate the linkage between the corporate strategy and project execution by developing clear policies, standards, and guidance.

♦ Define and standardize the activities of the project management business process (PMBP). Incorporate project success factors, business process flows for both multiproject and single-project environment, and the use of lessons-learned in project planning.

♦ Develop a risk management program for the districts. Projects should include the development, documentation, and distribution of a comprehensive risk management plan.

♦ Enhance communications within districts and project delivery teams (PDTs) by investigating the use of electronic project portals to improve collaboration of team members, movement of project information, and standardization of project plans.

♦ Pursue integration of P2—the Corps' new project management information system—into the district operations. Consider the use of a simple project scheduling software program for projects that don't need the complex network analysis systems.

♦ Establish an LRD project management competency program to enhance competencies at the organizational, project, and individual levels. Establish clear roles and responsibilities. Enhance the existing training and certification program for project managers and team members.

♦ Establish a project support office (PSO) to assist the project manager and PDTs in managing their projects. The LRD should also develop a division-level PSO to provide and support standards, benchmarking, software standardization, skills development, and team-building.

♦ Consider integration of the PMBP into the project delivery cycles using the ISO 9000 certification process to maintain a continuous improvement focus. Continue competing for the Baldrige-type annual awards to stay focused on service delivery and customer satisfaction.

♦ Develop a project portfolio management program at the district level to prioritize the projects within the district's area of responsibility and assist in allocating resources to the project teams.

♦ Develop and implement a district performance management program to monitor performance of district projects and the portfolio.

♦ Continue to benchmark project management services against best-in-class firms and adopt best practices.

The LRD is well-positioned to lead the Corps in creating a PMBP to reflect how business is really done.

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Chapter 1
Introduction

The U.S. Army Corps of Engineers (USACE) is responsible, through its Directorate of Civil Works, for the planning, design, construction, and operation of civil works projects, including those done in conjunction with state and local governments. Through its Directorate of Military Programs, it also manages the design and construction of major facilities and infrastructure to support the Army, Air Force, and selected Navy locations, as well as other DoD and international programs. In 1999, the Corps performed construction valued at more than $6 billion for its civil works, military, and other agency customers.

Two years ago, USACE adopted a customer-focused program and project management (PPM) philosophy to ensure the timely delivery of cost-effective, quality products and services. Its policy guidance, Engineer Regulation (ER) 5-1-11 Program and Project Management, which is designed to integrate its project management processes, prescribes this philosophy but provides considerable latitude for each district in implementing its own project management business processes.[1]

The Corps' Great Lakes and Ohio River Division (LRD), headquartered in Cincinnati,[2] asked the LMI to evaluate how effectively it has managed implementation of ER 5-1-11 and to identify areas where the LRD and its subordinate districts could improve. In response, we compared the LRD business processes to those consistent with the tenets of project management endorsed by the Project Management Institute (PMI) and best-in-class firms and organizations utilizing modern project management business practices.

In our study, we focus on the performance of the LRD in the context of project management processes. Using the PMI project management body of knowledge (PMBOK)[3] standard for our study, we employed competitive benchmarking and other business process improvement techniques to identify best practices from industry and the public sector for adoption by the LRD.[4]

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[1] U.S. Army Corps of Engineers, Program and Project Management, ER 5-1-11 (Washington, DC: 27 February 1998).

[2] The Corps has seven of these divisions, collectively known as major subordinate commands (MSCs) and as regional business centers (RBCs). Under the RBC concept, which is relatively new to the Corps, the various RBCs define their roles and responsibilities. In this report, we use the terms division, MSC, and RBC interchangeably.

[3] In September 1999, the American National Standards Institute approved the PMBOK as a national standard. Accordingly, we structured our analysis around its nine knowledge areas.

[4] The Corps' strategic vision encourages the design of "best business processes" to deliver products to the customers.

In this chapter, we describe USACE project management programs and business initiatives and our study approach.

BACKGROUND

In 1988, the Corps implemented *Initiative 88*—a life-cycle project management process that relied on a matrix management organizational structure. Under this strategic plan, the Corps moved its districts from a functional organizational structure to a matrix organization with a deputy for project management assigned oversight responsibilities.[5] Although this formula did not prove immediately successful, in that the district functional organizations (namely, engineering and construction) still retained extensive power, it charted the course for the Corps to become a project management organization.

Current PPM Program

In responding to the changing nature of its mission responsibilities, the Corps revamped its static, highly prescriptive project management approach—essentially a rigid framework of mandatory, generic processes—and adopted a customer-focused program and project management business process (PMBP) philosophy intended to ensure the timely delivery of cost-effective, quality products and services to its customers.

In February 1998, USACE issued ER 5-1-11 to integrate its project management business process. It proposed a new approach to doing business and provided guidance on PPM implementation. The regulation reflected a "paradigm shift to focus attention on the program/project execution process, rather than the [products and services of] individual organizations" and integrated program management under the Commander for corporate oversight.[6] In effect, it centralized program management to enhance corporate decision-making and provided strategic goals for the districts to attain.

At the strategic level within each district, the District Deputy Engineer for Programs and Project Management (DDPM) was given program oversight for all work completed within the district. At the project level, the project managers (PMs) were made responsible for managing project resources, data, and commitments, using the PMBP, consisting in part of the project management plan and the project management information systems.[7] By definition, each project had one PM, who acts as the team leader and primary point of contact for the customer. This was a key change to the Corps' traditional engineering and construction

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[5] Steven E. Browning, Anthony F. Leketa, and John Saia, "Managing the Organization by Teamwork," PMI Conference, Philadelphia, PA, 12-13 October 1999.

[6] See Note 1.

[7] The corporate project management information system prescribed for use in the Corps was the project management information system (PROMIS), an in-house system that captured project data and linked directly to the Corps' financial management system, known as CEFMS.

functional organization structure and created significant friction within the organization. As with many organizations embarked on a significant change in corporate culture, change came very slowly.

Future PPM Initiatives

The Corps is revising its PPM and quality management regulations to create an overarching policy document that outlines its business philosophy and describes how it manages the work it receives. We see this new document as the next evolutionary step in providing the necessary vision and guidance needed by the field activities in advancing the corporate change to a project management organization. It addresses project performance measurements, continuous improvement, and teamwork.

This study used the current ER 5-1-11 in assessing the LRD's performance. As we were completing it, the Corps was working to define its policies for business practices and develop a new corporate management information system. These significant efforts will change the face of its project management. From the results of our assessment, the LRD is well poised to lead the rest of the Corps in effectively implementing headquarters' policies and directives and successfully attaining the Chief's vision of improved performance and customer satisfaction. The RBC is one place where this leadership can be shown.

Regional Business Centers

In a parallel effort to the PPM programs, the Corps established RBCs under a new business-centric philosophy that holds the MSCs accountable for the actions of their subordinate districts. They were designed to enhance the business management of the Corps' regional offices by leveraging underutilized resources between districts, such as labor, technical and management expertise, and contract capacity.

Each RBC's regional management board (RMB) works to balance the resources available within the division's area of responsibility to help enable the most efficient mission execution. The RMB is responsible for both the PMBP and resource management within the districts. It can provide key leadership and sponsorship of project management activities. This study's focus on performance management is a natural next step for the RMB. The recommendations in this study call for a linkage between the management of a single project and the management of multiple projects in a district's portfolio—an issue of effective portfolio management and resource allocation.

STUDY APPROACH

Throughout our study, we focused on performance and success in meeting project management requirements and other strategic goals. Our first step was to put the

Corps' project management program in a performance context. In so doing, we asked how can the Corps, and LRD in particular, achieve the project management performance objectives of ER 5-1-11.

Focus on Performance

Focus on performance management has dominated the agenda of federal government managers in the past decade, driven in part by the requirements of the Government Performance and Results Act (GPRA) of 1993 and the pressures of constrained budgets and improved service delivery requirements.[8] The GPRA directed federal organizations to develop strategic plans with appropriate performance measures to evaluate progress toward meeting goals. Specifically, the GPRA required agencies to "improve federal program effectiveness and public accountability by promoting a new focus on results, service quality, and customer satisfaction."[9]

It is, in part, from this congressional mandate, and the increasingly competitive nature of infrastructure development, that the Corps' strategic goals include improving the execution of its program and project delivery and increasing customer satisfaction, ostensibly using project management as a catalyst to effect this change. But has implementing project management in the Corps and LRD made a difference?

The traditional approach to answering this question would be to evaluate the Corps' cost and schedule data from a representative sample of projects and customer survey data and responses to see if projects were on time and within budget. This approach was not feasible for this task because the district's project data in the PROMIS database were not sufficiently robust—the necessary information to calculate cost and schedule performance was not available.

More importantly, modern project management performance analysis requires more than just cost and schedule data to determine success. We define "modern" project management as the integration of the classic focus (on cost and schedule) and meeting customer needs and expectations. Inherent in this definition are the complexities of teamwork, organizational structure, and other environmental concerns.

To answer the PPM performance question, we formulated the Corps' program performance question in Table 1-1, in the context of its complex network of internal and external factors. Since cost and schedule wouldn't completely answer

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[8] In the early 1990s, Congress found "that congressional policymaking, spending decisions and program oversight were seriously handicapped by insufficient attention to program performance and results. Furthermore, federal managers were seriously disadvantaged in their efforts to improve program efficiency and effectiveness, because of insufficient articulation of program goals and inadequate information on program performance" (U.S. Congress, 1993). In response to these findings, Congress enacted the GPRA.

[9] Public Law 102-62, 103rd Cong., 1st sess. (5 January 1993).

the performance question, we used project management process maturity as a surrogate for actual performance measurements.

Table 1-1. USACE PPM Performance Question

Can the...	...with these resources...	...through these actions, processes, and decisions...	...meet these objectives...	...to attain these goals...	...for these customers?
Corps', divisions', and districts' PPM programs	Legislative authority, budget authority, staff, equipment, and information and data systems	Enable RBCs/divisions to leverage resources across functional and geographic boundaries. Establish DDPM to integrate district products to leverage resources across functional boundaries. Assign technical function chiefs responsibility to develop technically competent work force, assign technical members to project teams, and ensure technical product quality. Hold PM responsible and accountable for successful completion and delivery of assigned projects to customers, within established costs, schedules, and quality parameters. PMBP elements include the following: ■ Centralize PM oversight under DDPM. ■ Establish project teams led by PM. ■ Obtain scope agreement with customer. ■ Utilize corporate management information systems. ■ Prepare project plan. ■ Establish project controls. ■ Evaluate against project baseline (scope, schedule, cost). ■ Maintain fiscal stewardship. ■ Facilitate customer involvement. ■ Continuously improve customer service. ■ Evaluate project performance; document lessons learned. Evaluate PM performance and benchmark against industry and other agencies; select and implement best practices.	Change into a PM-oriented organization through organizing to effectively execute project management (i.e., to reduce or eliminate the stovepipe effect) and ensure all functional elements and disciplines work together. Develop and implement uniform PMBPs throughout the Corps, divisions, and districts to enhance service to customers: ■ Optimize customer and corporate resources. ■ Foster teamwork. ■ Provide a focal point for interface with customers. Emphasize completing projects and programs rather than just individual projects or phases; ensure PMBP reflects interdependent nature of projects and programs throughout the life cycle of a project. Enhance USACE's reputation as world's premier engineering organization.	Improve execution of projects and programs. Increase customer satisfaction.	Congress and administration, state and local municipalities, design and construction industry, other federal agencies, DoD, Department of the Army, and USACE internal (Civil Works, Military Programs, etc.)

References: Developed from ER 5-1-11.

Benchmarking and Process Improvement

After developing our program logic model, we used a benchmarking technique developed by Professor Bill Ibbs at the University of California, Berkeley, to investigate how effectively the LRD implemented project management processes.[10]

We assessed the LRD districts' business processes by comparing the maturity of their project management processes to private-sector best-in-class firms. The objective of the benchmarking analysis, using industry standards, was threefold: assess the LRD's project management process maturity, apply best-in-class industry standard benchmarks, and identify areas for performance improvement and areas where efficiencies already exist. From this analysis, we identified differences, or gaps, and used them to focus our follow-on interviews with PMs and other members of the project delivery team (PDT) at each district.

We then analyzed potential improvement areas, using data collected from industry sources and site visits, and recommended ways to enhance the effectiveness and efficiency of LRD project management processes throughout the division. Figure 1-2 presents our approach.

Figure 1-1. Benchmarking and Process Improvement Study Approach

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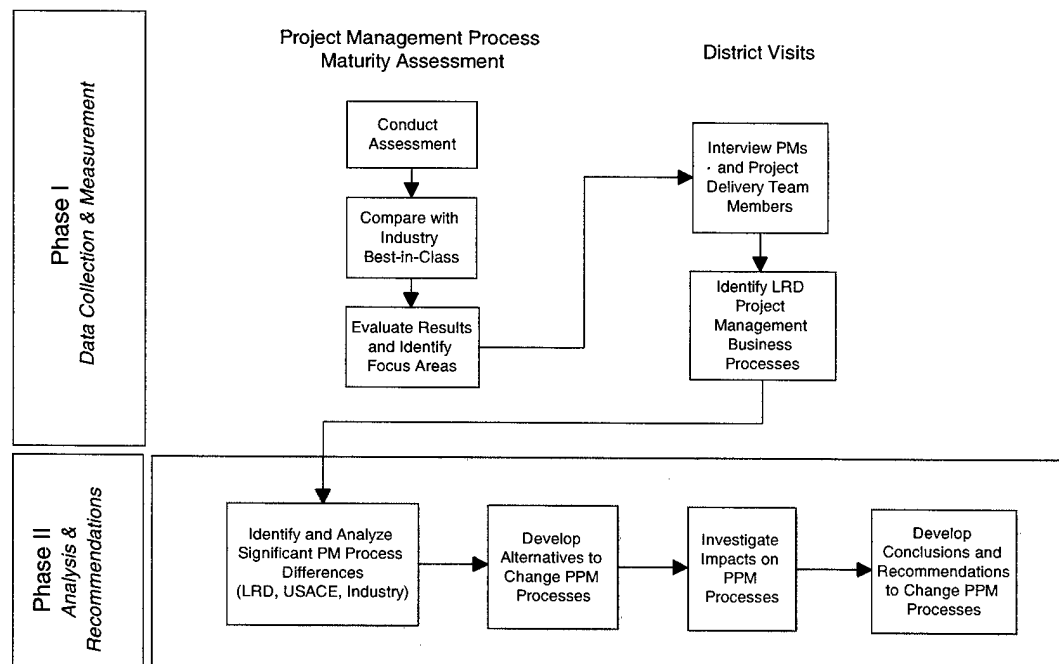
[10] Professor Ibbs developed the Berkeley project management process maturity benchmarking method with support and sponsorship from the PMI Educational Foundation.

A benchmark and process improvement study requires significant cooperation from the organization being evaluated since detailed process information is required for analysis. The LRD and district personnel cooperated to the fullest extent possible. Personnel at each district enthusiastically and professionally portrayed their business processes and practices. We greatly appreciated their investment in time and energy in meeting with us to discuss their processes; we enjoyed the opportunity to learn from these dynamic districts.

COORDINATION

In conducting our study, we were aware of several other ongoing studies and initiatives dealing with project and program management within the Corps. We either coordinated with or reviewed the work accomplished by these other teams in order to gain deeper insight into the nature of project and program management within the LRD and the Corps.

The specific studies and initiatives we worked with included the following:

♦ LRD's draft regional PMBP and the work of the Division System Integration Team

♦ HQ, USACE initiatives in rewriting the PPM and quality policy (ultimately combined into 5-1-11), establishing PMBP standards, and developing P2 (the follow-on system to PROMIS)

♦ Engineer Inspector General's report on teamwork completed in 1999

♦ Results of the South Atlantic Division's PMBP command inspection report

♦ Sacramento district's (SPK) work in PMBP development and the South Pacific Division's (SPD) related regional PMBP model.

We also visited the Seattle (NWS) and Savannah (SAS) districts to review their project management programs.

REPORT ORGANIZATION

This report conveys the results of the assessment of the LRD program and project management processes. Chapter 2 presents the project management process maturity assessment that helped identify the strengths and weaknesses of the seven LRD districts and flagged areas to investigate in our district visits.

The next three chapters focus on the primary topics that formulate our recommendations. Chapter 3 deals with linking strategy to execution in the districts' application of PMBP principles in translating strategic vision into tactical action. Chapter 4 addresses project portfolio management issues, and Chapter 5 discusses

performance management programs. Chapter 6 outlines a tentative implementation plan for the LRD and the districts. The appendixes provide additional detail.

Chapter 2
Process Maturity Assessment

Having the ability to compare an organization with other firms and organizations across different industries, both in the public and private sectors, gives decision-makers a powerful business process improvement tool. To identify ways they can improve their performance and reduce costs, many federal organizations have turned to performance benchmarking. We define benchmarking as

> The process of improving performance by continuously identifying, understanding, and adapting outstanding practices and processes found inside and outside the organization.[1]

Born in the private sector to improve quality by way of continuous process improvement, benchmarking and the adoption of best practices has withstood the test of time as a proven and effective management tool.[2] The engineering and construction industry benefited from adopting other industry's innovations and best practices. For example, the time-honored critical path method (CPM) so widely used on construction projects was adopted from DoD weapons programs of the 1950s and 1960s, the use of quality assurance programs was adopted from the nuclear industry, and the use of bar-coding was adopted from the grocery industry. It is no surprise that federal organizations began looking at benchmarking as a tool to achieve the performance improvements now required by GPRA.

We use the performance benchmarking technique to assess the level of project management performance within the LRD. In this chapter, we describe our benchmarking approach and assessment results, followed by identifying specific focus areas, which we investigated during the district visits.

BACKGROUND

Project management has rapidly grown in popularity in the past 10 years, primarily because project management techniques and practices offer firms and organizations real help in succeeding in today's highly competitive business environment. The Berkeley project management benchmarking tool quantitatively

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[1] American Productivity and Quality Center (APQC), *Benchmarking: Leveraging "Best Practice" Strategies*, 1998.

[2] In recent years, literature on benchmarking has grown vastly, resulting in a number of thorough and instructive books on the subject. See, for example, Robert C. Camp, *Business Process Benchmarking* (Milwaukee: ASQC Quality Press, 1995); Michael J. Spendolini, *The Benchmarking Book* (New York: American Management Association, 1992); Gregory H. Watson, *Strategic Benchmarking* (New York: John H. Wiley and Sons, Inc., 1993); and Richard Y. Chang and P. Keith Kelly, *Improving Through Benchmarking* (Irvine, CA: Richard Chang Associates, Inc., 1994).

examines an organization's overall level of project management processes and practices.[3] The Berkeley methodology provides solid and comparative studies across industries and companies within an industry. It also assists managers in assessing which, if any, project management practices would be best for their organizations.

For this study, we define project management as the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholders' needs and expectations from a project. Figure 2-1 represents the nine knowledge areas from the PMI PMBOK and the six project management phases of a project as a basis for the benchmarking tool used in the study. Appendix A describes these knowledge areas and phases in detail.

