

Why PE Does Not Equal PM

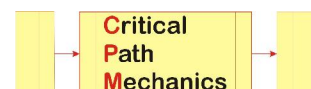
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Evolution of the Professional Engineer As Project Manager

An ambitious and business savvy Professional Engineer (PE) finds himself suffocating in a large, sedentary firm. Convinced he can do better on his own he hangs out his shingle and opens his own firm. Operating as a professional service firm he has to ensure at least one half to two thirds of his service providers must be PEs. As his business begins to grow modestly he takes on an employee. Naturally enough this first hire is another PE. As a matter of economic, and regulatory necessity the PEs are their own CAD Technicians and project managers (PMs).

The PEs are successful and the business grows. The projects grow in technical complexity and are generally profitable. A receptionist is added to the staff, then CAD technicians and finally some accounting help. Flush with success the founders are justifiably confident in their own managerial skills and grateful for their PE Licenses, which enabled them to achieve financial independence.

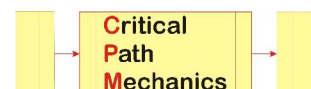


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The firm continues to grow to the point where the founding partners need to train the first generation of project managers, for they are entirely occupied with the running of the firm and drumming up business. They draw on their own body of experience to provide guidance to their proteges. In keeping with their hard won experience, and with an eye on regulatory requirements, the proteges are all PEs. Based on their personal experience, they believe a PE is the ideal team member to aspire to project management.

The growth continues, at times at a torrid pace. The first generation of PMs now begin training their successors. What started out as an economic necessity has attained the stature of a proven policy: in order to be a project manager one must first be a licensed PE!

The successor project manager's skill set is derived from the distilled experience off their predecessors in the firm. Each generation filters and interprets their own experiences in evaluating what they will pass down to their successors. Seeing the past with perfect vision they discard "bad" data from the failed projects and pass along what they "know" to have worked. The flaw in the approach is that bad management often is perceived to have succeeded in spite of it self. The timely action of dedicated and skilled subordinates masks the flaws in the management practices. Exacerbating a flawed approach, under the pressure of deadlines and rapid expansion, the senior PMs only have time to pass along to their successors what they need to get the job done. The quality of



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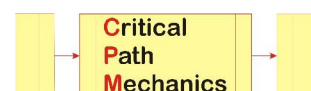
the information which is passed from one generation to the next takes on the guise of folklore rather than rigorously tested processes.

As the business grows, so does the complexity of the projects. The PMs are encountering both technical and managerial problems they, and their predecessors have never seen before. The corporate body of knowledge is inadequate and the PMs are left to fend for themselves. Increasingly, projects begin to lose money, are completed late, or both. Increasingly engineers use their intimate special knowledge of their technical processes to disguise their ignorance of project management processes in order to create the illusion of competence.

While the focus of this paper is primarily on private engineering firms, similar dynamics are at work in other industries producing similar results. Government, Manufacturing, Telecommunications and Pharmaceuticals, just to mention a few, have their own project management horror stories stemming from similar practices.

Okay, So What's Your Point

Often the only determinate of success is whether the project was completed. Secondly, did the firm make money? Finally, was the project completed on time? Project managers who bail out a failing project with only a modest loss are hailed as heroes. The overall health of the organization is not



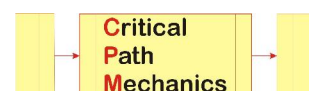
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considered at all. Nor is the health and moral of the employees, until the first one quits or management notices that “a lot of people seem to have colds all the time.”

The larger and more complex the project, the more likely the relief of “getting the job done” will precipitate a celebration rather than introspection at what could have been done better. If the project made money nearly any sin of bad management will be forgiven. Yet the seeds of future failure have been planted. The frustration and fatigue experienced by the project manager do not simply go away. Even worse the PM may accept this as a normal part of getting the job done, increasing the likely hood of failure on future projects as flawed or missing management skills are not addressed.

The PMs are completely preoccupied with their day to day struggles attempting to master the project management skill set as they attempt to manage their projects. They have little or no time to develop the next generation of PEs, who are the company’s true revenue generators. Younger engineers become dispirited and drift away from the company. Those who stay are less productive and more error prone. Increasingly, the more experienced people begin to moan about what a good placed it “used to be” to work. The senior engineers and PMs bemoan the fact that if you want something done right, you must do it your self. Cash flow begins to dwindle.

