

# PRECEPTS OF PROJECT MANAGEMENT <sup>1</sup>

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Engineers are generally not schooled in the basics of project management but are expected to learn on their own. Here are some pointers that could make project managers more effective.

Ask any engineer to name the best, and the worst, project managers he or she has ever worked with, and I suspect that very few will have any difficulty coming up with a list. Most engineers will agree that good project managers are in the minority, or even rare, but this should be no surprise considering the fact that engineers are taught virtually nothing about project management. An engineer's formal education is almost exclusively focused on the technical aspects of the profession. Engineering colleges have traditionally assumed that their graduates would acquire project management skills on the job. Consequently, engineers typically learn it (or not) from their role models, who generally are the senior engineers with whom they work, some of whom are poor project managers themselves.

Successful projects share at least two characteristics: They are completed on schedule and within budget. Achieving these goals is the quintessential measure of good project management. Most engineers realize this, but lack an understanding of the skills and procedures necessary to achieve these objectives.

## PROJECT MANAGEMENT PRIMER

The following list identifies some essential elements of good project management based on personal observations and experience. The list is not presented in any particular order of importance and is by no means all inclusive.

### **1. Start worrying about the project schedule and budget the day the project is awarded.**

This should be obvious, but in fact, a great deal of effort, time, and money are wasted at the start of a job simply because the project manager thinks that ample resources are available. In reality, time and money quickly disappear during the project. Many engineers are familiar with "the 80:20 principle," which states that 80 percent of the budget is consumed during the first 20 percent of the project. Another interpretation is that only 20 percent of the real work actually gets done during the first 80 percent of the schedule. This principle is akin to Murphy's Law, but as with all clichés, it holds an essential truth: namely, that time and money are frequently wasted at the start of a job - which brings us to the next suggestion.

### **2. Begin each project with a carefully thought-out plan as to the amount of time, effort and budget that each task will require.**

This does not mean that an elaborate critical path must be developed for every project; however, the basic ideas of critical path management could be applied to almost all projects. For example, what is the first task that needs to be completed and how many tasks can be performed simultaneously? Most important, when should each task be completed and how much of the budget should be expended performing each task? These are the milestones and target dates by which the project manager measures work progress.

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A simple bar chart might be sufficient for a small job, but some form of plan is necessary for all projects. Without a clear plan, it is typically assumed that the level of completion is reflected in the amount of budget expended. Then, when the project manager tries to assemble the work into a final package near the end of the project, it is not uncommon to discover that considerable work may still need to be done, but with neither the time nor budget left to complete it. The project manager may then approach the client to request more time, which may be granted, and more money, which is rarely granted.

On the other hand, if the project manager is tracking the progress of the work, as well as the budget, he or she may discover that more time or money may be justified at a point where it will not come as a last minute surprise to the client expecting a completed project. Clients can generally accept bad news; they just do not like surprises.

### **3. Be both a project manager and a mentor.**

To be cost competitive and efficient on relatively large projects, balance the use of staff level personnel and senior engineers. This is not a new idea! The problem is that most project managers do not interact sufficiently with junior level engineers and technical support staff for this combination to be efficient. With no disrespect to our schools and colleges of engineering, senior engineers frequently forget how little they really knew when they first got out of college. They also forget how long it takes a staff level engineer to do things, or what they need to know to accomplish a task. Do not assume they know; provide guidance as to what you want and how long it should take to complete. Without guidance, a junior engineer may waste a great deal of time doing work that is not required, searching for information that is unnecessary or that the project manager failed to provide, or simply wandering off in the wrong direction.

Keep in mind that all junior engineers initially lack experience and judgment; they need proper guidance to develop both. Project managers are not expected to be experts in all technical areas, but they should know where the experts in the company can be found and how to link junior engineers with these experts.

### **4. Provide a completion time and budget to each individual assigned to a task.**

Never leave a task open ended. A completion time and budget indicates to the individual performing the work the level of effort required for the task. Keep in mind that junior engineers may not yet understand the practical difference between the level of detail required for conceptual design versus the effort required for final design or construction level drawings. Even senior level staff need to know how much time they can charge to a project, which determines the level of detail they provide. It is also an excellent idea to see that everyone on the project team reads the proposal so that all individuals are aware of the scope of work, budget and deadlines.

### **5. Provide appropriate project data to all members of the project team.**

The project manager should make sure that everyone on the team has the same basic information, design parameters, base-line drawings and so forth. It is quite common to discover when the report is being prepared that different engineers made different assumptions for a piece of information common to several tasks; consequently, adjustments must be made at the last minute and work redone to correct the situation. It is the project manager's responsibility to ensure that all team members are notified of changes that will affect their tasks. The project manager should not simply assume that everyone on the team is communicating; this will prevent frustration and wasted effort at the end of the project. The project manager should also provide guidance in making appropriate assumptions, particularly when working with junior level engineers.

### **6. Discuss the details of each task with the individual assigned to do the work.**

Do not expect people to be able to read your mind. Define the extent of the task so that the individual assigned to it has a clear understanding of what needs to be done. Provide an example of a completed task from a project with a similar scope of work if one is available. In addition, developing the details of each task will enable the project manager to determine if the scope of work needs to be redefined or renegotiated and discussed with the client. It may also contribute to the project manager's understanding of areas outside his or her expertise. Such knowledge is

particularly important when interacting with the client or regulatory agencies because at such times a piece of information may be provided that could be important to a particular task and that might have otherwise gone unnoticed by the project manager.