Figure 2-1. Areas Covered by the Process Maturity Assessment
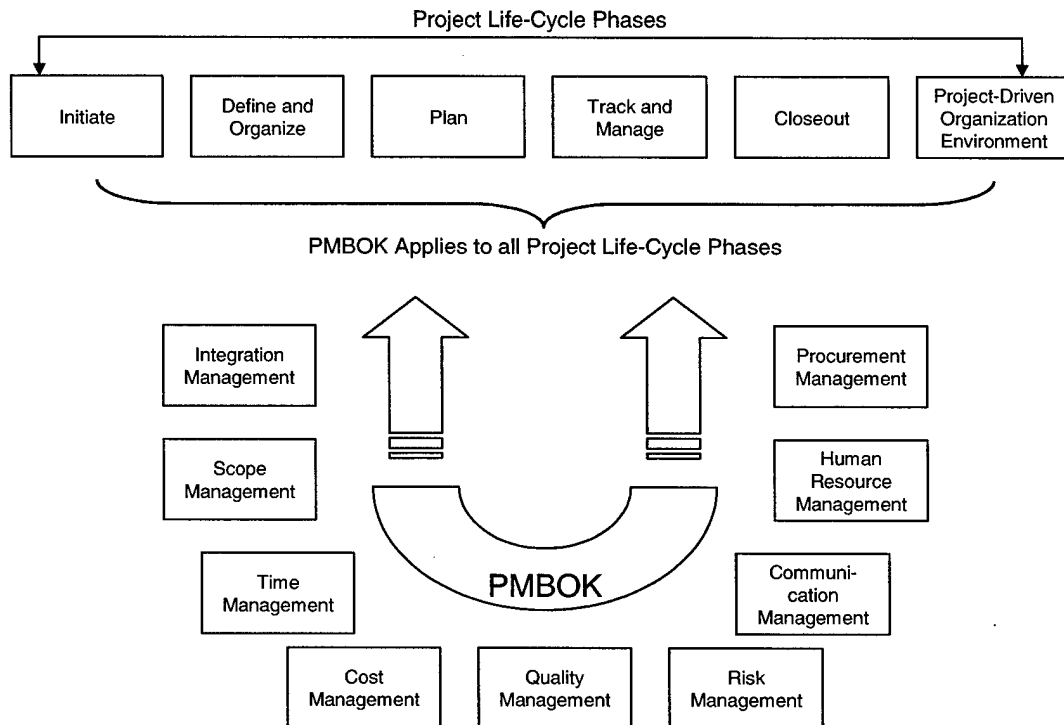
METHODOLOGY

The Berkeley assessment tool is a rigorous and comprehensive project management benchmarking methodology used to assess and evaluate the maturity of project management processes and practices among different industries. In analyzing the results of the assessment, we gained unique insight into the LRD's project management business model. From this benchmarking evaluation, we ascertained the performance level of the LRD's districts in meeting the tenets of the Corps' project management policy guidance in ER 5-1-11. Although we obtained data

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[3] See Note 10, Chapter 1.

2-2

from each of the districts, the focus of our study was to evaluate the LRD in aggregate—not each individual district within the LRD.

Project Management Maturity

Maturity refers to the relative presence of certain conditions that tend to promote, facilitate, and optimize a process. In our study, we define project management process maturity as the level of sophistication of an organization's current project management practices and processes. Figure 2-2 presents the five levels of maturity we use. As a firm moves through project management maturity levels, it tends to become more sophisticated in project management approach and practices. Appendix B defines each of the maturity levels in detail.

Figure 2-2. Levels of Project Management Process Maturity
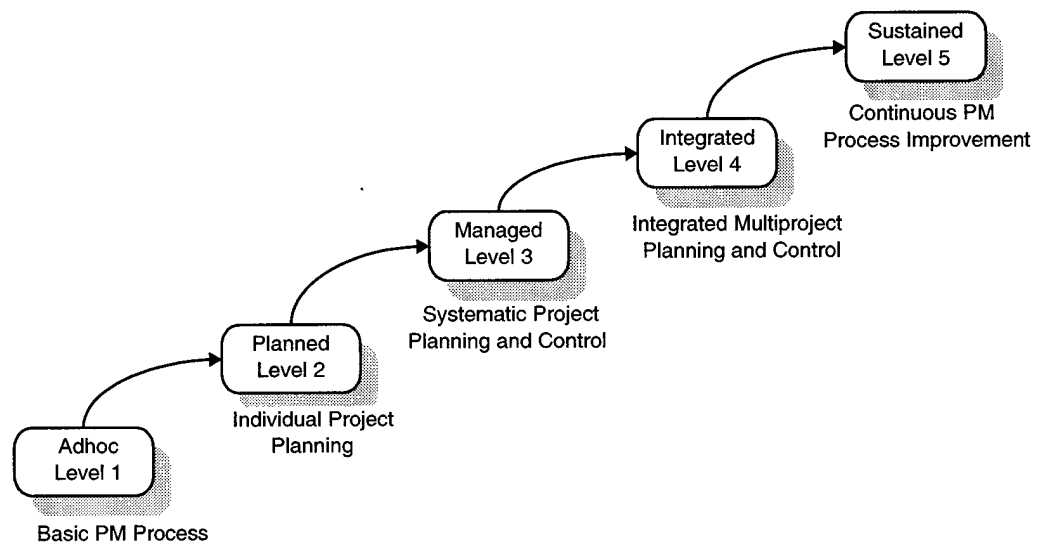
We use project management process maturity as a surrogate for project management performance, i.e., by measuring how an organization conducts project management in terms of cost, schedule, risk, teamwork, and organizational structure. In addition, by benchmarking and continually evaluating project management process maturity, an organization can measure its performance.[4] We asked two general questions in our assessment of the LRD:

◆ Do the districts do the "right" project management activities?

◆ How do they compare in doing the right things with those best-in-class organizations across several industries?

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[4] The International Benchmarking Clearinghouse of the APQC supports this view. It concludes that improving process maturity in an organization improves financial and nonfinancial performance.

2-3

The comparative level of project management process maturity will help define how effective the LRD has been in implementing the requirements of ER 5-1-11. We don't imply that an organization must use the most advanced project management techniques on every project; instead, we evaluate how wide-ranging the organization's project management tool kit is.

For instance, on a large lock and dam project, such as Olmstead, a very robust PDT is in place with a sophisticated project management organization and set of processes. Whereas, on a small "fast-burn" hazardous, toxicological, radiological waste (HTRW) project, the schedule may only be 5 weeks in duration. The short schedule may cause the project manager to use only the most rudimentary project management tools and techniques—because they are good enough to do the job.

Process Maturity Assessment

The Berkeley project management maturity assessment tool evaluates "how" project management is executed within an organization. It addresses the tenets of project management through inclusion of the PMBOK across the life cycle of a project. It is a robust benchmarking tool designed, in our case, to compare the LRD's project management maturity both with its peers in the private sector and across other industries.

The assessment tool uses statistical techniques to assess the maturity of project management processes and practices among different industries. The primary purpose of the benchmarking methodology is as a reference point, or a yardstick, for an organization applying project management processes. It compares project management strengths and weaknesses with other organizations. It can provide and guide the necessary processes and requirements needed to achieve a higher maturity level, lead to suggestions about an organization's application expertise, or produce recommendations on how to hire, motivate, and retain competent staff.

DATA COLLECTION

The assessment tool—and corresponding database of 43 firms that have already participated in the project management benchmarking initiative—enabled us to collect project management process data for the LRD and then compare it to the industry database best practices.

The Berkeley method enabled us to the capture the essence of the LRD's project management processes. The responses to the questionnaire, which has 161 multiple-choice questions, were made in a structured gradation, using a Likert scale (with 1 being the lowest level of project management maturity and 5, the highest) and related directly to the LRD and districts' project management. Appendix C gives an example of the detail and rigor of each question. We sent 4 questionnaires to each of the 7 LRD districts and received 24 responses.

The objective of the survey was not to obtain a statistically defensible sample but a variation among the sample to avoid bias when constructing a picture of the LRD PPM program. It identified areas of interest for us to probe when conducting the follow-on interviews. At the districts, for example, the results of the survey indicated a weakness throughout the LRD in project risk management.

ASSESSMENT PROCESS

We conducted an independent, third-party assessment using state-of-the-art project management business practices. As an independent entity, it is easier for us to be objective when dealing with the many sensitive issues found in an organization undergoing a major business cultural change, such as the Corps in its transition to project management. When evaluating the LRD, we can dispassionately relate results, without the possible difficulties an internal team may face.

In making our comparisons, we used data collected from 43 firms in the engineering and construction (EC), information management and movement (IMM), information systems (IS), and high tech manufacturing (HTM) industries. By comparing the LRD to this total population of firms, we gauged where it stands in relation to some world-class organizations. Appendix D lists these firms.

We also defined a peer group for a more detailed comparison with the LRD. We selected these firms because they participate in large-scale construction projects as either owner or contractor and, in many cases, operate as a regulated public utility, similar to the Corps. The firms selected as the LRD peer group were Bechtel Corporations, Chevron, NYNEX, Williams Gas Pipeline, and the Australian Army Engineering Agency.

LRD personnel provided the data we obtained from the surveys. In cases like this, personnel tend to inflate their abilities and work processes. Before completing the assessments, we reminded LRD personnel about the value of an objective self-assessment. We incorporated this issue in making our analysis.

Using the study to investigate specific strengths and weaknesses in the districts, we better assessed their level of PM maturity. For districts with either high or low responses, focused follow-up questions asked during the site visits provided greater insight into their good or poor business practices. We then combined the various district findings to create a detailed picture of the LRD project management practices.

RESULTS

The following results summarize our analysis of the maturity of the project management processes maturity for the seven districts within the LRD. Our objectives were to analyze in detail the current state of the LRD's project management practices and identify opportunities to improve project management effectiveness.

Project Phases and Knowledge Areas

The LRD project management process maturity index was 3.47, which is slightly above the average maturity of the other 43 companies (at 3.26) in the Berkeley database. Figure 2-3 displays the ratings of the LRD and other companies in the database. The company identities are hidden to protect any competitive advantage they may enjoy. In the figure, EC1 through EC18 represent the 18 EC companies, IMM1 through IMM12 represent the 12 IMM companies, and so forth.

Figure 2-3. LRD Project Management Process Maturity
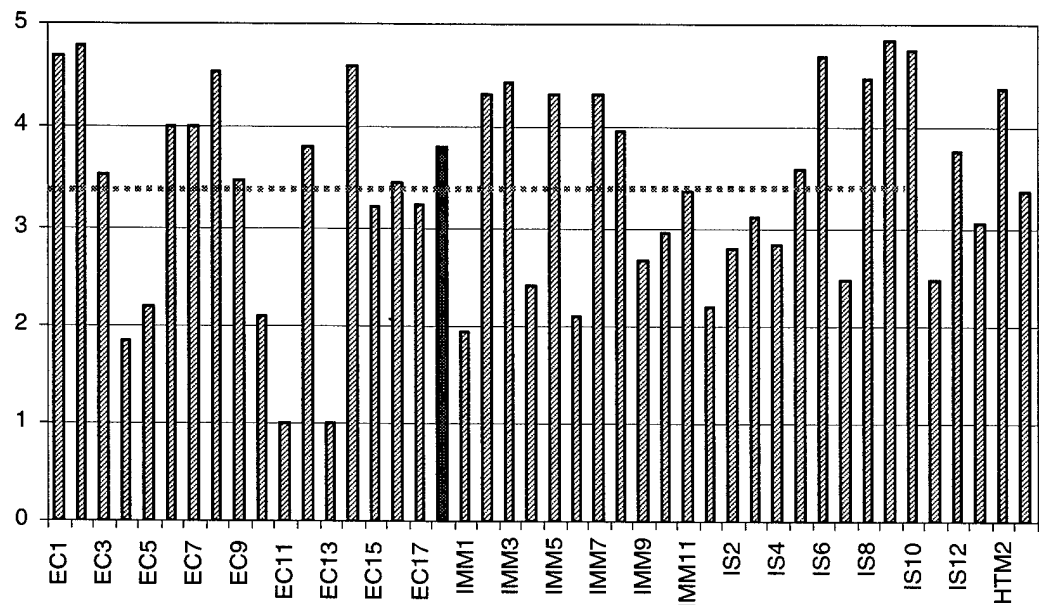
The comparison to the general population of companies in the Berkeley database provides a general sense that the LRD is performing better than others but, more importantly, shows that it has room for improvement since there were others with higher overall scores.

We next compared the LRD to the peer group we selected. Figure 2-4 presents the results of this comparison. The peer group's maturity level was 3.73, superior to the LRD at 3.47.

Figure 2-4. LRD Project Management Process Maturity versus Peer Group
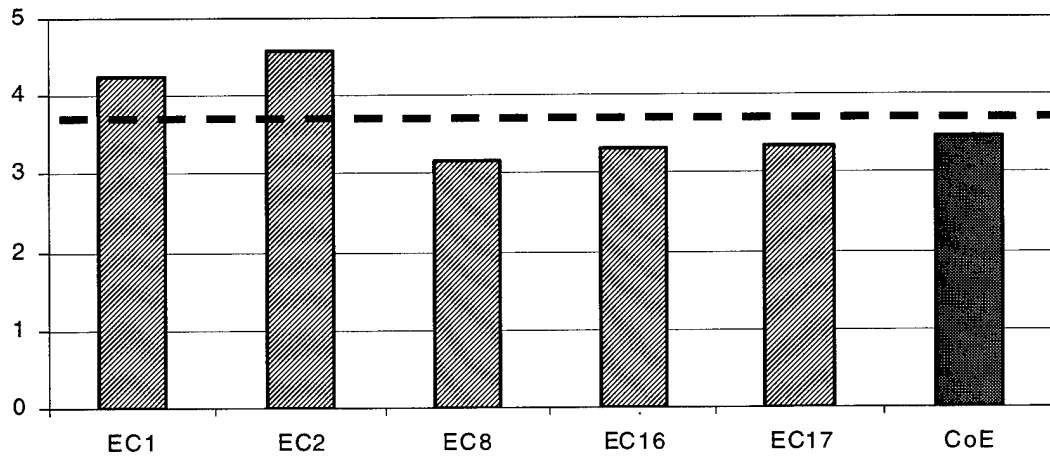
Figure 2-5 presents the detailed results of the district assessments compared with the peer group. The shaded boxes indicate areas in which the LRD lagged behind its peers.

Figure 2-5. LRD District Results Compared with the Peer Group

	Area	A	B	C	D	E	F	Overall	Peer Group	Delta (LRD-Peer)
PMBOK® Knowledge Areas	Scope Management	3.25	2.70	3.74	4.09	3.93	3.83	3.64	4.15	-0.51
	Time Management	3.09	2.92	3.55	4.02	4.02	3.76	3.6	3.86	-0.26
	Cost Management	3.61	3.78	4.19	4.75	4.44	4.42	4.26	4.28	-0.02
	Quality Management	3.68	2.73	3.43	3.35	3.88	3.64	3.49	3.15	0.34
	Risk Management	2.67	2.09	2.91	3.47	3.33	3.10	2.97	3.35	-0.38
	Communication Management	3.25	2.62	3.52	4.08	4.01	3.75	3.6	3.81	-0.21
	Human Resources Management	2.63	2.19	3.22	3.46	3.78	3.33	3.18	3.44	-0.26
	Procurement Management	3.50	2.95	3.50	3.96	4.07	3.81	3.67	4.04	-0.37
	Integration Management	2.92	2.36	3.43	4.15	3.81	3.74	3.46	3.67	-0.21
Project Life Cycle	Initiate	3.78	2.76	3.52	3.99	3.64	3.85	3.43	4.27	-0.84
	Define and Organize	3.41	2.99	3.61	4.47	4.38	4.09	3.87	4.13	-0.26
	Plan	2.82	2.32	3.22	3.65	3.85	3.48	3.29	3.54	-0.25
	Track and Monitor	2.94	2.55	3.47	4.02	3.63	3.57	3.4	3.65	-0.25
	Close	2.88	2.61	3.57	3.67	3.82	3.47	3.33	3.54	-0.21
	Project-Driven Organization Environment	2.75	2.68	3.66	3.66	3.94	3.50	3.45	3.63	-0.18
	Overall	3.08	2.58	3.44	3.89	3.86	3.64	3.47	3.73	-0.26

The peer group column in Figure 2-5 represents the average maturity assessment results of project management processes for Bechtel, Chevron, Australian Army Engineering Agency, Williams Gas Pipeline, and NYNEX. The "Delta" column represents the difference between the LRD average and the peer group comparison.

Although we were concerned primarily with the aggregate results for the LRD and not the specific districts (due to the small sample taken at each district), we provided the district results to show the significant variability among districts. We have masked the district identities and combined two of them, due to some missing surveys, for a total of six districts, designated as "A" through "F." Figure 2-6 presents the district side-by-side comparisons.

Figure 2-6. LRD District Comparison of Process Maturity Level
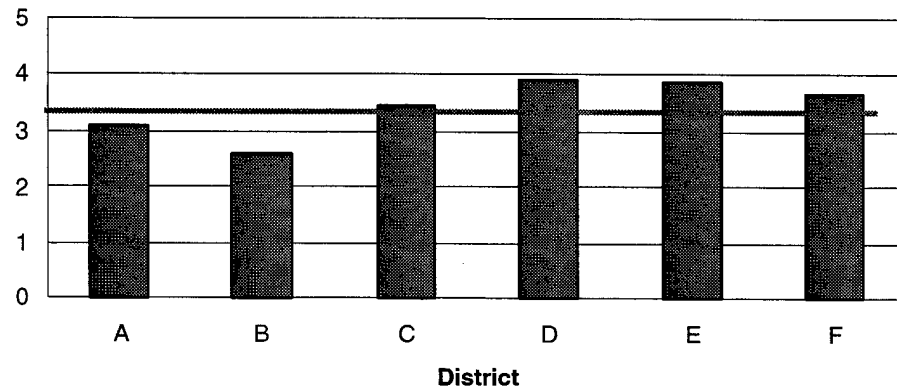
Analysis of Results

In our analysis, we find any difference with a value greater than 0.30 as significant and warranting additional investigation. The results, presented in Figure 2-5, are quite erratic, both within each of the districts and between them. These erratic processes complicate coordination between projects and communication between offices.

Our findings from this survey highlight key management process areas where the LRD scores significantly above or below the peer average—higher in quality, and lower in scope, risk, and procurement management, and in the initiate phase of a project.

QUALITY MANAGEMENT

As defined in our study, quality management refers to meeting or exceeding the needs of the client and includes all activities of the overall management function that determine the quality policy, objectives, and responsibilities. It implements them by such means as quality planning, quality control and assurance, and improvement within the quality system. The LRD scored high in this area, most likely as a function of the strong management focus on quality products and customer satisfaction found in the Corps' culture.

The results of our assessment show that although quality management does indeed score high, the focus may be partially misplaced in that only the product, and not necessarily the process by which the districts manage projects, is considered. We address this issue in the next chapter in our discussion of defining performance success within the LRD. We are pleased to see that the Corps' new 5-1-11 policy document takes a strong performance and process-oriented perspective in defining USACE business practices, including quality and project management.

SCOPE MANAGEMENT

Scope management consists of scope planning, scope definition, scope verification, and scope change control. It was in this area that the LRD scored significantly lower than the peer group. For example, we found that the priorities between individual project objectives were only informally defined and documented and that the PM, rather than the PDT, only informally documents the existence of the appropriate project checklists (such as one for project initiation).

PROJECT RISK MANAGEMENT

Project risk management is another area in which LRD scored below the peer group. It is a process that seeks to maximize the results of positive events and to minimize the consequences of adverse events by identifying, analyzing, and responding to project risk. Risk identification, quantification, response development, and response control activities are used in project risk management.

For the LRD, the survey assessment results indicated there was no consistent practice of developing, documenting, and distributing a comprehensive project risk management plan. For instance, risk management practices include the identification of at least one contingent action, assigning an owner and defining a trigger mechanism for each of the top risk areas in a project. We found very few respondents developed contingency plans and assigned owners.

It is also important to note that the LRD, and the Corps, are not the only organizations to score low in this area. The private sector is struggling with how and when to apply risk management to their projects—for instance, in the peer group of this study, the risk management score is the second lowest at 3.35. This type of result, indicative of industry's difficulty in dealing with project risk management, spurred the PMI to completely rewrite the risk chapter in its new version of the PMBOK—notable in that this was only one of the major revisions in the new PMBOK document.