The succession model cited above also lacks scalability. In order to retain the young engineers they must be nurtured for years until they become PEs. For

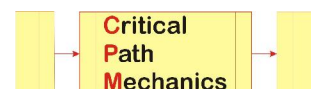


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the reasons cited above senior engineers are not available to nurture the next generation of PEs. Hiring experienced engineers away from other firms may be effective over the short term, but only at inflated cost. There is also no barrier to competing firms poaching the most promising young engineers. Increasingly the PEs are drawn in to PM roles and do not have the time to train their young engineers. Both the technical and managerial sides of the firm suffer from a shortage of skilled practitioners. A culture of good management with a sincere emphasis on nurturing skill sets would be a long term solution which provides a steady stream of qualified engineers and a barrier to poaching. But to many this seems like a dream only held by the Polly Annas of the firm.

It is easy for management to dismiss these as growing pains. Or to concede them as a necessary evil of becoming a large firm. But could there be other causes for these problems? Is this malaise truly inevitable?

Consider the Project Engineer's Body of Knowledge versus the Project Manager's Body of Knowledge as depicted in figure 1. The PE body of knowledge was extracted from the Fundamentals of Engineering Exam Reference Book published by National Council of Engineering Examiners. The Project Management Body of Knowledge (PMBOK) was extracted from the book of the same name published by the Project Management institute.



PE Versus PM Bodies of Knowledge

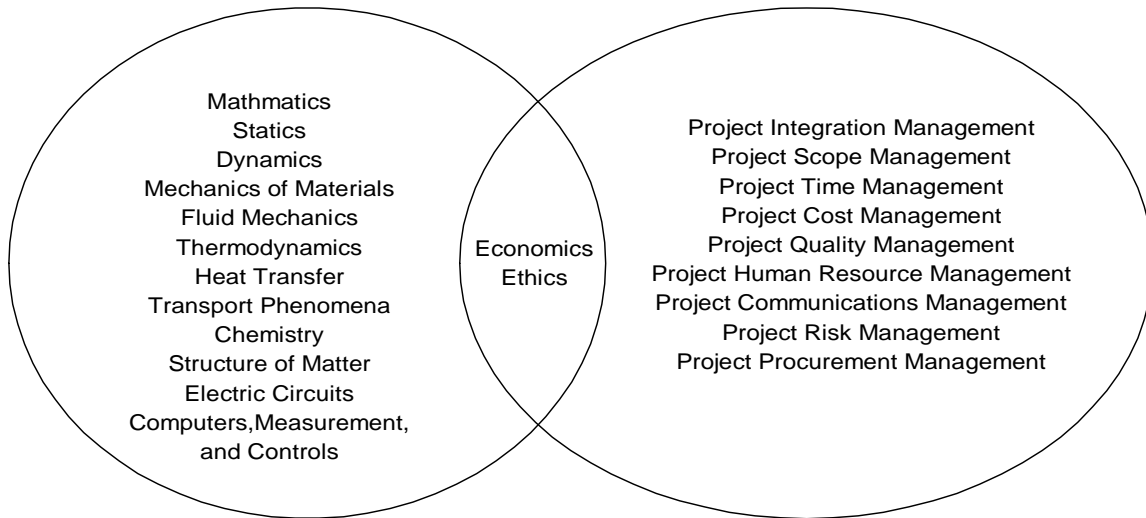
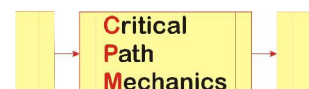


Figure 1

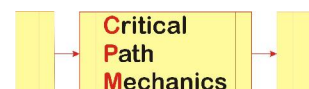
Engineers literally spend years gaining experience and honing their technical skills in order to complete their licensing as Professional Engineers. If they are bright and energetic they complete the process before they are thirty. Not even thirty years old, and they have risen to the highest level of certification in their profession. They may find a passion for some specialty in their field and continue on to get a masters or a doctorate to satisfy their need for further fulfillment. Or they may choose a path that leads them to positions of greater authority and a higher level of compensation. If they show promise as a manager and some leadership ability, by virtue of their PE they are made project managers.



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But what in their professional development has prepared them to assume this role? All too often it is on the job training or mentoring by a PM with many years of experience, but no formal training in project management which is the sole source of preparation. From the above diagram it is clear that Project Management has a well defined skill set. The only elements that are in common with the PE body of knowledge are economics and ethics. A project manager who's sole qualification for the job is that they are a PE, is being set up to fail, or at the very least struggle. Neither condition is in the best interest of the individual or the firm.