#### **7. Periodically check on the progress of each task.**

Do not assume that everything is going well simply because no one is coming to you with questions or problems. Do not assume that work is necessarily being done simply because the budget is being spent. Check on the progress of all of the individuals on the project team. (Some will need more guidance than others.) Doing so will save time and money as well as help identify major problems that will need to be resolved or note changes in direction or scope of work that the client will need to be informed of. Do not wait until the budget for a task is exhausted before discovering that the engineer doing the work went off in the wrong direction. Checking on the progress of each task along the way will allow the project manager to make appropriate adjustments and corrections, or to add staff to assist with completion of a task. The failure to properly complete a task is more often the fault of the manager than the engineer doing the work.

#### **8. Do not defer action on difficult matters or decisions.**

Problems do not go away and they do not solve themselves. Confront problems directly, with tact and a basic respect for the individuals who may be involved. This is not to advocate hasty actions or decisions, but a good project manager will not procrastinate in matters that affect the progress of the project. If you find a mistake, correct it as soon as possible and determine what effect the error may have on other tasks. If you made the mistake, accept the responsibility, correct the matter, and get on with business. It requires greater strength of character for an individual to admit a mistake than to blame it on someone or something else. It is a poor project manager who thinks that mistakes will go unnoticed.

#### **9. To whatever extent possible, match the members of the project team to the tasks they do best.**

This is not always possible, but it is something that the project manager should keep in mind, particularly when given the opportunity to select the members of the team. We do not all have the same abilities, even though we may all possess a similar basic education. Some individuals do not possess the personalities that make them effective on a multiple-person task; they may work better on a single-person task. Others may have outstanding analytical skills, but poor organizational skills. The project manager should be cognizant of the abilities and limitations of the project team members. Similarly (though frequently more difficult to do), the project manager should be aware of his or her own abilities and limitations. One individual cannot do anything and everything, although a number of people think they can.

#### **10. Allow ample time for the final report.**

Underestimating the time and effort necessary to prepare and assemble the final report (drawings, specifications, etc.) is a common and serious mistake. It is a misconception that if we do the engineering right the report will write itself. It typically takes longer to pull the final report together than assumed in the proposal (particularly the last 10 percent of the project).

Just as your high school English teacher taught you, start with an outline. A good time to write the outline is at the start of the project when you are developing the basic plan for completion. Remember that the final report is essentially what most consulting engineering firms sell to a client. It is what the client and the regulatory agencies see, rather than the technical calculations themselves. If the final product is something that was thrown together at the last minute, the client will inevitably wonder about the quality of the engineering that went into it. Do not underestimate the time required for developing text and drawings, coordinating figures, preparing appendices, and reviewing and revising.

Unfortunately, many engineers do not consider report preparation to be "real engineering." Part of the reason, no doubt, is that the focus of their education is analytical. Engineers need to realize that as much true "engineering"

goes into forming sentences and paragraphs that communicate technical ideas and conclusions, as goes into the calculations that form the basis of those conclusions.

### **11. Remember that managing a project equates to managing people.**

The success of any project ultimately depends on the efforts of the people who do the work, not just the project manager. A good project manager will motivate members of the project team to put forth the extra effort that distinguishes a job well done from a job that is merely satisfactory. He or she orchestrates the successful completion of a project in the same manner that a good conductor orchestrates the performance of gifted musicians in a symphony. Consequently, good "people skills" will serve a project manager as well as, or often better than, good technical skills.

I am not suggesting that project managers manipulate people, but rather that they treat the members of the project team with the same dignity and respect that is afforded to the client's staff. People appreciate being told when they have done a good job or offered a good suggestion. Occasional praise also tends to make people less defensive when the need arises for admonition or criticism. All members of the project team deserve to be treated with courtesy and respect, even when they make mistakes.

The most effective project managers are typically individuals who are respected by the individuals who work for them. Professional courtesy will be afforded a project manager simply because of his or her position in the organization, but respect is something that needs to be earned, and technical ability is no substitute.

### **12. Keep the client involved.**

Too many engineers simply fail to communicate with the client. Sometimes the client does not know exactly what he or she is asking for, but at other times the client knows what the final product should look like even better than the consultant. Interact with the client from the onset of the project, if only to provide updates on the status of completion. Most clients appreciate being kept informed. Solicit feedback, although it is not necessary to incorporate every suggestion. While it is the consultant who will bear most of the responsibility, it is foolish to ignore good suggestions or advice.

Whenever appropriate, allow the client an opportunity to review drafts of the final report, drawings, specifications and the like. This allows the consultant an opportunity to receive some potentially valuable input from the client in the form of questions and comments, and makes the client take some level of responsibility for the final product. This minimizes the potential for clients to be embarrassed by something a consultant may put in a report, perhaps unnecessarily or perhaps because it was poorly stated. Remember that people do not like to be kept in the dark, particularly when they are paying for professional services.

## **NO EXCUSES**

Successful projects do not just happen. They are the result of the efforts of all the members of a project team, but primarily the efforts of the project manager. Excuses abound for unsuccessful projects: There was not enough time allowed to do the work; there was not enough money in the budget; the client did not communicate what was expected of the consultant; I was working with inexperienced engineers; and so on. At times such observations are valid; however, all too frequently they are simply excuses for poor project management. Good project managers can frequently negotiate more time or money, if they are doing their job properly and such changes are justified. Similarly, if a project manager communicates with the client, he or she will have a better chance of determining what is expected of the consultant. Most problems, both real and perceived, can be solved most of the time.

The essentials of good project management are planning, communication, and coordination. While they are skills that come naturally to some individuals, they can also be developed by most engineers. Considerable time and effort are required for successful project management, and as with so many things in life, it looks a lot easier than it is.