PROCUREMENT MANAGEMENT

Procurement management includes the procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout activities associated with the life cycle of a project.

For procurement management, the LRD does indeed have a fairly robust and innovative regional contracting board that helps level the contracting resources. It allows the districts to use the capacity of a contract vehicle from a district other than their own—allowing more flexibility and better use of resources throughout the RBC. We did find that the districts, during project development and initiation, only informally consider market conditions for the procurement of project services (planning, design, construction) but do not document these conditions.

INITIATE PHASE

The initiate phase analyzes the feasibility and staging of the project, and examines the possibility of applying a systematic approach for project planning and managing. This area is important because it sets the tone for all subsequent phases of the project.

The LRD's maturity in this area is extremely low. For developing new work, we discounted some of the delta since the LRD, in general, receives its work through the legislative process—the ability to choose projects is limited. But under the auspices of the outreach program or customer partnering arrangements, more attention to proposal development and planning should be made. The remainder of the delta is explained in part by the following:

◆ Final reports (post-mortems, lessons-learned) of similar, previous projects are not consistently reviewed.

◆ Only an informal analysis and documentation of organization priorities and strategy are made for some projects.

◆ Success and failure criteria (such as tolerance) for the project are not always identified and documented, and when they are, it is done informally.

◆ Only an informal analysis and documentation of possible tools or technologies are made for each project.

COST MANAGEMENT

The objective of project cost management is to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, budgeting, and control. The primary concern of cost management is dealing with the cost of resources needed to complete project activities.

The LRD scored highest in this PMBOK area, with a score of 4.26, and relative to the peer group, the LRD was essentially at the same score.[5] This result is not surprising due to the Corps' strong focus in managing-to-budget and the key metrics used to measure performance, namely financial performance measures. But, as we

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[5] The difference was only 0.02 in the scores, with LRD at 4.26 and the peer group at 4.28.

discuss in Chapter 3, focusing only on financial performance does not give a full picture of the LRD's performance in project management.

District Visits

The Berkeley project management process maturity assessment tool was step one of the two-step process in defining LRD's performance in project management. By disaggregating project management into the 9 PMBOK process areas across the 6 project phases, we were able to explore the complex arena of project management as it relates to the LRD. The survey tool results gave us a feel of how to target our follow-up visits to the districts to validate these findings and explore additional areas we uncovered during the site visits. Appendix E contains a typical district visit questionnaire, which we tailored for each site visit to reflect the results of the maturity assessment.

By building on the results of the Berkeley survey tool and the district visits, Chapters 3, 4, and 5, present additional findings and conclusions, and develop specific recommendations that deal with the PMBOK focus areas and the project life cycle phases. All of the findings in this chapter are incorporated into recommendations in the following chapters.

Chapter 3
Linking Strategy to Execution

INTRODUCTION

To succeed, an organization must link its strategic focus and direction directly to the execution of its product or service. World-class firms routinely develop strategic goals and objectives that cascade down through their production, marketing, and sales operating plans. The strategic goals and objectives of the Corps should likewise cascade down through the framework of the PMBP to the execution of their operating plans. There are two important facets of this linkage: the individual project perspective and the management of many projects simultaneously—with the PMBP integrating the two perspectives.

Single Projects

From the project management perspective, the identification and integration of the myriad project management philosophies, processes, activities, and issues are highly complex and difficult undertakings. The Corps traditionally uses the PMBP to describe both a business philosophy and an execution methodology for managing the delivery of a single project. Initiative 88 started the formal evolution of the Corps from a functional, stovepiped engineering and construction (E&C) entity to one operating more like an organization with a modern project management business orientation. But, as with many change management issues within a large government organization, the initiative became bogged down and its goals obscured; there still remained a large E&C functional power base within the Corps.

Realizing that the transition was in trouble and that change was coming very slowly and needed a push, the Chief of Engineers promulgated the current Corps' strategic vision and goals and published ER 5-1-11 in early 1998. This document provided the current strategy under which the Corps operates its business and set the stage for this study to determine how well the LRD has done in meeting the goals and objectives of ER 5-1-11.

Multiple Projects

The other critically important aspect of linking strategy to execution occurs within the district's corporate board, specifically in how it manages its project portfolio and executes its projects simultaneously. Although the management of a project is a very important element of a successful Corps, success in meeting the performance requirements of ER 5-1-11 cannot be attained without an effective

and efficient district portfolio management program. The ability to effectively manage multiple projects simultaneously with an efficient allocation of resources is key to successfully meeting the strategic goals of improved project performance and customer satisfaction.

We have organized the next three chapters to deal with the tangible, positive initiatives that the LRD can implement to raise its maturity to a level commensurate with the most appropriate best-in-class practices of the private sector and other agencies—steps that can improve their overall project performance.

This chapter, building on the findings and conclusions of the assessment survey presented in Chapter 2, presents our findings, conclusions and recommended changes or enhancements to the PMBP in the LRD districts.[1] This chapter focuses on the single project perspective of the PMBP. In Chapter 4, we take the management of multiple projects perspective of the PMBP and discuss issues and make recommendations for efficiently and effectively allocating resources to the district's project portfolio. Chapter 5 lays the framework for a performance management program for the LRD districts to measure their performance at the project and portfolio levels. Chapter 6 presents a tentative implementation plan incorporating the recommendations of Chapters 3, 4, and 5.

FINDINGS AND CONCLUSIONS

To be effective, agency leadership must develop strategies that align the resources, outputs, and tasks of the organization with the needs of the public: they must be transformed into specific actions and operations. The Chief of Engineers' strategic plan establishes the long-term direction of the Corps in the context of a vision of the future, a unique mission, and a specific set of goals, objectives, and policies developed in response to customer requirements, external mandates, and external and internal environments. Our performance question (see Figure 1-1) reflects the coupling of the strategic direction of the Corps to improved project delivery performance.

The Chief's strategic plan, known as the CORPS PLUS Strategy, has three goals:

◆ *Revolutionize effectiveness*. Best business practices, bold process reengineering, and innovative use of technology will dramatically improve performance and customer satisfaction.

◆ *Seek growth opportunities*. Growth will be strategically targeted to meet emerging Army and national needs, sustain and enhance core competencies, and maintain full-spectrum capabilities critical to the Army.

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[1] For this study, we envisioned the PMBP as a synthesized, interdependent grouping of many different processes and activities designed to deliver projects efficiently and effectively. Our vision of the PMBP includes strategic and tactical applications, procedures, and activities.

◆ *Invest in people.* Enlightened leadership and a talented, productive, and diverse work force will enable the Corps to enhance its value to the Army and the nation.[2]

During our site visits, we found a wide variation in how the districts incorporate the goals and objectives of CORPS PLUS into their project delivery processes. Some districts, in meeting the first goal of the strategic plan, proactively utilize the philosophy of business process improvement and incorporate best practices. For instance, Louisville was actively involved in the ISO 9000 process and working to integrate the project management, engineering and construction business areas; Huntington recently initiated the ISO process and Pittsburgh is contemplating starting the process. In a similar fashion, Huntington and Nashville competed in programs modeled on the national Baldrige award criteria to review their processes and performance.

In addressing the second goal, we found that districts had creatively worked effective partnerships with their customers to enhance project success. Buffalo's and Detroit's partnerships with the EPA, Nashville's initiative to organize around its congressional districts, and Chicago's partnership with four of its key customers are examples; the account executive program throughout the LRD appears to be working. In Detroit, we found a strong focus on project management competencies and a new training program being implemented.

But, it was clear during our site visits that the districts are fairly autonomous in their management and, since there are no standard project management business processes in place throughout the LRD, they do not necessarily share best practices effectively and, as a result, develop their own business processes. In some cases, management seemed to understand the strategic linkage with projects, but in our discussions with project delivery team (PDT) members, there was a disconnect—the team members did not always see how their project fits within the strategic plan or aim of the Corps, LRD, or district. These examples demonstrate a breakdown in communication both within and between districts.

PROJECT MANAGEMENT BUSINESS PROCESSES

Since 1998, the PMBP has been described as the overarching business framework that drives all of the Corps' business processes. During our district site visits, we found confusion as to what the PMBP consisted of—some districts had a well-documented process for managing the delivery of projects, others used a number of different management processes. Many times this was a function of the style and experience of the individual PM or specific program. In the end, we found it very difficult for the districts, and LRD in the aggregate, to measure the success of their projects and management processes.

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[2] Adapted from USACE, "Goals" [on-line document], cited August 2000. Available from http://www.usace.army.mil/essc/visiona/Mastateg.htm.

The LRD project portfolio is large and complex, challenging the districts in delivering the projects within cost and scheduling constraints. While collecting data, including the benchmarking analysis and district visits, we developed a wide range of findings and conclusions regarding LRD project management.

Overall, while the LRD effectively manages projects, there are many areas in which it can significantly improve its project management business practices, thereby increasing process maturity and, by extension, its performance. Continuous improvement is a key characteristic of the best-in-class firms.

The following findings in the LRD project management practices have the most potential for streamlining and improvement:

◆ The application of PMBP varies widely throughout the LRD districts:

➤ The Berkeley assessment tool's competitive benchmarking analysis identified a wide variation among the districts, with the district project management process maturity indexes ranging from a high of 3.89 to a low of 2.58 (on a scale of 5.0).

➤ Comprehensive project management plans are not well developed initially and poorly used throughout the project. Priority of individual project-level objectives is only informally defined and documented.

➤ Success and failure criteria for the project are not always identified and documented, and, when they are, it is done informally. Some districts use the classic cost and schedule criteria as their sole measure of performance success.

➤ The LRD does not effectively use available tools, such as earned value management or trend analysis, to track the performance of projects with respect to cost and schedule.

➤ Project management documentation is not written to the standards of best-in-class firms.

➤ Lessons-learned are not effectively disseminated or used in developing the project. Final reports of similar, previous projects are not consistently reviewed.

➤ Some LRD districts are involved in the ISO 9000 certification process to measure performance against stated goals. They are investigating how best to use the PMBP as the integration tool for the project delivery phases (planning, design, construction, operation, and maintenance).

◆ There is no explicit focus on project risk management. Projects do not include development, documentation, and distribution of a comprehensive risk management plan.

◆ Developing project-level authority is difficult throughout the LRD.

◆ No effective project management information system is in place to support PMs.

◆ The lack of a performance success definition and an associated performance measurement program greatly restricts the LRD's ability to identify and develop improvements in project management.

◆ Project management competencies vary.

> In many districts, the roles and responsibilities of the PM and the PDT are unclear.

> Transition of project management responsibilities during the construction phase is confusing and unclear.

> No systematic program exists for recruiting and training project management professionals and PDTs. Remnants of the E&C stovepipe still remain in the construction phase of a project.

Application of PMBP

As presented in Chapter 2, the project management process maturity and project management process implementation varies extremely among districts. In many instances, this stems from the autonomy of the individual districts and corresponding lack of prescribed standard project management policies and practices. Many districts left process definition up to their PMs and PDTs, a risky endeavor because project success then depends wholly on the competence of the PM and the PDT. For example, during our interviews, some district team members said they were unsure of their roles as they moved from team to team since each PM operated differently. This seemingly insignificant lack of clearly defined roles and responsibilities creates confusion, inefficient use of resources, and a breakdown in communication, to name a few of the possible problems.

This lack of understanding or buy-in by the work force was one of the greatest barriers to changing the Corps project management business practices. The work force—still working under past, comfortable business strategies—did not understand or trust the new vision requiring the transition to a project management philosophy as it became established. This disconnect caused planning, engineering, and construction to continue to improve their own sometimes-efficient processes at the risk of not responding to the strategic signals above them. There was no integrated, synthesized approach to delivering work to the customer.

Defining Performance Success

The districts vary widely in their definition of performance success and execution of modern project management. Some viewed success as meeting time and cost targets, some incorporated customer satisfaction, and some did not explicitly measure their success in completing projects.

In the past decade, the understanding of project management has changed and matured as more practitioners refined and applied its tenets. The classic view of project management performance success—focusing on the cost and time aspects of a project—has changed significantly. No longer can we define success only in terms of cost and schedule. We must address a much wider range of needs, concerns, and issues presented by a diverse mix of stakeholders.

The most recent changes within the industry, manifested in the new PMBOK exposure draft, demonstrate this shift.[3] In this edition, key changes in the project management field include (1) acknowledgement of the role of the project office, (2) expanded treatment of earned value, and (3) a complete rewrite of the risk management chapter. The PMBOK, as the newly approved ANSI national standard for project management, has a decidedly team-focused perspective, confirming that successfully managing a project involves more than just looking at cost and schedule.

Although cost and schedule are popular measures of success (since they are easy to measure and remain within the realm of the project organization), they can be somewhat misleading and do not provide the complete performance picture. As the definition of project success has become more complex, it incorporates many of the other areas of the PMBOK, with a focus on the "soft skills" of project management: customer satisfaction, teamwork, and communication. These changes are part of the new "modern" project management.

In measuring success, two distinct components must meet or exceed the stakeholders' expectations:

◆ *Product success*, which focuses on the effects of the project's final product, deals with the goal and purpose of the project.

◆ *Project management success* focuses on the project (successful accomplishment of cost, time, and quality objectives) and the manner in which the project management process was conducted.

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[3] This version was promulgated in April 2000 for review and comment. The PMBOK has evolved significantly since PMI published its initial standards in 1983. The 1996 version acknowledged the importance of integration of the PMBOK areas, refined the focus on projects, and highlighted the project life cycle.

In our definition of project success, meeting the goals and purpose of the project are as important as how the process was completed.[4]

Risk Management

Not one district we visited has an effective policy of project risk management. Each had ways of dealing with various types of risk, most notably design risk, but no custodian of risk had "ownership" or responsibility for risk management or the necessary tools to manage it.

Under PMI's newly crafted definition, risk management is the "systematic process of identifying, analyzing, and responding to project risk, including the maximization of the probability and impact of positive events and minimizing the consequences of events adverse to project objectives."[5] This involves the interdependent processes of risk management planning; identification, assessment, and quantification of risk; risk response planning and monitoring; and control.

Examples of project risk include a lack of technically qualified PDT personnel, inadequate funding, or a remote project site location. Mitigating factors could include an enthusiastically supportive customer, an innovative technical solution, or a highly competent contractor. In managing these wide-ranging perspectives of risk, many best-in-class firms employ risk "stewards" as their experts in handling risk, staying abreast of the best practices in risk management, and helping project teams apply a suitable level of risk management techniques to increase the probability of project success.

Project Management Information System

The project management information system in use at the time of our study, known as PROMIS,[6] is too rigid and cumbersome. It is a "one-size-fits-all" design, requiring the same detailed level of information for small and large jobs. In addition, PROMIS does not provide adequate project-level support for the PM; district management uses it primarily as an upward reporting tool. Each district has a strong need for a project management information system that supports the PM and the PDT.

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[4] David Baccarini, "The Logical Framework Method for Defining Project Success," *Project Management Journal*, Vol. 30, No. 4, 1999, pp. 25–32.

[5] Project Management Institute, *PMBOK 2000 Edition, Exposure Draft*, June 2000.

[6] Data entry into PROMIS halted during the course of our study, and an initiative for procuring a state-of-the-art project management information system was started. The new system, P2, is expected to be online in mid-2001.

Performance Management System

One of the cornerstones of an effectively run organization is the ability to measure performance and take corrective action in areas that are under-performing. In general, the districts do not have a performance objective with respect to managing multiple projects—or at least one focusing on more than just cost and schedule. The extremely strong focus on budget execution is suboptimizing, and in some cases, actually reducing, project portfolio performance.

For example, the requirement to execute a district's civil works 2101 budget on a "first-in, first-out" basis for projects may not allow the "right," or highest priority, projects to be completed in the case of a funding shortfall. If the projected funding for the year does not materialize or is cut back (as happened this year with construction general funding), then high priority projects still in the pipeline may be stopped, whereas lesser priority projects may have already been awarded since funding was available. This forces a concentration of effort on program execution to the detriment of other projects that might be better aligned to strategic goals.

Project-Level Authority

A PM's success is a function of both *de jure* (by law) and *de facto* (in fact) project authority. The former is the legal or rightful power to command or act in the management of a project. In this case, the PM can commit or withdraw resources with a legal authority usually granted in writing and including the complementary roles of other managers (functional managers, general managers, etc.)

The latter represents the influence brought to management of a project by reason of a particular person's knowledge, expertise, interpersonal skills, or personal effectiveness. Organizational knowledge, the ability to communicate (interpersonal, presentation, and public speaking), conflict management, negotiation, writing, competence in working effectively with other functional managers and stakeholders, and technical skill in the technology embodied in the project are all part of the PM's de facto project authority.

The districts vary widely in their project authority, most notably in de facto authorization, which is primarily a function of the project management competencies within the district organizations. We address this issue below.

Project Management Competencies

The districts do not identify, develop, or maintain project management competencies. This shortfall includes the capability of the organizations to create an environment enabling individuals and teams to carry out their jobs effectively, the effectiveness of teams in harnessing the cross-functional perspectives needed to resolve the complex problems typically encountered in district projects, and the capability of individuals to identify and solve problems.

RECOMMENDATIONS

No single change or recommendation will significantly improve the LRD's project management process maturity performance because the issues are pervasive and cultural: resolution will involve the effective integration of both short- and long-term fixes. Our recommendations all involve the business of project management—since that is the Corps' stated method of project delivery. For the LRD to successfully deliver projects to the customer, the PMBP must be the bedrock processes that govern all work and it must address issues related to management of both single projects and multiple, simultaneous projects.

The following subsections outline the various elements of a recommended PMBP for use in the LRD districts. We recommend an integrated and synthesized approach, one that blends the hard and soft issues of project management into a successful program. Successful implementation of these recommended changes requires (1) support of project management from senior management, (2) an environment that supports project management and performance measurement, (3) documentation and dissemination of best practices, and (4) a general awareness of project management concepts throughout the LRD.

We recommend the following:

♦ Clarify the linkage between the strategy and project execution.

♦ Determine project success factors.

♦ Define the PMBP for

➤ multi- and single-project environments,

➤ large and small projects, and

➤ centralization of resources under the PM.

♦ Develop a risk management program for the districts.

♦ Investigate the use of collaborative project portals.

♦ Establish clear roles and responsibilities.

♦ Investigate LRD's competency in project management.

♦ Establish a project support office.

♦ Continue to benchmark project management services.

Strategy and Project Execution

We recommend the LRD implement an effective PMBP—designed as the only way the LRD completes work—throughout the division to help meet the CORPS PLUS strategic goals and objectives. Figure 3-1 presents the interrelationship between strategic, project, and operational management with the project management business processes operating as the integration agent between the corporate strategy and district operations. Using the PMBP philosophy, the project plans developed by the districts for each project should reflect the goals and objectives of the Corps' and LRD's strategic direction. Likewise, the operational plans and corresponding resource plans should reflect the needs of each of the district's projects. There should be a correspondingly strong relationship between the project and resource plans.

Translation of the Corps strategic goals into an effective implementation plan significantly challenges the LRD and its districts. Defining a clear project management business process that artfully blends the technical issues of project management (such as cost and schedule control) and the softer issues (human and organizational behavior) is difficult. In the following sections, we outline our approach to defining an effective PMBP framework that will enable the LRD and its districts to successfully achieve improved performance. Chapter 4 will address the use of effective portfolio management and resource allocation.