The point of this paper is not to imply that PEs should not be project managers. The point is that there is a skill set which must be mastered in order to be an effective project manager. The degree of technical complexity of the project should be the determinate of whether a project manager must be a PE. The all too easy answer is to say that every PM in an engineering firm must be a PE. Anyone who has completed the PE Certification process has the raw intellectual ability to become a project manager. The real issue is whether they have the aptitude and determination to master the skill set, as well as the leadership ability. In any case, the project management skill set should be mastered by the PM prior to taking over the project to ensure the greatest opportunity for success.

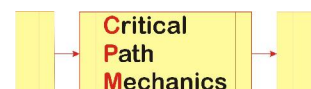


Finding Your Way Out of the Swamp

Establish the Minimum Acceptable Standard. The commonly accepted project management skill set has been coalescing since the days of the Polaris Missile Program and Rand Corporations pioneering work in PERT. The most widely accepted current standard as defined by the American National Standards Institute (ANSI) is the Project Management Body of Knowledge. More than any other profession, Professional Engineers should understand the importance of adhering to accepted standards. In the current environment where obtaining surety bonds is a major obstacle to starting a project, credible evidence that a firm can execute on schedule and within its fiscal targets are essential. A firm which has implemented the PMBOK in their ISO 9000 system provides such credible evidence.

Grow the project management skill set within the organization.

Starting with a large organization with a primitive understanding of the Project Management Body of Knowledge this could take years. In expanding the skill set you are defining the manner in which all aspects of your business are going to be governed. Expanding the skill set will in fact alter the culture of the company. To affect this type of change several conditions have to be present. The top level management has to be absolutely committed to change. The most important changes will have to be affected by the senior members of the firm. No

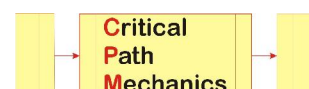


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consultant can come in and work a miracle during weekly visits, or if they co-locate with you for months at a time. The instruments of change must be an organic part of the organization.

Employ Only Certified Project Managers. Just as the state sets the standard for providing engineering services by licensing Professional Engineers, the firm can set a standard for providing professional project management services. The most readily available certification, which does not require an additional degree is the Project Management Professional (PMP) administered by the Project Management Institute. The goal of the institute in establishing this certification was to provide a minimum standard for practitioners of project management. The certification includes experience requirements and a written exam, similar to the PE. The institute is also establishing an additional specialist's qualification which certify project management skills and experience in specialized areas. The subject matter of the exams is outlined in the Project Management Body of Knowledge and includes the topics indicated in the figure 1. Certification as a PMP should be included in the minimum requirements for becoming a project manager in the firm. Any project manager who is not PMP certified should be considered probationary, with a finite deadline to qualify.

The Project Management Institute currently provides a publication, the **Project Manager Development Framework**, to supplement the **Guide to the Project Management Body of Knowledge**. It is meant to provide prospective project managers with a tool to aid them in evaluating their project management

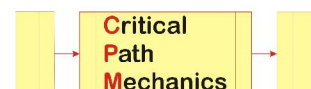


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skill set. The framework generously allows users to tailor the framework to their industry's need. Construction, Architectural and Engineering firms should make no mistake, every skill defined in the framework must be present in the firm.

Some skills may be provided for through sound process and procedures which are rigorously adhered to. A well conceived ISO 9000 system can provide additional structure. The balance of the skill set must reside in the project manager. No skill may be omitted!

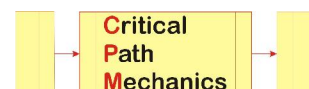
Establish a Project Management Office (PMO). These come in several flavors and should evolve as the firms' skill set matures. The formal relationship of the office to other elements of the managerial structure will vary greatly from one firm to the next. In very large organizations the PMO may comprise one axis of a matrix organization. Ideally the PMO is a small cadre of project management professionals. The role of the project office is *not* to run every ones projects for them. Their roll is to provide administrative, intellectual and emotional support to the firm's project managers. By virtue of their unique access to the firm's project management information the PMO may provide enterprise wide analysis for upper level management, but that should not be their primary focus. They should be dedicated to fostering the best practices of project management at every level of the organization. In the course of promoting these best practices the PMO would facilitate the certification of aspiring project managers as PMPs.



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The PMO could consist of a senior, certified project manager, schedulers and budget analysts. You will note that a “certified” PM is specified. The PMO would be functionally similar, but distinct from functions such as accounting and quality control. This is necessary and desirable in order to maintain checks and balances within the management structure. While Quality Assurance is a major skill area within the PMBOK, ISO 9000 requires the quality organization be independent and a direct report to upper management. Accounting generally has standards which require similar independence and reporting requirements as Quality Control. Firms which perform significant amounts of work for the federal government may maintain a separate Contracting Office in order to deal with the complexity of federal contracts and to facilitate audits.