Figure 3-1. Relationship of Strategic, Project, and Operational Management
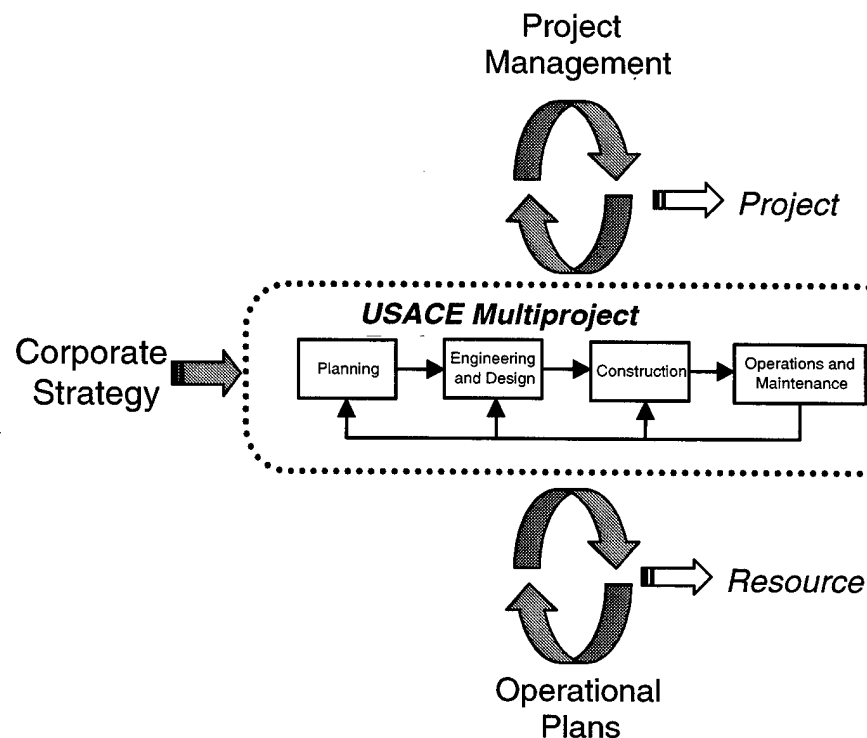
In Figure 3-2, we present the interdependencies of strategic management, the PMBP, and performance management from a top-level perspective. The figure shows how the processes and activities of the PMBP flow from the district's strategic management activities and link to individual project execution, with the management information system and performance measurement program providing feedback to the district for evaluating how well it is achieving its objectives.[7]

Figure 3-2. Linkage of Strategic and Tactical Perspectives of the PMBP
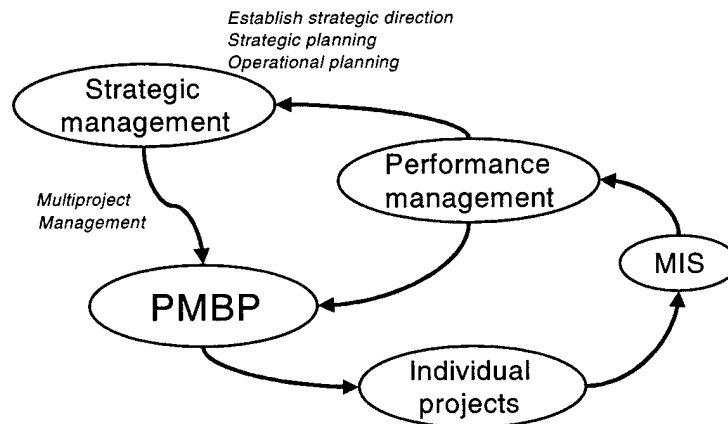
We recommend that the PMBP, at the MSC and district levels, provide a clear linkage between the strategic plans and the projects that the LRD executes.[8] It should set forth clear policies, standards, and guidelines for the district to review, and it should incorporate

◆ performance success and measurable criteria,

◆ business processes and interfaces with other systems and management areas,

◆ roles and responsibilities, and

◆ competencies.

In addition, the LRD and district leadership must ensure these important perspectives are communicated to, and understood by, the PDT members.

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[7] We use this same framework to introduce the portfolio management program in Chapter 4.

[8] We recommend using a meta-rules (or more comprehensive, global directives) management model that focuses on the utilization of general guidelines implemented by autonomous PMs who are wholly accountable for a project's success. In a project management system like this, a PM must interpret and apply the project management guidelines to the unique circumstances of the project. The PMBP should be designed to allow this critical flexibility and offer guidelines on how to do this.

Project Success Factors

One of the first steps in establishing the performance linkage is to identify what factors influence the success of a project or the project management process. Understanding the factors and characteristics of success, the LRD and the districts will be able to better manage their portfolio of projects. For instance, knowing that having clearly defined goals and objectives for a project (linked in some manner to the strategic plan) will increase the chances of success, the PM will incorporate this concept into the project planning and performance measurement.

Table 3-1 shows a sample of typical factors considered critical to the successful completion of a project and related to issues that the project team or parent organization can control or influence. These factors span the PMBOK areas and provide some insight into what drives success in the private sector.

Table 3-1. Critical Project Success Factors

1.	Clearly defined goals and general direction from the start
2.	Willingness of top management to provide the necessary resources and authority/power for project success
3.	A detailed specification of the individual action steps for project implementation
4.	Communication and consultation with and active listening to all impacted parties
5.	Recruitment, selection, and training of the necessary personnel for the project team
6.	Availability of the required technology and expertise to accomplish the specific technical action steps
7.	The act of "selling" the final project to its ultimate intended users
8.	Timely provision of comprehensive control information at each stage in the implementation process
9.	The provision of an appropriate network and necessary data to all key actors in the project implementation
10.	The ability to handle unexpected crises and deviations from the plan

Adapted from Jeffery K. Pinto and Dennis P. Slevin, "The Causes of Project Failure," *IEEE Transactions on Engineering Management*, Vol. 37, No. 4, November 1990, pp. 269–276.

We recommend that the LRD focus on these, or a modified list of, success factors in developing its PMBP and related practices since they address the tenets of modern project management discussed earlier in this chapter. For example, many of the factors can be seen in the activities of the PMBP we lay out below, while others are important to the risk management program we recommend. Also, these factors will lay the groundwork for establishing the integrated performance management program and measures. These factors will characterize the key activities that the LRD and districts use to execute their work and meet the goals and objectives of ER 5-1-11.

Other factors influence project success and should be addressed by the organization, PM, and the PDT in developing the project management plan and project risk management plan. We recommend that the LRD and districts also incorporate these factors into their PMBP:

◆ Characteristics of the project team leader

◆ Power and politics within the organization

◆ Urgency of the project

◆ Client and owner's representative (nature of client, nature of expectations, level of sophistication, nature of relationship with other members of team, etc.)

◆ Project characteristics (site conditions, buildability, quality of design, quality management procedures, and access to site)

◆ Environmental characteristics (geographic location, physical environment, economic conditions, sociopolitical conditions, and industry relations)

Project Management Business Processes

The PMBP is the heart of the district project delivery operation—or at least it should be. We recommend that the LRD and districts standardize their PMBP to detail multiproject and single-project scenarios. Although each district has its own culture, using common project management standards will benefit the entire LRD. It provides the perfect vehicle for integrating project management and functional work activities of the planning, engineering and design, and construction divisions. It facilitates management of resources and workload on projects shared among districts and results in better information collection, evaluation, and resource allocation within districts and the LRD.

Process owners and key stakeholders, primarily the districts, must be involved in developing and establishing their project management business processes. Our recommendations are interconnected and should be viewed collectively. Some recommendations may be accepted and some may not—the districts will decide which are worth pursuing.

We recommend that the districts focus on developing project management standards in the areas of process flows, performance measures, roles and responsibilities, risk management, and project management competency.

Figure 3-2 shows the flow from strategic management to project management. Inherent in this relationship is the management of multiple simultaneous projects. While most of the Corps policy focuses on how to manage a single project (as we do in the next subsection), we recommend that multiproject management be evaluated and incorporated into the LRD PMBP philosophy, policies, manuals, and standard operating procedures.

Figure 3-3 presents a more detailed view of how the single- and multiple-project environments must interface for effective and efficient operations. The strategic, or multiproject, level gives the strategic direction for each of the individual projects to follow, including project prioritization within the district's portfolio, resource allocation for execution, and various management controls. Initially, the customer submits a project requirement for the Corps to execute. During the subsequent concept development phase, the district prepares the initial project documentation for funding and project approval purposes.

Figure 3-3. Relationship of Multiproject Management and Individual Project Management
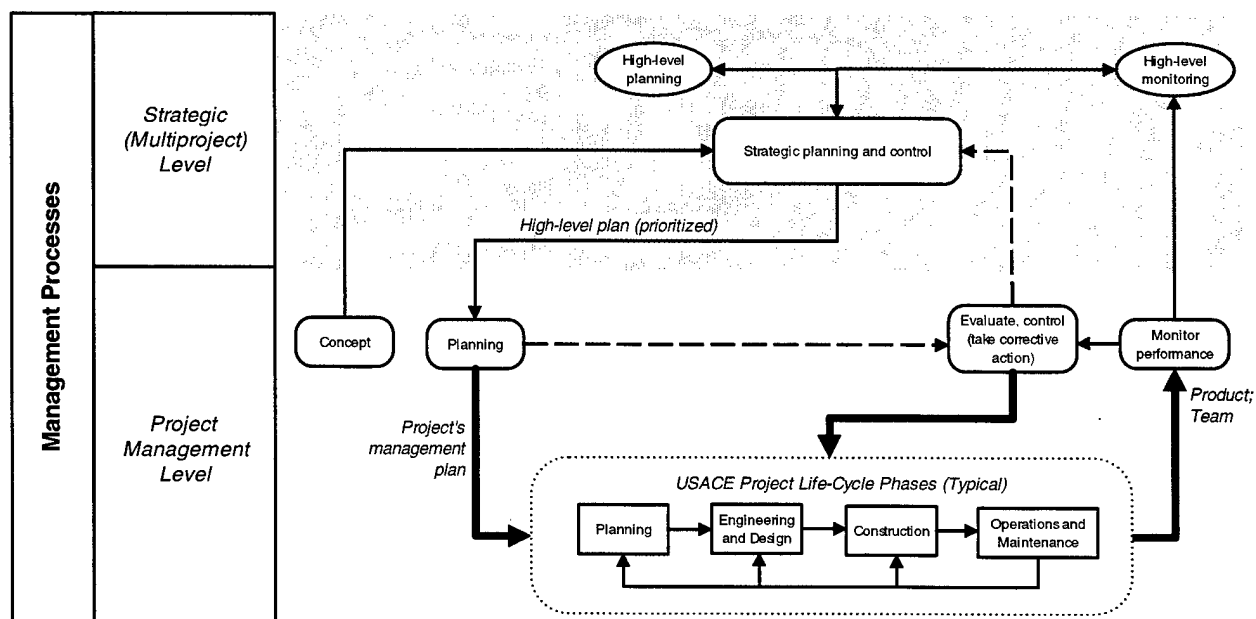
Adapted from Rodrigues, Alexandre, "SYDPIM—A System Dynamics-based Project-Management Integrated Methodology: Integrating System Dynamics Project Models with PERT/CPM Tools," Working Paper, June 1998.

INDIVIDUAL PROJECT MANAGEMENT PROCESSES

When the top-level project prioritization plan is promulgated, the detailed project management planning is initiated in conjunction with the traditional project planning. During this project management planning phase, the most important decisions are made, or at least discussed, to put the project on its best possible footing. Also, the key project elements are established. Typically, a competent PDT is selected, project goals and objectives are agreed upon, expectations set, and, most importantly, risks identified and problems in execution anticipated.[9] These activities prepare a roadmap for project execution since many projects are years in duration and the PDT needs a plan to follow and modify as the project progresses.

Appendix F contains a process flow chart that identifies the key project management business process activities, at the project level. Our framework uses an array of the nine PMI PMBOK areas, listed down the left side of the chart, and maps them to the various activities of the PDT (for the concept and planning phases).

We make a distinction here in that the multiple delivery phases of a project—namely planning, engineering and design, construction, and operations and maintenance—will all exhibit certain aspects of the project management planning phase.[10] For example, the project planning phase in civil works may treat a reconnaissance study as a project with all of the activities identified in Appendix F covered. Similarly, the design phase will have all of these attributes.[11]

As the project moves into the execution phase (planning, engineering and design, construction, and operations and maintenance), the PMBOK areas are still in place and the project management control loop invoked (see Appendix F). This monitoring, evaluating, and controlling cycle is in place throughout the project life cycle after the project management planning phase sets the baselines, or standards. During execution, the PDT evaluates the project's performance *and* the project management process performance. If performance is not as expected, it should identify the cause of the problem and take corrective action. Figure 3-4 presents the generic control loop.

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[9] Managing risk at the project level will ultimately enhance the district's project performance. Likewise, managing risk in the district's project portfolio will improve its ability to effectively allocate resources across multiple projects. We address this issue in Chapter 4.

[10] See Appendix G for civil works and military programs project delivery process charts. In these charts, we describe the various activities required in each phase of the project. Although some of the activities are managerial in nature, they most often represent activities of the functional divisions within a district.

[11] During the establishment of the project management program throughout the Corps, a traditional source of PMs was the engineering division in the district since it routinely handled projects and managed them through its phase of work.

Figure 3-4. Project Management Control Feedback Loop for Use During the Execution Phase of a Project

```
                    ┌──────────────┐
                    │ Performance  │
         ┌─────────▶│  standards   │───────────┐
         │          └──────────────┘           │
         │                                       ▼
  ┌──────────┐                          ┌──────────────┐
  │   Take   │                          │   Observe    │
  │corrective│                          │ performance  │
  │  action  │                          └──────────────┘
  └──────────┘          ┌──────────────┐        │
         ▲              │  Evaluate    │        │
         │              │   actual     │        │
         └──────────────│ performance; │◀───────┘
                        │identify cause│
                        └──────────────┘
```
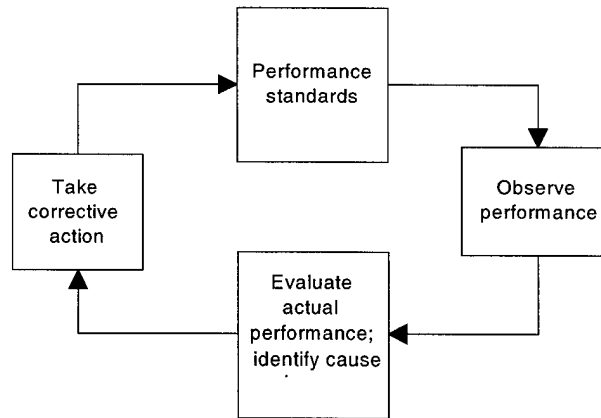
Project managers must plan for the unexpected, especially in the resource-constrained environment in which the Corps and LRD operate. The new PMBOK "establishes control as the inherent process of project progress. The [PDT] will adapt and the schedule will change accordingly: they will re-plan, re-execute, and re-assess until progress is acceptable or milestones met."[12]

INTEGRATION OF PERSPECTIVES

The integration of the project-level business practices and strategic portfolio management into the project delivery process forms a self-contained system of systems that the districts can develop and implement immediately.

We found several districts either working toward, or contemplating the start of, the ISO 9000 quality management certification process. In addition, several districts were using the Army Performance Improvement Criteria (APIC) program or its civilian counterpart, the Malcolm Baldrige Award program at the state level, to help them focus on continuous improvement and to blend their quality management and business processes.

The new 5-1-11, USACE business processes, offers a client-focused approach to quality and teamwork, which provides a mechanism to institutionalize the PMBP processes. The LRD is in an excellent position to take a leadership role in the Corps to help shape the future: it is already taking many of the necessary steps.

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[12] Karen L. Brown, "Analyzing the Role of the Project Consultant: Cultural Change Implementation," *Project Management Journal*, Vol. 31, No. 3, 2000, pp. 52–55.

PROJECT SIZE

The PMBP should differentiate between different project types or project sizes. In general, project management processes should be standardized, but the processes used on a large project should differ from the processes for a smaller project. This key difference drives many resource decisions. For instance, in a large project, such as the construction of multiple locks and dams, the optimum management information system is typically more complex and robust than that required for a smaller, less complex project.

Larger projects have more senior PMs assigned, and the smaller projects are training grounds for up-and-coming PMs. The larger projects typically receive more attention, funding, and other resources than smaller projects. Despite the importance of larger projects, smaller projects should not be neglected. Smaller projects may in fact be more technically complex and test the management skills of even the most skilled and experienced project manager. The LRD must be cognizant of the possibility of erasing the gains made on the larger projects, in terms of performance satisfaction, by the possible loss of performance on neglected smaller projects. The corporate boards should tackle this risk management issue.

We therefore recommend that the LRD incorporate the very real dynamic created by large and small projects into their PMBP. The best-in-class private-sector firms routinely use dual project management operating systems.

CENTRALIZED MANAGEMENT

We recommend that the PM be responsible to the corporate board for management of all project-related activities and funding, including the supervision and administration (S&A) and planning and design (P&D) funding. This allows more efficient use of resources and performance of the role mandated by ER 5-1-11.

Figure 3-5 shows the current relationship between the PMs, usually assigned to one program area (such as civil works or military programs), and the resident engineer (RE), usually dealing with multiple PMs and issues on the same installation. This arrangement allows the construction division to centrally manage the construction S&A account and level resources across the district. Although efficient from a functional perspective, it does not always provide the linkage between the district's strategic management and project priorities and, hence, may result in suboptimal project performance.

We recommend the PM be given full authority to manage the PDT from start to finish across all phases of the project. We expect that the PM will rely a great deal on the RE, with the RE becoming the de facto field manager during construction.

The LRD needs to establish clear roles and responsibilities for both the PM and RE. We envision that the PM will handle the cost control, client relations, project risk, and contract management issues, and the RE will handle the schedule, field supervision, and quality assurance aspects of the job.

Figure 3-5. Current Organizational Responsibilities of the PDTs
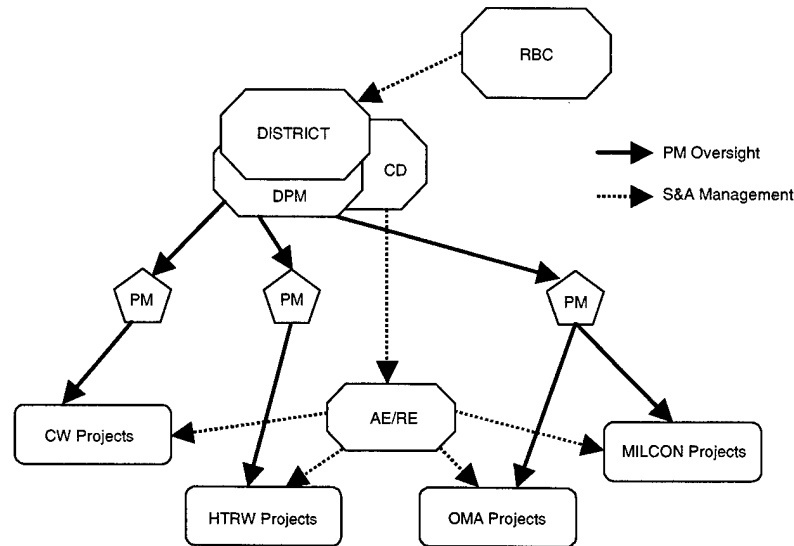
Note: AE = area engineer; CD = construction division; CW = civil works; DPM = deputy for project management; MILCON = military construction; and OMA = Operations and Maintenance, Army.

Risk Management Program

We recommend that the LRD and districts implement a risk management program to deal with multiple project risks and to help identify, assess, and manage risk on projects and within the project portfolio. This section deals with risk at the project level; Chapter 4 deals with risk inherent in the district's project portfolio.

Risk management is recognized throughout industry as a key element of the successful management of projects. As the management of risk evolves through the life cycle of a project, knowing how to manage risk enhances the probability of success. Risk management deals with the unknown outcome of, and response to, future events. In general, outcomes are categorized as favorable or unfavorable, and risk management is the science of planning, assessing, and handling future events to ensure favorable outcomes. The alternative to risk management is crisis management, a resource-intensive process normally constrained by a restricted set of available options.[13]

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[13] Adapted from the Defense Systems Management College, *Risk Management Guide for DoD Acquisition*, second edition, May 1999.

The different risk categories in the risk management program should include the following:

◆ *Technical, quality, and performance risks.* These include unproven or complex technology, unrealistic performance goals, and changes in technology or industry standards.

◆ *Project management risks.* These include poor allocation of time and resources, problems with contractors, size of project, and poor communication techniques.

◆ *Organizational risks.* These include internally inconsistent cost, time, and scope objectives, lack of prioritization of projects, inadequacy or interruption of funding, organizational experience with this type of project, and resource conflicts.

◆ *External risks.* These include changes in the regulatory or legal environment, changes in the market or economy, labor issues, sponsor or owner issues, and physical project attributes (weather, location, etc.).

In developing an effective risk management program, the LRD and districts should ensure the program includes

◆ an effective analysis of risk based on the severity of its impact on the project or portfolio,

◆ an effective risk-control strategy,

◆ a process for continually reevaluating and reassessing risk during project implementation,

◆ an effective risk-monitoring plan, and

◆ a useful "lessons-learned" document based on the risk management strategies.

In many best-in-class organizations, the project management organization identifies an individual (or group of individuals, depending on the size of the operation) to act as a risk manager, or steward of risk management practices. As an advocate for managing risk in the organization, the risk steward keeps risk management foremost in everyone's mind: risk awareness is second nature in the business operations.

Collaborative Project Portals

Standardized business practices and effective communication and collaboration within a PDT are key elements in successfully completing a project. From development of the project requirements and conceptual design to the actual construction and maintenance of a facility or structure, there is a constant exchange of information among project team members.

The Corps' current initiative to develop the P2 system will provide a standardized project management information system designed to enhance upward reporting and program management. We anticipate it will have some project-level attributes, such as cost and schedule data, but will not enhance communication, information flow, and collaboration among the PDT members.

One step in standardizing the PMBP is standardizing and automating the project management plan. Although ER 5-1-11 requires management plans for all projects, project management plans are not always prepared or, when they are, not used in the management of a project and just put away. Development of an automated project management plan process that provides the optimum level of business standardization and the best set of tools to help the PM and team is needed.

We recommend the LRD and districts investigate the use of collaborative project sites to enhance communications and information exchange. Use of an automated project site (web portal or division/district intranet site) within the LRD districts allows for standardization of PMBP practices, from management plan development and team building to project performance measurement.

Rapid advances in information technology now allow the PDT to send and receive information using, for example, the Internet and a simple web browser. This permits a significant change in the way the LRD organizes for project management and work group collaboration. Using an electronic project site, PMs can secure and centralize project data, using a standardized format, for all that need to see it, thereby reducing costs and saving time as they gather and disseminate information throughout the project life cycle. Using a central project site on the web, project teams can develop their management plans (using a standard template), maintain a constant window into a project's evolution, and communicate, coordinate, and collaborate effectively with all team members, wherever they happen to be.

A static electronic repository of project information, e.g., documents and drawings in a virtual file cabinet, meets only about 40 percent of the functionality of a collaboration system. The true power of a collaborative system is the ability to simultaneously revise documents or mark up drawings, rapidly exchange information, communicate in interactive discussions, move documents through the project process using workflow tools by streamlining review cycles, and continuously and systematically update project status.

Team members can post, share, retrieve, modify, and track the project information they need, including the latest computer-aided design files, spreadsheets, requests for information, submittals, transmittals, live database reports, photos, and other third-party software applications. Information is always available to the right team member at the right time and place, regardless of location.

For organizations seeking ISO 9000 compliance, a collaborative project site with document management capabilities allows it to maintain and control critical documents.

Roles and Responsibilities

We recommend that the LRD and districts establish clear roles and responsibilities for the organization, PM or team leader, and the PDT members. Table 3-2 shows a sample array of responsibilities. In this matrix, we identify different functional or management areas for the different players in the project delivery process and link the continuous elements of the PMBP to several of the key project management activities. The matrix assigns responsibility to several levels of the organization (team leader/PM, project team, district, and LRD/HQ) representing the tactical and strategic perspectives.

Competency in Project Management

Although the LRD and districts have some formal training and some ad hoc mechanisms in place to build project management competencies, a more focused, centralized effort is needed to identify and prepare the right people with the right skills to perform at the right time. Selecting PMs and training them to become competent in managing projects is a significant responsibility. The quality of a project is significantly reduced when competencies are weak.

The competency of the PM—defined by effectiveness in functioning in the roles of visionary, technical expert, motivator, team builder, and negotiator—is a key to successful project or product completion. The ability, or inability, of PMs to use "temporal skills (a basic orientation toward past, present, and future) that complement the ongoing activities that their projects are experiencing"[14] are reasons for project management success or failure.

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[14] Jeffery K. Pinto and Dennis P. Slevin, "The Causes of Project Failure," *IEEE Transactions on Engineering Management*, Vol. 37, No. 4, November 1990, pp. 269–276.

Table 3-2. Project Management Roles and Responsibilities

Description	PM	PDT	District	LRD/HQ
Planning (What are we aiming for and why?)	X			
Develop project objectives, goals, and strategies.				
Develop project work breakdown structures.	X	X		
Develop precedence diagrams to establish the logical relationship of project activities and milestones.	X	X		
Develop time-based schedule for the project.	X	X		
Plan for the resource support of the project.	X		X	
Organizing (What's involved and why?)				
Establish organizational design for team.	X		X	
Identify and assign project roles to members of the project team.	X			
Define project management policies, procedures, and techniques.	X	X	X	X
Establish standards for the authority, responsibility, and accountability of the project team.	X		X	X
Motivation (What motivates people to do their best work?)				
Determine project team member needs.	X	X		
Assess factors that motivate people to do their best work.	X	X		
Provide appropriate counseling.	X		X	
Establish rewards program for project team members.	X		X	
Conduct initial study of impact of motivation on productivity.	X			
Leadership (Who decides what and when?)				
Establish limits of authority for decision-making for the allocation of project resources.	X		X	
Develop leadership style.	X			
Enhance interpersonal skills.	X	X		
Prepare plan for increasing participative management.	X	X		
Develop consensus decision-making techniques for the project team.	X	X		
Control (Who judges results and by what standards?)				
Establish cost, schedule, and technical performance standards for the project.	X	X	X	
Prepare plans for the means to evaluate project progress.	X	X	X	
Establish a project management information system for the project.	X	X	X	(X)
Prepare project review strategy.	X	X	X	
Training (How is competency maintained?)				
Establish project management and team training standards.			X	X
Establish a comprehensive PM and team member level training program.			X	X
Implement a mentoring program.	X		X	
Develop and implement a team performance evaluation system.	X	X		

The LRD and districts should review their project management competence at the individual, team, and organizational levels to answer the following questions:

◆ How capable are individuals at identifying and implementing solutions to problems? This typically includes the PM, the project sponsor, technical personnel (team members), functional managers, and support personnel.

◆ How effective are teams at harnessing the cross-functional perspectives needed to resolve complex problems typically encountered in district projects? Do they identify project goals and objectives, work together effectively, and continuously improve their performance?

◆ How capable is the organization at creating an environment that enables individuals and teams to carry out their jobs effectively? This typically includes review of the collaborative environment, organizational policies and standards, and resources committed to enhance team-building.[15]

Fostering excellent managers—who have not just multiple functional skills, but sensitivity and perceptiveness regarding the softer, more judgmental issues that are often crucial to project success—is key. Project management competencies are typically divided into two categories: soft and hard skills. Soft skills involve behavior, attitude, and communication styles. Hard skills refer to the mechanical skills of planning, scheduling, and controlling. Although hard skills are easier to perfect than soft skills, both are necessary to successful project management: hard skills set the goals and procedures, while soft skills make sure that people can meet those objectives:

◆ Soft skills include leadership, organizing, flexibility, business judgment, trustworthiness, integrity, communication styles, coaching and mentoring, active listening, setting and managing expectations, constructive project negotiations, and issue and conflict resolution.

◆ Hard skills include the ability to define, plan, and control the project in terms of strategic objectives, deliverables, assumptions and constraints, and resources on an iterative basis as the project moves through its life cycle.

Effectiveness at senior levels of the project organization requires people of exceptional breadth and ability. The principal characteristics of a PM are an ability to comprehend the technical, business, organizational, and other issues inherent in the job; decisiveness; and good interpersonal skills. Senior project and program managers exhibit a further crucial characteristic: an ability to take a wide and comprehensive view of the current and upcoming issues posed by the project, to integrate these into a focused, directed course of action, and to communicate these clearly and directly.

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[15] J. Davidson Frame, *Project Management Competence: Building Key Skills for Individuals, Teams, and Organizations* (San Francisco, CA: Jossey-Bass Publishers), 1999.

Examples of enhancing project management competencies include

◆ leveraging PMI, training organizations, and educational institutions to learn current project management techniques and remain current with the state of industry practice;

◆ supporting and funding project management professional (PMP) certification and project management training programs; and

◆ initiating a mentoring and project management development program to develop PMs.

We recommend that the LRD assess the project management competence of its districts (at the organizational, project team, and individual levels) by investigating their current project management skill levels. We further recommend that the LRD develop a project management competency program using industry project management competency best practices. It should address, at a minimum, the proper education and training levels and skills, success and performance measures, adequate tools to do the job, and team-building.

Project Support Office

We recommend that the LRD and the districts consider implementation of a project support office (PSO). The PSO provides a reliable team resource that underpins the successful day-to-day operation of the PM. Due to the multiple core issues of project management—such as business practices, communication, team motivation, analytical skills, and problem solving—PMs are hard-pressed to focus on the many project control and administration issues surrounding a project. The private-sector firms practicing best-in-class project management use this concept routinely. The PSO "represents an evaluation in the way multiple projects are managed, from conception through results measurement. The PSO is the organizational structure, policies, methodology, processes, procedures, controls tools, people, training, and all necessary components required to integrate existing projects, manage the portfolio, and control the required functions."[16]

The PSO is typically staffed by a small team of experienced project professionals, each with a well-grounded understanding of the complexities and difficulties of project management in the Corps. They provide a sound foundation on which the PM can rely, thereby preventing project failure and ensuring the PM's success. They may be the first to spot project trends leading towards failure, or they may identify ongoing projects in need of support, sometimes recommending that projects should be put on hold until certain risk items are addressed.

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[16] Project Management Institute, "Program Management Office Group Moves Forward," *PMI Today*, September 2000, p. 4.

Table 3-3 identifies various activities that the PSO could execute for the LRD and the districts.

Table 3-3. PSO Activities

Function	District	Division/RBC	HQ
Management of corporate project management standards	X	X	X
Benchmarking	X	X	X
Performance measurement	X	X	X
Analysis of project portfolio prioritization	X		
Risk management (corporate and project level focus)	X		
Software standardization (estimating, scheduling, presentation, etc.)	X	X	(X)
Operational (hotline) support	X		
Management of training requirements	X	X	
Skills development (PM, team members, organizational)	X	X	
Team-building and partnering	X	X	
Career development	X	X	X
Interaction with project management profession	X	X	X

Benchmarking

We recommend that the LRD and districts continue to benchmark themselves against the best-in-class practices in the industry and adopt effective business practices. The Berkeley assessment research indicates that by increasing the LRD overall results by 0.50, an 11 percent schedule improvement and a 12 percent cost improvement can be realized.

We also recommend the LRD identify the amount of time and effort it spends on project management services and compare this to the industry average. From the results of the Berkeley assessment tool research, project management expenditures measured as a percentage of project management revenues averages 2.2 percent. In addition, those firms with higher project management maturity have lower project management cost.

Chapter 4
Project Portfolio Management

INTRODUCTION

Too often, project team members are assigned to projects haphazardly and don't understand the needs of the team and their expected role. In some cases, the functional managers, typically those responsible for assigning team members, do not have an effective program in place to manage assignments of their personnel to the many teams they are required to support. Time and attention are wasted resolving conflicts over resources, resulting in missed milestones, confusion within the functional divisions, and a general dissatisfaction with the PDTs.

In this chapter, we look at ways a district can handle multiple projects simultaneously. Chapter 3 dealt with the issues regarding management of a single project, ostensibly with a project team led by a project manager with proper authority and responsibility. But as we add more complexity—in the form of many projects underway at the same time in different phases of their life cycle—with team members working on many different projects, the competition among project leaders for the common resources of the functional manager grows dramatically. Several issues are at work in this type of environment.

First, although the projects share common resources, they will not necessarily share objectives, especially if a diverse set of customers is involved. Also, as the projects come and go, the mix of required resources will change, with some projects having higher priorities than others. Having many projects underway simultaneously seriously exacerbates resource competition, resulting in increased conflict among personnel and gamesmanship to curry favor in order to compete for the scarce resources. Many times, senior management must intervene to decided how project priorities are set—often opening the door for office politics.

The project review board (PRB) at the district level, designed to review and discuss potential solutions to project issues, is effective, but does not fully address all project issues. No central decision support mechanism is in place to evaluate the various competing issues of, for example, cost, schedule, and district resources.

In the private sector, firms are constantly considering new initiatives and reviewing ongoing projects. Despite the importance of project portfolio management, it is generally difficult to do efficiently and correctly. One of the more difficult problems large firms and organizations face is deciding how to optimize the allocation of their resources. Decisions are made when new initiatives are considered and, at least in theory, during frequent project reviews. The typical process these firms follow is to evaluate the projects, assess the

company's strategy and resources, and allocate these finite resources to the projects to maximize success, minimize risk or harm, and match the company's strategic goals.

Best-in-class firms typically use a mixture of qualitative and quantitative project assessment techniques, and graphic depictions of project and portfolio characteristics, to build a visual representation of a "balanced" portfolio, or rough uses of optimization methods and ranking tools. Other, less mature firms typically only have a rough plan for managing projects, poor merging of PM assessments with executive-level decisions, and a weak appreciation for the limitations of the software and assessment tools they use.

PORTFOLIO MANAGEMENT

The district's project portfolio is a group of projects that competes for scarce resources with multiple and conflicting objectives. As discussed in Chapter 3, the district's portfolio selection and project prioritization must be linked to the Corps' corporate strategy. Since projects create value for the customer, failure in the management of multiple projects will impair the ability of the district to accomplish its mission and reduce performance.

The strategic-level planning and control operation is managed at the organization's corporate level and deals primarily with project prioritization and resource allocation (See Figure 3-3). As decisions are made at this level, they cascade down to the individual projects for execution. The strategic level is a roll-up of the individual project requirements.

Project Portfolio Management Program

An organization using portfolio management effectively is typically one focused on work that directly supports the achievement of its strategic goals, objectives, and mission. A project portfolio management program usually includes the appropriate mix of project categories, the criteria used to score project candidates, and the organization's capacity to execute projects.

The goal of portfolio management in the district is to allocate the right resources effectively, efficiently, and consistently to mission-critical projects. Effective project portfolio management involves understanding

- ◆ the relative value and risk associated with ongoing and proposed projects,

- ◆ the way resources are allocated across projects and the amount available for new projects, and

- ◆ the need to make tough decisions about how, when, and which projects will be completed, if at all, based on a shared understanding of the value they add to the organization.

The issue of the strategic fit of a project is a significant challenge. Strategic portfolio selection techniques typically involve higher level management, which is able to decide on strategic direction, focus, and budget allocations. Portfolio analysis, using participative decision-making concerning the fit, is highly desirable. It is repeated at regular intervals to ensure the adopted strategy is updated to suit the current operational environment. The selection criteria can be both qualitative and quantitative, with consideration of political objectives.

Prioritizing Projects in Portfolio

The LRD needs to enhance the integration between strategic management and tactical execution, i.e., its use of resources to complete multiple, simultaneous projects should be improved.

Many districts have difficulty with their prioritization of projects and with the allocation of their limited resources, both for in-house execution and contract administration requirements. No formal method exists for linking strategic aim with resource allocation, i.e., the projects that would support and enhance strategic goals did not always receive the attention and concentration of resources they deserved. For example, in terms of staffing either an in-house design or managing an A-E's work, prioritization typically involves the functional chief making an educated guess at the district's highest priorities and the project manager trying to convince the functional chief of the critical nature of a certain project.

Without some basis for discretion among projects, all become a number one priority. This results in suboptimal decisions, often reducing the district's performance. A good example of this occurs when program funding reductions are passed down from higher headquarters and decisions must be made as to how to distribute the funding cuts. Without an effective decision support mechanism for choosing the "right" projects, the districts are more likely to cut funding for the "wrong" ones. In addition, finding the "best fit" (matching personnel ideally suited to specific projects) on the basis of skill, experience, and project need rather than on organizational political bias or favoritism is more difficult.

When it comes to prioritizing in a portfolio, projects are of a number of types:

◆ Sacred cows (projects suggested, or mandated, by management)

◆ Operating necessity (projects supporting existing systems)

◆ Competitive necessity (projects that enable districts to keep abreast of the competition).

PRIORITIZING PROJECTS

Many projects are delayed and fail to meet cost and schedule expectations because the resources that were promised at the onset were never actually allocated or were stripped away. The over-commitment of resources is a common problem, often stemming from the philosophy of doing "more with less."

We recommend that the LRD districts prioritize projects by developing a project selection methodology to assist in their resource allocation decision process.

Setting overly ambitious goals in resource allocation is unrealistic and is a recipe for project failure. Realistic objectives permit the proper allocation of resources and provide reasonable chances for success. It is not in management's best interest to make every project a top priority. Experienced team members can easily recognize when they've been short-changed on resources and that even a superhuman effort on their part will have minimal chance of achieving success. The alignment of resources with project requirements should be a precondition of the project plan and a primary goal of portfolio configuration.

Resources should not be treated like a shell-game, both internally within the organization and externally with the client. Careful resource allocation means meeting the expectations of the customer and demonstrating management's commitment to the client and to its employees. To ensure suitable resources are available, a mechanism that matches resources with project requirements should be used when selecting projects in the portfolio. Having adequate resources to complete the project within the budgeted cost and schedule is a critical variable of project success and needs to be one of the filters in measuring risk and ranking the projects within the portfolio.

To ensure the resource shell-game is not played, projects should have levels of priority to establish their rank in receiving resources. A simple method of dividing projects into a range of importance would be to assign them numerical values:

- ◆ Priority one, for the most critical. Only a few projects would receive the highest rank since ample resources would be dedicated to ensure success.

- ◆ Priority two, for projects deemed important, but less critical on the basis of their position on the ranking chart.

- ◆ Priority three, for projects that are important but less essential in terms of customer need or organizational mission. Resources for these projects could be made available in emergencies to support priority one projects.

Project Priority Matrix

Figure 4-1 shows a simple methodology for systematically assessing the relative positions of the projects within the portfolio. For each project, the district would develop a weighted scoring model and

◆ define the measures of interest and establish criteria weights using the district corporate boards,

◆ rank order the results, and

◆ select the project portfolio mix within available funding.

Figure 4-1. Sample Project Ranking Chart

Criterion	Criteria weight	Score			Weighted score
		Very good (3)	Fair (2)	Poor (1)	
Reduces operating costs	20				
Improves safety	20				
Has acceptable risk	20				
Fits with budget execution plan	10				
Provides improved service to customers	10				
Total Score					

A project screening board (which could be a "working-level" PRB or the risk management steward) could perform this exercise to come up with a slate of projects for consideration. The district's corporate board could then approve or amend the ranking of the projects.[1] Once the projects are listed in priority order, the simple 1 through 3 ranking discussed above could be applied to group the projects.