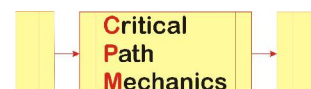
The PMO accomplishes their function through surveys of the existing body of knowledge, training tailored to the existing level of knowledge and auditing of project processes. The schedulers and budget analysts provide the level of service and expertise of full time experts to projects which do not have the workload to justify full time specialists. This arrangement also supports data collection in support of upper level management activities such as enterprise resource planning. Estimating and proposal preparation may be placed under the cognizance of the PMO, as they have constant and immediate feedback on costs, workload and process improvements. Sales and pricing should remain separate, once again to maintain the proper checks and balances within the process.



Redefine the role of Project Engineer. Not all engineers have the aptitude or desire to become PMs. But they are talented engineers who deserve special recognition and additional responsibility. The ideal Project Engineer has a passion for the technical aspects of the job. He, or she, is capable of assuming the responsibility of a project manager, but prefers to mentor young engineers and immerse themselves in the engineering.

Where should the Project Engineer (PrE) fit in? Many large scale projects have considerable managerial duties associated with them to the point that the Project Manager cannot properly monitor the technical development of the project. These projects often require the coordination of multiple engineering disciplines and supporting technicians. Two people are needed to manage the project: a Project Engineer who manages the technical issues and a Project Manager who works the financials and the schedule. Clearly these functions are closely related and must be fully integrated. To achieve this, the PM and the PrE must have an in depth understanding of each others rolls.

This style of project management ideally results in a system of checks and balances. The PrE is the ultimate technical authority and can prevent the PM from cutting corners unnecessarily, while the PM can rein in the PrE by controlling the budget and the schedule. Neither manager needs to go outside the project to get a second opinion on any major decision as they are both cognizant of the activities underway and the requirements of the project.

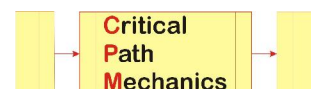


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The assumption to this point is that the PM is also a PE who has decided to move in to management. There is a case for project managers on engineering projects who are not PEs. While this may seem inconceivable at first, a Project Manager that understands the inputs, constraints and outputs of engineering processes can manage an engineering project. This need not be an act of desperation when the firm is fresh out of PEs to make PMs. Some customers are more comfortable with a project manager who can act more as an interpreter of technical issues for them, rather than an incomprehensible practitioner of the art.

Below is a summary of the possible combinations of PMs/PrEs which might be employed by an engineering firm and a summary of where they are appropriate.

- PMP with a technical Degree. Relatively small projects with little or no regulatory approval required.
- PMP with a technical Degree, PrE Deputy. Complex projects where the demands of project management are too great for the PM to adequately monitor the technical aspects of the project.
- PMP also a PE. Moderate size projects with regulatory requirements.
- PMP also a PE, with a PrE deputy. Large projects which are intensely technical, such as research and development or experimental structures.



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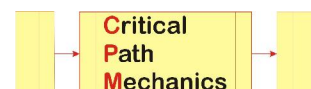
Clearly there is no one size fits all solution. The existence of a PMO which has cataloged the full range of the firm's skill set and understands its strengths and weaknesses is invaluable in fitting the project management structure to the project.

Summary

Increases in scale inevitably increase the complexity of projects. Compound this with the rapid advances in technology, the rising expectations of customers with regards to quality and on time delivery and you produce an endless landscape of management challenges. The functional organization of old rapidly grinds to an agonizingly slow place and eventually collapses. Emerging team based organizations may fare little better without the structure provided by modern project management methods.

Very few organizations are willing to blaze new trails in management, particularly when they have reason to believe they are successful, or heading down the path to bankruptcy. A brief visit to www.pmi.org to review the list of Corporate Partners of the Project Management Institute should provide some comfort to even the most skeptical that the approach outlined above is based on sound principle.

When organizations are profitable, the ills which will ultimately result in the firms collapse may be dismissed as growing pains, or "the cost of doing business." But the time to address these ills is during the periods of high



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profitability, where the opportunity to recover from mistakes exists. Waiting until the organization is perceptibly ailing results in a scenario where an error in judgement can mean the end of the company. Modern success stories are typified by companies, which constantly strive to improve, regardless of their current state of success. Choose to be one of those companies!