Understanding Project Risk

Performing the project screening exercise helps build an understanding throughout the district of how project risk influences project selection. Identifying and measuring risk can help a district determine relative placement of a project in a district's project portfolio and the appropriate allocation of resources to each project. By prioritizing projects, the corporate board and PDT can focus on critical areas and issues. It also provides perspective on the importance a customer places on certain aspects of project performance and can help the PDT focus on critical issues.

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[1] Additional criteria could include whether the project mission is critical for customer and whether adequate resources are available.

Chapter 5
Performance Management

INTRODUCTION

A performance management system will strongly affect the behavior of the managers and employees in the districts. A corporate focus on financial-only performance measures will skew the perception of performance success. For example, the Corps' use of budget execution data as the primary element in determining project and program success provides only part of the performance picture. The LRD must look at a balanced blend of financial and nonfinancial performance measures in determining success.

Public- and private-sector best-in-class organizations use performance measurement to gain insight into, and make judgments about, the effectiveness and efficiency of their programs, processes, and people. These organizations decide which indicators will best measure their progress in meeting strategic goals and objectives, gather and analyze performance data, and then use these data to drive improvements in their organization and successfully translate strategy into action. These best-in-class organizations

> have in place a mature performance measurement process, communicate this process throughout the organization, clearly link strategic plans and accountability, use compensation and rewards systems effectively, operate effective information management systems, and use performance measurement results to drive continuous improvement.[1]

To capitalize on this, Congress enacted the GPRA, Chief Financial Officers Act, and Government Management Reform Act of 1994 requiring federal agencies to

- ◆ develop strategies to deliver high-quality goods and services to their customers, and

- ◆ measure their programs' performance in meeting these commitments.

This chapter addresses the development of a performance management program designed to effectively measure and evaluate the project management delivery strategies discussed in Chapters 3 and 4.

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[1] National Performance Review, "Benchmarking Study Report," Washington, DC, June 1997.

PERFORMANCE MANAGEMENT

In the context of this study, performance management is the process whereby the LRD or a district organization ensures that it is pursuing strategies and actions that will enable it to achieve its goals and objectives. The measurement and evaluation of performance are central to control and require that four basic questions be addressed:[2]

- ◆ What has happened?

- ◆ Why has it happened?

- ◆ Will it continue?

- ◆ What are the consequences, and is any response required?

The performance measurement aspect of the program is addressed in answering the "What" question. The evaluation aspects are addressed in answering the "Why," "Future," and "Consequences" questions. By finding out what has actually been happening, district senior management can determine with considerable certainty in which direction the organization is heading. If performance is acceptable, they can continue on course. If not, the corporate boards can then apply anything from a mid-course correction to a reversal in direction, ostensibly with enough time to effectively make the change.

Selection of a range of performance measures appropriate to a district should be made in relation to their strategic intentions. Since the Corps is aspiring to be the "world's premier engineering organization," then it should be measuring its performance in this area relative to its competitors. The project management process benchmarking assessment conducted as a part of this study is a good example of this comparison. In addition, since the Corps endeavors to improve project execution and customer satisfaction (both a function of service quality), then it should be monitoring and controlling the desired level of quality.

The following subsections outline the various elements of a performance management program.

Best-in-Class Systems

An effective performance management program provides an organization the ability to take a comprehensive look at where they are and where they are going, and then react appropriately.

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[2] This is the same control feedback loop philosophy discussed in Chapter 3.

Best-in-class systems typically have these characteristics:

◆ Measures should provide for a limited, strategic focus. The districts should select a few critical measures for determining project management and project delivery performance. Measuring everything, or at least too many items, dilutes and obscures the really important issues. The performance measures should be linked to strategic goals and objectives and operational planning.

◆ Measures should be of the proper elements of the PMBP. The districts should develop central measures of the PMBP, tied to the strategic focus. Targets, ranges, or specific values may be used.

◆ Measurement process should not be the focus. The districts need to focus on the strategic and operational goals and the performance measurement results, i.e., the evaluation of the performance measures, and not focus on the measurement itself.

Types of Measures

World-class organizations tend to be interested in the same general aspects of performance: internal business operations, financial considerations, and satisfaction of the customer, employee, and stakeholder. For the Corps, and the LRD in particular, these map to the PMBP, programming and budget issues, and the internal and external satisfaction issues.

When choosing an appropriate range of performance measures, it is necessary to balance them to make sure that one dimension or set of dimensions of performance is not stressed to the detriment of others—e.g., the financial (budget execution) issue discussed above. The mix chosen will vary from firm to firm in the private sector and from district to district for the LRD.

Establishing the Program

Once an organization has decided on its performance measures, the next step is to determine a baseline for each of the measures selected. This is done once data are collected for the first time on a particular measurement.

Determining appropriate goals for each measure after these baseline data are collected can be accomplished in several ways, e.g., various statistical analysis techniques as well as benchmarking to set goals for future performance. One technique is to set goals that will force the organization to "stretch" to exceed its past performance. By benchmarking measures, an organization can validate the fact that the goals are still attainable.

Organizations should continually assess whether their current measures are sufficient or excessive, prove useful in managing the business, and drive the

organization to the right result. Performance measurement has no purpose if data are not used to improve organizational performance. When measures become obsolete, they should be eliminated or replaced.

Performance analysis also lets organizations change the priority of specific measures over time. Refining and changing measures is healthy and necessary, but frequent changes will cause confusion and may affect accountability.

Responsibility and Accountability

The district's senior leadership—accountable for developing the strategic plan and resource allocation plans—should be the key individuals responsible for establishing performance measurements and goals; they act as enablers for effective performance measurement systems. Generally, managers, individual business units, or the in-house staff are accountable for coordinating and maintaining the performance measurement system.

The performance goals of an organization are a shared responsibility of all its employees, each of whom has a stake in the organization's success. A critical challenge for private and public organizations alike is ensuring that this shared responsibility does not go unfulfilled. Accountability helps organizations meet this challenge.[3]

Underlying employee empowerment is management's view of its employees as an asset rather than a resource. The process of performance measurement has led to a better understanding of how individual employees or teams of employees contribute to the performance goals of an organization. The contributions of individuals and teams are a starting point for enumerating the results for which they are accountable. Once established, each individual is held accountable for the appropriate performance measure.

Generally, organizations have a formal written plan describing how performance measures will be implemented. In many cases, the plan details the measurements, goals, objectives, and common alignment to the organizational strategy. In addition, it is a common practice to identify one individual who will be responsible and accountable as a respective measurement owner.

Financial and Nonfinancial Indicators

There is a tendency in government organizations to manage to the budget, or the "bottom line." As in the private sector, a focus on the bottom-line financial indicators remains the fundamental management tool. This financial-only perspective encourages management to take a number of actions that focus on the short term at the expense of investing for the long term.

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[3] According to the NPR's benchmarking study, "the system is a closed loop... responsibility is attached to authority resulting in accountability...you can only hold employees accountable if they have control."

Robert S. Kaplan of the Harvard Business School states: "if senior managers place too much emphasis on managing by the financial numbers, the organization's long term viability becomes threatened. That is, to provide corporate decision makers with solely financial indicators is to give them an incomplete set of management tools." The financial view is a one-dimensional look at corporate activity. Increasingly, over the past decade, industry has emphasized the importance of the nonfinancial type of performance measurement.

The single bottom-line number is well-understood by executive management; it tends to avoid using multiple indicators because they are difficult to design and sometimes difficult to relate, one to another. Multiple indicators are made necessary by the sheer complexity of the Corps and LRD corporate activity.

FINDINGS AND CONCLUSIONS

Although the districts are focusing on their customers and have started linking strategic performance with project performance, no consistent metrics are in place to measure effectiveness in satisfying the customer.

The current focus on obligations/expenditures and upward reporting requirements detracts from local PM requirements and doesn't provide an adequate measure of performance.

Several districts have taken significant steps to adopt a performance measurement program, using both qualitative and quantitative performance measures. For instance, Pittsburgh is developing its balanced scorecard, Louisville continues with its ISO certifications (Huntington and Pittsburgh are soon to follow), and Huntington, Nashville, and Pittsburgh use either the APIC or the state-sponsored Baldrige competitions to measure performance.

RECOMMENDATIONS

We recommend that the LRD and districts implement performance measurement and performance management at both the project and team levels and use measures that focus on customers (linking strategic and project performance). These measures must differentiate between types of customers and their common and unique needs.

Performance-based management encourages managers to agree on both the agency program goals and the implementation strategies required to achieve them. These managers will then be able to "develop performance measurement systems to

◆ manage programs in accountability to stakeholders and public,

◆ demonstrate effective or improved performance, and

◆ support resource allocation and other policy decision making."

Regular monitoring of the service or product quality and program results is a critical factor in effective program performance management. Performance or outcome monitoring is critical to enhancing the success of any enterprise. Key performance indicators can be reviewed periodically throughout the life cycle of a project: (1) the consistent use of project management systems, (2) the establishment of control processes, (3) the use of interim metrics, (4) the quality of resources used versus resources planned, and (5) the involvement of the customer.

Table 5-1 presents sample performance measurements and outlines several types of performance measures, both financial and nonfinancial, that meet the goals and objectives of ER 5-1-11. The performance measures identified should be developed in conjunction with other district strategic measures, similar to the Huntington and Pittsburgh efforts.

Table 5-1. Sample Performance Measurements for LRD Districts

Goals	Objectives	Initiatives	Measures

Increase customer satisfaction	Delighted Customer	Document customer requirements and expectations in management plan	Feedback
			   —Formal surveys (partnering sessions and end of project)
			   —Informal discussions
			Number of customer referrals
			Repeat business

	Enhance reputation as world's premiere engineering organization	Develop new business opportunities	Number of new customers
			Credentials:
			   —Level of expertise: number of PMP, PE/RA, etc.
			   —Level of higher education: graduate
			   —Number of recognized experts in district
			   —Number of years of service, by discipline

Improve execution of projects and pro-grams	Exceed expectations	Set realistic expectations with customer, district, PDT	Number and value of projects early and/or under budget Number and value of projects late and/or over budget Satisfaction index of PDT from final team survey
		Manage performance (at district and project level) *Representative measures*	Earned value analysis Percentage actual expenditures to planned Percentage of milestones met, by program Trend of acquisition lead time (by project phase) Reliability: Up-time of operational facilities Response time to M&R service calls Number of rework items (due to contractor); modifications (due to designer) Results of customer and team performance surveys
		Correct process problems	Number of process problems identified in reporting period Number of process changes made in reporting period
	Improve business processes	Map project management business processes	Implement standardized PMBP—linking strategy and execution Results of periodic benchmark of PPM processes
		Optimize corporate and customer resources	Clear prioritization of district portfolio Percentage of top priority projects not completed/started as scheduled or programmed Percentage of unprogrammed/unanticipated work completed (funding turbulence)
		Foster teamwork	Results of PDT surveys and partnering sessions Number of team awards in reporting period
		Provide focal point for interface with customer	Ratio of customer-specific PMs (or account executives) to number of customers in district
		Emphasize completing projects; not just phases	Analysis of project milestone delivery time
		Improve communication	Results of PDT surveys and partnering sessions

We further recommend that the districts investigate the use of the Baldrige or APIC criteria and processes. The rigor and discipline needed to compete for these prestigious awards offers a superb opportunity to integrate many different improvement efforts, including the ongoing PMBP initiatives. In general, these programs review leadership, information and analysis capabilities, strategic planning, human resources utilization, quality assurance, and customer satisfaction.

Chapter 6
Preliminary Implementation Plan

The LRD can take a number of steps to improve the efficiency and effectiveness of its project management processes. In general, we advocate pilot testing the recommendations at one or two LRD districts to refine implementation and develop buy-in from the work force.

Adoption of these recommendations will reduce program and project risk and help the LRD and districts to improve their performance level. Furthermore, it will generate repeatability in their processes.

PROJECT MANAGEMENT BUSINESS PROCESSES

We recommend the following in regard to project management business processes:

- ◆ Clarify and promulgate the linkage between the strategy and project execution by developing clear policies, standards, and guidance.

- ◆ Define and standardize the activities of the PMBP. It should incorporate

  - ➤ project success factors and key performance influence factors;

  - ➤ business process flows for both the multiproject and single-project environment and large and small projects;

  - ➤ project and organizational performance measures;

  - ➤ roles and responsibilities of the organization, PM, and the PDT; and

  - ➤ requirements for the use of lessons-learned in project planning.

- ◆ Develop a risk management program for the districts. Projects should include the development, documentation, and distribution of a comprehensive risk management plan. Risk management, if effectively employed, should be second-nature to those on project and program teams.

- ◆ Enhance communications within the districts and PDTs by

  - ➤ investigating the use of electronic project portals to improve the collaboration of team members, the movement of project information, and the standardization of project plans;

> promulgating the results of the PRBs to the PDTs to communicate decisions made and ensuring district personnel are aware of the results of district's portfolio ranking;

> increasing communication and sharing of ideas, problems, and best practices among district engineers (meeting at least a quarterly); and

> ensuring that for some minimum project size, regular team meetings are scheduled to track project performance and identify and resolve project issues (both internal and external to the PDT).

◆ Pursue integration of P2 into the district operations. Depending on the results of implementing P2, also consider the use of a simple project scheduling software program for projects that don't need the complex network analysis system as provided by Primavera. One size does not fit all.

◆ Organize around the customer, e.g., by location, program, or congressional district.

◆ Increase focus on customer satisfaction by collecting customer feedback throughout the entire project delivery process, not just the construction phase. Assess the needs and expectations of both the customer (internal and external to the district) and the team members. Do this on a regular basis throughout the course of the project, both formally (through surveys) and informally through discussion.

◆ Establish an LRD project management competency program to enhance project management competency at the organizational, project, and individual levels:

> Establish clear roles and responsibilities for the LRD and districts in executing project management.

> Develop or enhance existing training and education program for project managers and team members.

> Develop or adopt a professional certification program for project managers.

> Increase focus on team-building and establishing an effective team working environment.

◆ Establish a project support office at the district level to assist the project manager and PDTs in managing their projects. The LRD should also develop a division-level PSO to provide and support standards, benchmarking, software standardization, skills development, and team-building.

◆ Continue to benchmark project management services against best-in-class firms and adopt best practices.

◆ Consider integration of the PMBP into the project delivery cycles using the ISO 9000 certification process to maintain a continuous improvement focus. Continue competing for the Baldrige-type annual awards to stay focused on service delivery and customer satisfaction.

PROJECT PORTFOLIO MANAGEMENT

We recommend the following in regard to project portfolio management:

◆ Develop a project portfolio management program at the district level to prioritize the projects within the district's area of responsibility. Use this prioritization to assist in allocating resources to the project teams.

◆ Consider use of resource management software to assist in the effective and efficient allocation of functional division resources.

◆ Incorporate project risk into the portfolio management program.

PERFORMANCE MANAGEMENT

In regard to performance management, we recommend that the LRD develop and implement a district performance management program to monitor performance of district projects and the portfolio.

Appendix A
Assessment Definitions

PROJECT INTEGRATION MANAGEMENT

The objective of project integration management is to ensure that the various elements of the project are properly coordinated. It involves making trade-offs among competing objectives and alternatives in order to meet or exceed stakeholder needs and expectations. It includes project plan development, project plan execution, and overall change control.

PROJECT SCOPE MANAGEMENT

The objective of project scope management is to ensure that the project includes all the work required by the client to complete the project successfully. It consists of scope planning, scope definition, scope verification, and scope change control.

PROJECT TIME MANAGEMENT

The objective of project time management is to ensure efficient completion of the project. It includes activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control.

PROJECT COST MANAGEMENT

The objective of project cost management is to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, budgeting, and control. The primary concern of cost management is dealing with the cost of resources needed to complete project activities.

PROJECT QUALITY MANAGEMENT

The objective of project quality management is to meet or exceed the needs of the client. It includes all activities of the overall management function that determine the quality policy, objectives, and responsibilities. It implements them by such means as quality planning, quality control and assurance, and improvement within the quality system.

Project Human Resource Management

The purpose of project human resource (HR) management is to make effective use of the people involved with the project. It includes all the project stakeholders (sponsors, customers, individual contributors, project team members) training, and personnel assignment. HR management consists of organizational planning, staff acquisition, and team development.

Project Communications Management

Project communications management attempts to ensure the punctual and appropriate generation, collection, storage, and ultimate disposition of project information. It provides the critical link among people, ideas, and information that are necessary for success. It includes communications planning, information distribution, performance reporting, and administrative closure.

Project Risk Management

Project risk management is a process that seeks to maximize the results of positive events and to minimize the consequences of adverse events. It should identify, analyze, and respond to project risk. Risk identification, quantification, response development, and response control are included in this knowledge area.

Project Procurement Management

Project procurement management is required to acquire goods and services from outside the performing organization. It consists of procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout

Initiate Phase

The goal of this phase is to develop a proposal for a potential project efficiently and effectively. It analyzes the feasibility and staging of the project, and examines the possibility of applying a systematic approach for project planning and managing.

Define and Organize Phase

This phase defines the project's scope, organizes the project team, and establishes a project-driven organization environment.

PLAN PHASE

The planning phase defines a project and organizes the project team clearly. It establishes a framework within which a team can work most efficiently.

TRACK AND MONITOR PHASE

This phase collects, analyzes, and reports information for project status. Any adaptive actions required as a result are planned and executed.

CLOSE PHASE

This phase ensures that projects are finished promptly and that they are not left open for an extended period of time, possibly resulting in delays and confusion for the organization.

PROJECT-DRIVEN ORGANIZATION ENVIRONMENT

This area looks at the management "infrastructure" of an organization to ascertain the philosophies and processes in place to sustain a project-oriented organization. Areas of interest include compensation of project managers and team, development of project relationships with suppliers and subcontractors, planning for career advancement of project personnel, budgeting for project, and support for project management processes in the organization.

Appendix B
Maturity-Level Definitions

LEVEL 1—AD HOC STAGE

There are no formal procedures or plans to execute a project. The project activities are poorly defined and cost estimates are inferior. Project management-related data collection and analysis are not conducted in a systematic manner. Processes are unpredictable and poorly controlled. There are no formal steps or guidelines to ensure project management processes or guidelines. As a result, utilization of project management tools and techniques is inconsistent and applied irregularly, if at all, even though individual project managers may be very competent.

LEVEL 2—PLANNED STAGE

Informal and incomplete processes are used to manage a project. Some of the project management problems are identified, but these problems are not documented or corrected. Project management-related data collection and analysis are informally conducted, but not documented. Project management processes are partially recognized and controlled by project managers. Nevertheless, planning and management of projects depend largely on individuals.

An organization at Level 2 is more team-oriented than at Level 1. The project team understands the project's basic commitments. This organization possesses strength in doing similar and repeatable work; however, when the organization is presented with new or unfamiliar projects, it confronts major chaos in managing and controlling the project. Level 2 project management processes are efficient for individual project planning, but not for controlling the project or any portfolio of projects.

LEVEL 3—MANAGED STAGE

At this stage, project management processes become more robust and demonstrate both systematic planning and control characteristics. Most of the problems regarding project management are identified and informally documented for project control purposes. Project management-related data are collected across the organization for project planning and control. Various types of analyzed trend data are shared by the project team to help it work together as an integrated unit throughout the duration of the project. This type of organization works hard to integrate cross-functional teams to form a project team.

LEVEL 4—INTEGRATED STAGE

The project management processes are formal, with information and processes being well documented in this stage. The Level 4 organization can plan, manage, integrate, and control multiple projects efficiently. Project management processes are well defined, quantitatively measured, understood, and executed. Project management process data are standardized, collected, and stored in a database to evaluate and analyze the process effectively. Also, collected data are used to anticipate and prevent adverse productivity or quality impacts. This allows an organization to establish a foundation for fact-based decision-making.

In addition to effectively conducting multiple project planning and control, the organization exhibits a strong sense of teamwork within each project and across projects. PM training is fully planned and is provided to the entire organization, according to the respective role of project team members, Integrated PM processes are fully implemented at this level.

LEVEL 5—SUSTAINED STAGE

Companies at the sustained stage continuously improve their PM processes using, for instance, formal lessons-learned programs. Problems associated with applying PM are fully understood and addressed on an ongoing basis to ensure project success. PM data are collected automatically to identify the weakest process elements. These data are then rigorously analyzed and evaluated to select and improve the PM processes. Innovative ideas are also vigorously pursued, tested, and organized to improve processes.

Organizations at Level 5 are involved in the continuous improvement of PM processes and practices. Each project team member spends effort to maintain and sustain the project-driven environment. Project teams are dynamic, energetic, and fluid in a Level 5 project-centric organization.

Appendix C
Sample Questions

This appendix provides sample questions from the project management process maturity assessment tool.

Sample Questions from
Project Management Process Maturity Assessment Tool

The assessment tool integrates the following PMBOK knowledge areas across the phases of a typical project.

Appoint the Project Manager

25. Project Manager's Experience

No project manager identified 1

Project Manager is new to his/her company and is not familiar with the type
    of project or customer 2

Project Manger is familiar with his/her company's procedures but not the type
    of project or customer 3

The Project Manager is familiar with company procedures and type of project
    but not customer 4

The Project Manager is familiar with the company procedures, the type of
    project and the customer 5

Identify the Project Team

29. Core team members identified from each group involved in the project

No Core Team identified 1

An informal, incomplete Core Team is identifiable 2

An informal, but complete Core Team is identifiable 3

A formal, complete Core Team is identifiable but without a charter 4

A formal, complete Core Team with a written charter is identifiable 5

Define the Project

34. Resource requirements and capabilities are reviewed

No review of resources 1

Informal review of resources, no documentation 2

Informal review of resources, informal documentation 3

Formal review of resources, informal documentation 4

Formal review of resources, formal documentation 5

37. Applicable product development or project lifecycle milestones identified

No product development lifecycle 1

Informal product development lifecycle but without specific milestones 2

Informal development lifecycle with specific milestones 3

Formal product lifecycle with specific milestones, but milestones not
    identified in the plan 4

Formally documented development lifecycle milestones identified in the plan 5

Determine Workload Requirements

71. Distribution of all planned resources identified and documented

Project workload distributions not used...1

Some workload requirements determined as needed, but not formally
documented 2

Workload requirements for some key resources determined and documented
in the project file...3

Workload requirements for most resources, including all key resources,
determined and documented in the project file; some requirements
communicated to appropriate group managers...4

Workload requirements for all resources determined and communicated to
appropriate group managers for planning...5

Conduct Trade-off Analysis

78. Trade-off process defined for making final recommendations

Trade-offs made without formal prioritization and review. 1

Some analysis done and recommendations formulated. Little or no
documentation in the project file. 2

Trade-off recommendations defined by project manager. Little or no
documentation in the project file. 3

Trade-off recommendations defined by project manager and selected core
team members. Recommendations loosely documented in project file. 4

Trade-off recommendations fully defined by project manager and core team
in concert with the project sponsor and documented in the project file. 5

Gain Agreement on Changes

**82. An optimized project plan agreed to by all team members (including the
customer) and distributed**

Final (optimized) plan not reviewed with team members nor the customer.............1

Final plan reviewed by core team, final approval made by project manager.
Plan not distributed or distribution limited to core team members......................2

Optimized plan reviewed and agreed to by core team only. Plan not
distributed outside core team...3

Optimized plan reviewed and agreed to by core team only. Plan distributed to
all interested parties...4

Optimized plan reviewed and agreed to by all team members. Plan
documented in the project file and distributed to all interested parties..............5

Isolate Areas of High Sub-Project Risk

86. High risk areas identified and documented

Risk not addressed, even informally by sub-project managers. 1

Risk areas identified by some project managers using informal processes. 2

Risk areas identified by some, including most key, sub-project teams using a
systematic process. Risk areas documented in the project file. 3

Risk areas identified by most, and all key, sub-project teams using a
systematic process. Risk areas documented in the project file. 4

Risk areas for each sub-project determined systematically and documented
in the project file. 5

Review Project Management Process Quality

100. Process quality improvements documented and, where appropriate, implemented

No process quality review done. 1

Process quality reviewed by project manager. No documentation. 2

Process quality reviewed by project manager. Improvements documented in
the project file. 3

Process quality reviewed by the core team and potential improvements
documented in the project file. 4

Process quality reviewed with project team and potential improvements
documented in the project file along with an implementation plan. 5

Update Project Status

111. Updated schedule, resource profile, specs and quality data reflected in the project file

No updating of data 1

Informal update of some project elements/no file 2

Informal update and archiving of all project elements......................................3

Formal update of all project elements but without storing in file 4

Formal update of all project elements stored in project file...............................5

Determine the Cause

116. The root cause of each significant variance identified and documented in the project file

No root cause analysis/no project file 1

Informal, undocumented root cause analysis...2

Formal but informally documented and stored root cause analysis.........................3

Formal analysis and documentation of root cause but without a project file 4

Formal analysis and documentation of root cause with archiving in project file 5

143. Clear promotion path available for project managers, and path communicated to organization

No project management promotional path available; project management not seen as valuable for other career paths. 1

Project management recognized as helpful, but not required to support promotion through other career paths. 2

Project management experience desired for other career paths and some promotional opportunities for project management, but path not integrated with other career choices...3

Project management experience required for promotion along other career paths, some promotional opportunities within project management career path. 4

Complete project management promotional path available in support of, and parallel to, other promotional paths (e.g., functional, technical, etc.) and communicated to organization. 5

Appendix D
Benchmarking Study Participants

The following firms participated in the benchmarking study:

Advanced Graphics (Swiss)	GeoWorks
AFAG (Swiss)	GFAI (Swiss)
Ammann (Swiss)	Great Plains Software
Apple Computer	GTE
AT&T	Hewlett Packard
Australian Army Engineering Agency	International Business Machine
Bechtel Corporations	International Harvest
Bell Atlantic	Kodak
Bell South Telecommunications	Lucent Technologies
C. Overaa	Northwestern Mutual
Chevron	NYNEX
Contra Costa Electric	Proctor and Gamble
Digitron AG (Swiss)	San Diego Gas and Electric
Don Todd Associates	Schindler (Swiss)
East Bay Municipal Utility District	Sohard (Swiss)
Eichley Engineers	Sun Microsystem
Federal Express	Williams Gas and Pipeline

Appendix E
Interview Questions

This appendix contains a typical district visit questionnaire.

USACE Program and Project Management
Project Management Business Processes

Interview Questions

This list of questions will be covered by the LMI study team during the district visits. These questions are designed to help provide insight into how each district conducts program and project management in the execution of Corps project delivery.

During the district visits, the LMI study team will meet with district PMs and other project team members to discuss the typical project management business processes (PMBP) for Military Programs (MP) and Civil Works Programs (CW) project life cycle. The draft project management business process flows (found at http://globe.lmi.org/usace) will be used as a familiar frame of reference to help guide the discussions.

Our objectives are:
   ♦ to determine how, when, and where the project management business processes are implemented at each district,
   ♦ to determine if there are standard project management business process flows used in the Corps, and
   ♦ to identify any best practices that could be shared and incorporated in a district, division, or throughout the Corps.

Section 1: Project Management Business Processes (PMBP)

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1. How does the regional business center (RBC) initiative affect your role (project manager, engineering or construction team member) with respect to project management? What are some of the major changes in PM that have occurred as a result of the RBC concept? Please describe some of them.
2. How do the district's project management business practices relate to the following areas?

   ♦ Scope management   ♦ Risk management
   ♦ Time management   ♦ Team management
   ♦ Cost management   ♦ Communications management
   ♦ Quality management   ♦ Procurement management
   ♦ Integration management

3. How was project management implemented in your district? How were difficulties resolved? What were (are) some of the difficult problem areas or barriers? How did (will) you resolve these?
4. Do you use project management plans? On what types of projects? What do they consist of? Is there any formal/informal guidance on PMPs and their implementation? How often is the PMP for a project updated? Is the PMP an effective management tool?

E-3

5. How do you handle project and program risk within the district? Do you have a formal, and/or informal, risk identification and mitigation program that you use for program, project, and technical aspects of a project?
6. CW Budgeting: How do you account for and manage the cost and schedule turbulence created by congressional/programmatic funding increases or decreases in the budgetary process? Do you track this information? At what level?
7. What is your upward reporting requirement? What types of reports are you required to submit to higher headquarters?
8. After the interview session, please review the PMBP process flows pertinent to your program area (CW, MP, Environmental). You can access these flow charts at: http://globe.lmi.org/usace Do these process flows represent an accurate portrayal of the current project delivery process in your district? What changes would you make to the process charts? Please forward your comments to John Dettbarn (LMI) at jdettbar@lmi.org or by fax at (703) 917-7476.

Section 2: Project Performance

1. Does the district have any metrics in place (in addition to the CMR requirements) to measure current project performance in the areas of cost, schedule, and quality?
   - What are they? Do you use your own informal metrics?
   - When are they calculated (e.g., at what milestone or in what time period)? Using the PMBP flow charts, indicate the activities in which you calculate your performance metrics.
   - How are they used within the district? How long have you been using them? Are they useful to you?
2. Are there any areas that you believe you should measure but do not have access to the data or the data is not collected?

Section 3: Project Management Performance

1. How many projects do you manage? What is the total dollar value of these projects?
2. Are any metrics in place to measure current project management performance?
   - What are they? Do you use your own informal metrics?
   - When are they calculated (e.g., at what milestone or in what time period)? Using the PMBP flow charts, indicate the activities in which you calculate your performance metrics.
   - How are they used within the district? How long have you been using them? Are they useful to you?
3. How do project management teams measure their performance?
4. What PM management information system do you use to do this? How do you interface with CEFMS, PROMIS, and other legacy information systems?

Section 4: Project Management Organization and Teaming

1. Who is on a project team? How do you form these teams?
2. What role does the customer play in the project teams? Who handles customer interface?
3. The group discussions and responses to the above questions (plus the organizational information provided by each district) will help the study team clarify the following areas:
   - the relationship between PM and the functional organizations (ED, CD, RE, etc.)
   - the actual roles and responsibilities of the PM team
   - integration of planning, design, engineering, acquisition, construction, and owner issues
   - team communications (sharing of information, interactions, etc.)
   - organizational control and dispute resolution in project teams
   - adequacy of project team (including PM) training

Interview attendees:

Name	Position / Office	Telephone	Fax	E-mail
Experience	**Years in PM-type Work**	**Program(s)**		
District	**Mailing Address**			

Appendix F
Detailed PMBP

The following chart depicts the typical activities required in performing project management for an LRD project.

PMI Project Management Knowledge Areas	

Concept Phase

Establish Limits of Authority for Decision-making for Allocation of Project Resources

From Strategic Managem

Scope Management

Identify Need for Project

Define Initial Scope

Establish Initial Project Objectives

Establish Feasibility

Approve Project; Establish Strategic Priority

Refine Initial Scope

Define Project Objectives

Develop Work Breakdown Structure

Time Management

Define Project Activities

Activity list
Supporting do

Develop Basic Budget & Schedule

Update Resource Planning System

Cost Management

Risk Management

Review Lessons Learned

Identify Potential Risk Areas

Sources of risk
Risk symptoms

Quality Management

Define Quality

Tech, cost, schedule
quality baselines

Procurement Management

Team Management

Define Project Management Policies, Procedures, & Techniques

Make Key Personnel Assignments

Establish Standards for Authority, Responsibility, Accountability of Team

Communi-cations Management

MBP for Project Life Cycle

Planning Phase

Strategic Management Board

```
Develop Work
Breakdown      WBS
Structure
     │
     ▼
Define                Sequence                              Develop
Project  ──────────►  Activities  ──────────────────────►  Project    ─────►  Project schedule
Activities                                                 Schedule           Schedule mgt plan
     │           Project networks                                             Resource reqmt updates
     │           Activity list updates
     │
     │                Estimate
     └──────────►     Activity
Activity list         Duration
Supporting detail
                 Activity duration estimates
                 Basis of estimates
```

Refine Project Cost Estimate & Budget ──► Develop Resource Plan

Cost estimates
Cost mgt plan

Update Resource Planning System

```
Sources of risk    Identify Project
Risk symptoms      Risks; Review   ──►  Quantify Risk  ──►  Develop Risk
                   Lessons                                  Response
                   Learned
                              Opportunities to pursue;      Risk mgt plan
                              Opportunities to ignore       Contingency plans
```

```
Define        Identify
Quality  ──►  Customer
              Expectations
ch, cost, schedule
quality baselines
```

Develop Acquisition Strategy

Acquisition plan
Statement(s) of work

```
Define Project        Build
Organizational  ──►   Project
Approach              Team
     │
     │          Organization design      Identify & assign
     │          for team                 project roles
     │                                          Define        Assess        Establish      Develop
     │                                          Team          Team          Team           Consensus
     │                                          Member   ──►  Motivation ──► Rewards   ──►  Decision-making
     │                                          Needs         Factors       Program        Techniques for
     │                                                                                      Project Team
     ▼
Define
Communications
Protocol
```

Integrate into
Management
Plan

Develop
Project
Schedule

Project schedule
Schedule mgt plan
Resource reqmt updates

Refine Project
Cost Estimate &
Budget

Develop
Resource
Plan

Develop Project-
specific
Performance
Measurement
Plan

Cost estimates
Cost mgt plan

Update Resource
Planning System

Risk
nse

Risk mgt plan
Contingency plans

Develop
Acquisition
Strategy

Acquisition plan
Statement(s) of work

Define Team Member Needs	Assess Team Motivation Factors	Establish Team Rewards Program	Develop Consensus Decision-making Techniques for Project Team	Prepare Plan for Increasing Participative Management

Execution Phase
(Engineering, Design, Real Estate, Construction Activities)

USACE Project Life Cycle Phases (Typical)

```
Planning → Engineering and Design → Construction → Operations and Maintenance
```

Monitoring, Evaluating, and Controlling Cycle

Performance Standards

From:
Strategic policies,
Project team decisions

Observe Performance

Status reports
Progress reports
Forecasts

Evaluate Actual Performance; Identify Root Cause

Take Corrective Action

Management Responsibilities

Througout the project life cycle, the PM is responsible for team development, effective communications, and performance improvements.

PM also responsible for communicating with the customer to provide feedback and resolve issues that arise during execution.

Check variances from the management plan in the areas of
- cost,
- scope,
- schedule,
- quality
- team performance,
- project management process performance, and
- other, as defined in performance measurement area of plan.

Tools and techniques include the following:
- Change control system
- Configuration management
- Performance measurement
- Additional planning
- Project management information system.

Closeout Phase

```
Transfer Project          Reassign             Terminate          Reward
    and         ──────→  Project Team  ──────→  Project   ──────→  Personnel
Responsibility            Members
    │                        ↑
    │                        │
    ↓                        │
 Conduct Post-  ──────→   Document
   mortem              Lessons-learned
```
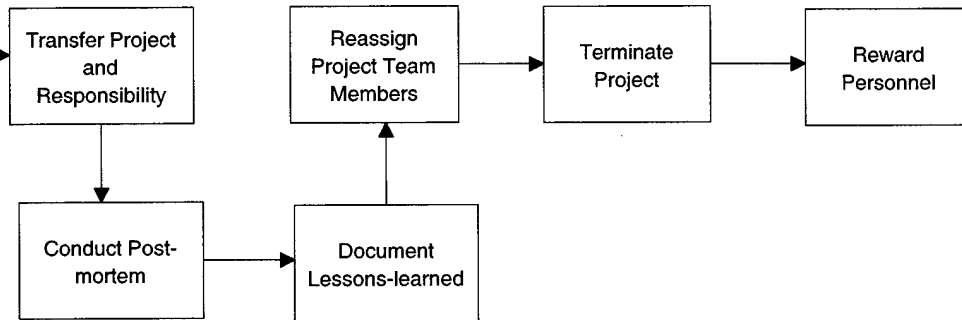
Appendix G
Product Delivery Processes

The following charts depict the activities and processes required in delivering a project in the civil works and military programs.

Civil Works Program

Project Delivery Process

NOTE: The following charts describe the Corps' generic **project delivery process** for the Civil Works Program. They do not include the various project management activities identified in the detailed PMBP chart found at Appendix F of this report.

Typical Project Management Process
(Civil Works Program)

Problem Identification

Lead Organization

Congress

USACE HQ;
Civil Works

Field Offices
Division and
Districts

Sponsor

Committee Chairman Approves (Study Resolution Authorizes Recon) → B

Draft Study Resolution

Committee Evaluates Proposed Request

Done by Resolution? — Yes / No → A

Delegation Member Refers to House or Senate Authorizing Committee

District Considers Budgeting New Recon

Existing Authority? — Yes / No

Advise Sponsor

Contact Congressional Delegation Member

Submit Letter to Corps District Office

Identify Initial Problem

Such as:
Flood damage reduction
Commercial Navigation
Ecosystem Restoration

Typical Project Management Process
(Civil Works Program)

Lead Organization

Civil Works Authorization

First Session of Congress — Second Session of Congress

| Jan - Feb | May | Aug - Sep | Jan - Mar | Jul - Sep | Oct |

Congress

- Committee Mark-up → House Bill
- Committee Mark-up → Senate Bill
- House Bill → Conf. Report
- Senate Bill → Conf. Report
- Conf. Report → Study / Project Authorized → C
- Testimony → Committee Mark-up

OMB/ Administration

- Provide Informal Coordination, Fact Sheets, Issue Papers / Coordination of Member Requests w/USACE HQs → Committee Mark-up
- Finalize CW Legislative Program; ASA(CW) Transmits to Congress → Testimony
- Coordinate with OMB, DACG, LRT / Resolve Policy Conflicts, Revise Bill & Report Language as Needed → Finalize CW Legislative Program
- Forward CW Legislative Program to ASA(CW) for Approval → Coordinate with OMB, DACG, LRT

USACE HQ: Civil Works

- A → Request Legislative Proposals
- F → Request Legislative Proposals
- Request Legislative Proposals → Legislative Review Team (LRT) Reviews Proposal
- Legislative Review Team (LRT) Reviews Proposal → Prepares Recommendation to Support, Drop, or Keep Open
- Prepares Recommendation to Support, Drop, or Keep Open → Provide Briefings to DCG(CW) and OASA(CW)
- Provide Briefings to DCG(CW) and OASA(CW) → Draft Bill and Report Language (ICW DAGC)
- Draft Bill and Report Language (ICW DAGC) → Forward CW Legislative Program to ASA(CW) for Approval

Field Offices
Division and Districts

- Prepare Proposals and Justifications → Legislative Review Team (LRT) Reviews Proposal

Typical Project Management Process
(Civil Works Program)

Lead Organization — Civil Works Appropriations

| Apr - Jul | Jun - Aug | Sep | Nov | Jan | Jul - Sep | Oct |

Congress

- Sign Bill (Annual Appropriations, Biennial WRDA)
- House Bill
- Senate Bill
- C
- F
- Committee Mark-up
- Testimony
- Provide Informal Coordination, Fact Sheets, Issue Papers / Coordination of Member Requests w/USACE HQs

OMB/ Administration

- Issue Passback
- Include Project in President's Budget
- Issue Additional Guidance
- Adjust Project Schedules to Reflect Budget Guidance
- Prepare Appeal (If Required)
- Support Appeal Process (As Required)
- OMB Conducts Budget Conference (multiple levels) — OASA(CW) Chief, COE Branch Chiefs, Division & District Cdrs

USACE HQ; Civil Works

- On-going Annually
- Conduct Corporate Board Review
- Submit Budget; Signed by ASA(CW)
- Roll-up Budget Requests
- Prepare Program Development Guidance

Field Offices — Division and Districts

- Develop J-sheets — problem scope — urgency — sponsor info
- Develop Budget Request; 10 Year Program

Typical Project Management Process
(Civil Works Program)

Lead Organization

General Investigations (GI) Phase
(Reconnaissance Study)

Typically 12 months Duration
(not to exceed 18 months)

Congress

- Study Authorized & Appropriations Provided

USACE HQ; Civil Works

- Provide Recon Funding
  - 100% Federal funding
- Develop FADs

Division

- Develop and Allocate Work Allowance
- Approve S.905(b) Analysis
- Approve FCSA Deviations

District

Start of Recon Phase
(First Obligation of Study Funds)

Define problems; identify potential solutions;
Estimate benefits and costs;
Appraise federal interest;
Estimate feasibility phase costs

- Prepare S.905(b) Analysis and Obtain Signed Letter of Intent (LOI)
- Begin Negotiations of Project Study Plan (PSP) and Feasibility Cost Sharing Agreement (FCSA)
- Finalize Negotiation of PSP and FCSA
- Deviations from Model Agreements? — Yes / No
- Review and Approve PSP
- Provide Final Certification of Recon Phase
- Request Feasibility Funds (GI)

D

End of Recon Phase

- District Cmdr & Sponsor Sign FCSA

Sponsor

B

C

Typical Project Management Process
(Civil Works Program)

General Investigations (GI) Phase -- continued
(Feasibility Study)

Continues on Next Page

←————— Typically 36 months Duration from Funds Provided to Sign Feasibility Study Report —————→

Lead Organization

USACE HQ; Civil Works

(D)→ Provide Appropriated Feasibility Funds (GI)

Division

Provide Quality Assurance Throughout Feasibility Study Process

(E)

Provide Legal and Independent Technical Review

District

Conduct Feasibility Scoping Meeting

Modify PSP, if Applicable

Initiate Feasibility Study (as detailed in FCSA & PSP)

Conduct Required Technical Studies (Hydrology, Hydraulic, Geotech, HTRW, etc.)

Study Potential Alternatives; Develop Conceptual Plans & Costs

Evaluate Costs and Benefits

Conduct Alternative Formulation Briefing (AFB), Optional

Recommend Plan to Solve Problem; Include Baseline Estimate

Prepare Project Management Plan

Develop Draft Feasibility Report

Sponsor

Typical Project Management Process
(Civil Works Program)

General Investigations (GI) Phase -- continued
(Feasibility Study to Design Agreement)

Typical Project Management Process
(Civil Works Program)

General Investigations (GI) Phase -- continued
(PED Engineering and Design)

Lead Organization

Sponsor

District

(G) → Prepare Quality Control Plan → Conduct Design Phase Partnering (if required) → Assess In-house Design Capability → Verify Budget & Project Scope & Schedule; Revise QC Plan → Provide Design Services; Obtain A/E Services (if required) → Conduct Technical Review Conference (TRC) and Site Visit → Develop Project Definition, Concept, and Final Design → Conduct Project Reviews (Requirements, Scope, Cost, Schedule, Quality)

Perform VE Study (if not done in Feasibility phase)

Develop Project Definition, Concept, and Final Design → Complete Final Design

Review for Biddability, Constructability, Operability, and Environment (BCOE) → Complete Final Design

Conduct Independent Technical Review; Incorporate Relevant Comments → Complete Final Design

Complete Final Design → Prepare Final Independent Government Estimate → Conduct Final Review Meeting → Revise Final Design; Prepare Plans & Specifications for 1st Construction Contract → Deliver Design Package to Contracts → (H)

Deliver Design Package to Contracts → Prepare Instructions to Field Personnel

Typical Project Management Process
(Civil Works Program)

Construction General (CG) Phase
(Contract Award)

Lead Organization

HQ, USACE or Division

District

Construction Contractor

C → Appropriated Funding Provided (CG) → Negotiate & Execute PCA → Initiate Real Estate Acquisition Process → Issue Request for Proposal or Invitation for Bid

H → Prepare Contract Documents

Issue Request for Proposal or Invitation for Bid → Receive Proposal or Bid

Receive Proposal or Bid — IFB → ED Bid Period Actions

Receive Proposal or Bid — RFP → Prepare Pre-negotiation Objective

Technical eval of RFP or IFB
On-site pre-bid mtgs
Review project estimates

ED Bid Period Actions → Evaluate Bids

Prepare Pre-negotiation Objective → Negotiate

Evaluate Bids → Revise Scope (If Necessary)

Negotiate → Prepare Post-negotiation Memorandum → Revise Scope (If Necessary)

Revise Scope (If Necessary) → Award Contract → Submit Bonds and Insurance → Issue NTP → J

Typical Project Management Process
(Civil Works Program)

Construction General (CG) Phase -- continued
(Construction)

Lead Organization

Sponsor

District

Resident Engineer

Construction Contractor

Work Acceptable? — Yes → Turn Over Project → Complete Turnover Documents → Final Payment → Physical and Fiscal Completion

No → Complete Rework

Conduct Pre-Final and Final Inspections

Prepare Modification & Engineering Changes During Construction

Review & Approve Shop Drawings/ Submittals

Attend QC Site Visits

Government QA Activities Utilize 3-Phase System

Process Progress Payments

Contractor QC Activities Utilizing 3-Phase Inspection System (Preparatory, Initial, & Follow-up)

Perform Work

Develop As-Built Drawings

O&M Manuals As-Builts 1354s Warranties

Pre-Construction Meeting

Submit Material Submittals

Start Work

Submit Site-Specific QC Plan and Construction Schedule

J

Typical Project Management Process
(Civil Works Program)

Operations and Maintenance Phase
(Corps Operated Projects)

Lead Organization

HQ, Civil Works

Request Supplemental Funding → Obtain Funding → Execute Work Plan (In-house or Contract)

- Preventive maint
- Maintenance
- Repairs
- Replacements
- Rehabs

Division

Funding Adequate? — No → Request Supplemental Funding

Yes → Execute Work Plan

Develop Work Allowances → Funding Adequate?

District or Sponsor

Estimate Program Requirements from On-going Operations → Develop Work Allowances

Develop Maintenance & Repair Requirements (Backlog) → Estimate Program Requirements from On-going Operations

Conduct Facility Condition Assessments → Develop Maintenance & Repair Requirements (Backlog)

Perform Maintenance & Repair Activities → Warranty Issue?

Warranty Issue? — No → Conduct Facility Condition Assessments

Yes → Identify Deficiency

Resident Engineer

Identify Deficiency → Analyze Cause

Analyze Cause → User Abuse / Warranty Item / O&M Failure

User Abuse → Stop

Warranty Item → Investigate & Verify Likelihood of Warranty Problem → Contact Contractor Rep for Warranty Response

O&M Failure → Stop

Military Program

(Military Construction, Army)

Project Delivery Process

NOTE: The following charts describe the Corps' generic **project delivery process** for the Military Programs. They do not include the various project management activities identified in the detailed PMBP chart found at Appendix F of this report.

Phases of the Military Programs MCA Project Delivery Cycle

Planning Phase

Problem Identification
(Page 3 of 13)

DD1391 Development
(Page 3 of 13)

Project Management Plan Development
(Page 3 of 13)

Engineering and Design Phase

Design Process
(Page 4 of 13)

Procure A-E Design Services
(Pages 5-6 of 13)

Construction Phase

Procure Construction Services
(Invitation for Bid, Page 7 of 13)
(Request for Proposal, Page 8 of 13)

Construction Operations
(Page 9 of 13)

Construction Operations
(Modifications)
(Page 10-11 of 13)

Construction Operations
(Commissioning and Close-out)
(Page 12 of 13)

Operations and Maintenance Phase

Operations and Maintenance Phase
(Warranty Items)
(Page 13 of 13)

Typical Project Management Process
(Military Programs)

Lead Organization	**Planning Phase** *(Project Baseline Development)*

Customer

Initiate Request for Work

Prepare DD1391 and Project Development Brochure

Document Customer Commitments and Expectations

Develop Integrated Project Management Plan (PMP) Baseline

also include:
Risk Assessment,
Acquisition Plan

Include:
Acquisition strategy
Scope
Schedule
Cost
Quality
Risk assessment
Project team roles and responsibilities
Project budget

PRB Approves PMP (MS009)

(A)

District

Accept Work

DD1391 Complete? — Yes →

Review DD1391

Assign PM and Identify Team

Section Chiefs Provide Resources

Initiate Development of Project Parameters;

Start Project Management Plan (MS006)

Project Delivery Team (PDT) Members:
Project Manager
Customer
Project Engineer/Architect (PE/A)
Contracting Officer/Specialist
Construction Project Engineer
Program Analysts

Liaisons / Extended Teams:
Architect/Engineering firm
Construction Contractor
Real Estate
Resource Management personnel
Counsel
Safety

Typical Project Management Process
(Military Programs)

Engineering and Design Phase
(Design Process for Military Programs Projects)

Lead Organization

Customer

District

Provide Design Funding

A → Conduct Design Phase Partnering (if required) → Verify Design Budget and Project Scope and Schedule → Implement Acquisition Tool Selected in PMP → A-E Required?

A-E Required? — Yes → B
A-E Required? — No → Initiate Design Services

Go to Procure A-E Process
See page 5

From Procure A-E Process
See page 6

D → A-E Submits CQC Plan; Incorporate into PMP → Initiate Design Services (A-E or In-house); Provide QA on Design; Customer Authorizes Phases of Design (MS024, MS025)

Initiate Design Services → Develop Charrette (5-15%) or Concepts (35%)

Perform VE Study (Optional)

Develop Charrette (5-15%) or Concepts (35%) → Design Approved?
Design Approved? — No → Develop Charrette
Design Approved? — Yes → Validate DD1391; Include in Program Preparation

Validate DD1391; Include in Program Preparation → Continue Design?
Continue Design? — No → Lost Design
Continue Design? — Yes → Develop Preliminary Design (60%)

Develop Preliminary Design (60%) → Complete Final Design (MS036)

Conduct Biddability, Constructability, Operability, and Environmental Reviews → Complete Final Design (MS036)

Complete Final Design (MS036) → Prepare Independent Government Cost Estimate → Conduct Final Design Review Meeting → Approve Design?

Approve Design? — No → Revise Design → Complete Final Design (MS036)
Approve Design? — Yes → Prepare Plans & Specs; Ready to Advertise → E

Go to Procure Construction Process
See page 7

Military Program Project Delivery Process

Typical Project Management Process
(Military Programs)

Engineering and Design Phase
(Procure A-E Design Services)

Lead Organization

Customer

District

B → Establish Evaluation Criteria / Prepare Source Selection Plan → Prepare Statement of Work (SOW) → Prepare Synopsis and Publish CBD Notice → Prepare Qualification Statements (N254, N255)

Develop Initial Ranking (Select Short-list of A-E Firms)

SSEB Evaluates Submissions / Determine Qualified Firms

Conduct Oral Presentations and Interviews with Short-listed Firms (May be done at A-E Firm's Location)

Establish Competitive Range (Final Ranking of Qualified A-E Firms)

Select AE Firm(s)

Issue Request(s) for Proposal

Develop Proposal(s)

Receive Proposal(s) → C

A-E Firm

Typical Project Management Process
(Military Programs)

Engineering and Design Phase
(Procure A-E Design Services)

Lead Organization

Customer

Obtain Additional Design Funding

Additional Funding Available? — Yes

District

Revise Scope

Prepare Pre-negotiation Objective

Perform Technical Analysis (hours, specialties)

Conduct Audit (if requied)

Perform Cost Realism Analysis

Negotiate
- Hours;
- Type and Discipline;
- Direct & Indirect Costs
- Period of Performance

Price Fair & Reasonable? — Yes / No

Available Funding OK? — Yes / No

Complete Summary of Negotiations

Award Design Contract

Issue Notice to Proceed

D

Go to Engineering & Design Process
See page 4

C

A-E Firm

Typical Project Management Process
(Military Programs)

Lead Organization

Procure Construction Services
(Invitation for Bid Process)

District

Construction Contractor

E

Issue IFB? —Yes→ Modify Scope and Estimates

Issue IFB? —No→ G

Go to Procure Construction RFP Process See page 8

Resolicit? —Yes→ (up to Modify Scope and Estimates)

Resolicit? —No→ Cancel Procurement Action

Convert to Negotiated Procurement? —Yes→ Prepare D&F to Convert → H

Convert to Negotiated Procurement? —No→ Resolicit?

Additional Funding Available? —Yes→ Provide Funding

Additional Funding Available? —No→ Convert to Negotiated Procurement?

Prepare and Transmit Synopsis Documents → Conduct Pre-bid Conference & Site Visit

Develop bid → Present Inquiries

Prepare and Issue Amendments (as needed)

Submit Bid → Receive Bids; Conduct Bid Opening → Conduct Price Analysis

Is Funding Adequate? —Yes→ Award Contract

Is Funding Adequate? —No→ Bid Items?

Bid Items? —Yes→ Can Award within Bid Items?

Bid Items? —No→ Additional Funding Available?

Can Award within Bid Items? —Yes→ Determine lowest responsible bidder

Can Award within Bid Items? —No→ Additional Funding Available?

Determine lowest responsible bidder → Award Contract

Provide Funding → Award Contract

Award Contract → Issue NTP → F

Go to Construction Phase: See page 9

Typical Project Management Process
(Military Programs)

Lead Organization

Procure Construction Services
(Request for Proposal Process)

District

Construction Contractor


```
G ──┐
     ├──► Prepare and Issue RFP ──► Receive Proposal(s) ──► Audit Required?
H ──┘
```

Prepare Proposal

Audit Required? ──Yes──► Conduct Audit ──► Perform Business Analysis ──► Competitive Proposal?
Audit Required? ──No──► Perform Technical Analysis ──► Competitive Proposal?

Competitive Proposal? ──Yes──► Develop Competitive Range ──► Prepare Discussion Objective
Competitive Proposal? ──No──► Conduct Fact Finding with Offeror (if required) ──► Prepare Pre-negotiation Objective

Develop Competitive Range ──► Notify Offerors Excluded

Prepare Pre-negotiation Objective ──► Negotiate Includes Requests for Revised Proposals ──► Prepare and Submit Final Proposal

Prepare Discussion Objective ──► Conduct Meaningful Discussions / Address Strengths and Weaknesses in Oral Presentations / Includes Requests for Revised Proposals ──► Prepare and Submit Final Proposal

Prepare and Submit Final Proposal ──► Evaluate Final Proposals ──► Fair & Reasonable?

Fair & Reasonable? ──Yes──► Continue?
Fair & Reasonable? ──No──► Conduct Meaningful Discussions

Continue? ──No──► Reevaluate Procurement
Continue? ──Yes──► Funding Adequate?

Funding Adequate? ──No──► Obtain Additional Funding
Funding Adequate? ──Yes──► Award Contract ──► Issue NTP ──► (I)

Typical Project Management Process
(Military Programs)

Construction Phase

Lead Organization

Customer

District

Area Office, Resident Engineer

Construction Contractor

Go to Transfer Phase
See page 12

Identify Customer Change

Work Acceptable? — Yes → (K)

No → (J)

Generate Customer Feedback

Brief Customer on Project Status; Line Item Review

Perform QA Documentation & Reporting

Monitor Construction Schedule

Perform Government Safety and QA Activities
Conduct Coordination and Project Site Meetings

Conduct Pre-Construction Meeting

Identify Changes

Conduct CQC Follow-up Inspection

Perform Construction Activities

Conduct CQC Initial Insp (Start of Work)

Initial Insp OK? — Yes / No

Start Work

Prep Insp OK? — Yes / No

Conduct CQC Prep Insp (Mat'ls & Equip)

Develop Required Plans

Perform Rework Activities

Typical

When Necessary

(I)
(F)
(N)
(M)

Typical Project Management Process
(Military Programs)

Lead Organization

Modifications Processes

Designer (A-E)

A-E Responsibility (ER 715-1-20)

A-E Responsibility Issue? —Yes→

A-E Designs Modification/Change

Design Modification & Prepare Cost Estimate

Design & Estimate Approved? —Yes→ Prepare & Issue RFP → L

No

Obtain Funds

A-E Accept Responsibility for Design?

Funding Available? —Yes→

No

Error & Omission ? —No→

Design In-house? —Yes→ Define Scope & Rough Cost Estimate

Design Change ? —No→

Yes

VECP Acceptable ? —No→ Reject & Return to Field

Yes

VECP? —Yes→

J

District Office

Area Office, Resident Engineer

Typical Project Management Process
(Military Programs)

Modifications Processes (continued)

Lead Organization

District Office

Area Office, Resident Engineer

Construction Contractor

L → Start Work Immediately?

Yes → Issue NTP (with NTE % included)

No → Prepare and Submit Proposal

Prepare and Submit Proposal → Evaluate Proposal → Prepare Prenegotiation Objective → Cost > $500K?

Cost > $500K? Yes → Audit Required?

Cost > $500K? No → Negotiate with Contractor

Audit Required? Yes → DCAA Audit → Modif Agreed Upon?

Audit Required? No → Negotiate with Contractor

Negotiate with Contractor → Modif Agreed Upon?

Modif Agreed Upon? No → Finalize, Document, & Issue Unilateral Change Order

Modif Agreed Upon? Yes → Finalize, Document, & Issue Bilateral Mod

Finalize, Document, & Issue Unilateral Change Order → Start Modification or Change Work

Finalize, Document, & Issue Bilateral Mod → Start Modification or Change Work

For Work that Started Immediately

Start Modification or Change Work → M

Go to Construction Phase. See page 9

Typical Project Management Process
(Military Programs)

Commissioning and Close-out Phase

Lead Organization

Customer

District Office

Area Office, Resident Engineer

Construction Contractor

```
K
```

USACE and Customer Sign Transfer Document to Transfer Facility → O

Complete Financial Closeout ← Issue Final Payment and Release

Conduct Phased/Final Joint Acceptance of Completed Facility ← Assemble Turnover Documents (As-Builts, Spares, O&M Manuals, Warranties, Key Plan, etc.)

Coordinate Bldg Outfitting & Other Activities Prior to Occupancy

Prepare Transfer Documents

Achieve Substantial Contract Completion

Update Punchlist

Work Acceptable for BO? — Yes / No

Identify & Document Deficiencies

Prepare Punchlist

Conduct Pre-final & Final Inspections — Identify Punchlist Items

Take Corrective Action

Complete Punchlist Items

N — Go to Construction Phase: See page 9

Review & Approve

O&M Manuals, Spares, Training, Verified Shop Drawings, Equipment Test Records, Commissioning Documentation

Typical Project Management Process
(Military Programs)

Operations and Maintenance Phase
(Warranty Items)

Lead Organization

Customer

District Office

Area Office, Resident Engineer

Contractor

Request Supplemental Funding → Obtain Funding → Execute Work Plan (In-house or Contract)

Funding Adequate? — No → Request Supplemental Funding; Yes → Execute Work Plan (In-house or Contract)

Develop Maintenance Action Plan

Estimate Program Requirements from On-going Operations

Develop Maintenance & Repair Requirements (Backlog)

Conduct Facility Condition Assessments

Perform Maintenance & Repair Activities

Identify Deficiency

Non-warranty O&M Failure or User Abuse

Analyze Cause

Potential Warranty Item

Investigate & Verify Likelihood of Warranty Problem

Contact Contractor Rep for Warranty Response

Make Repair