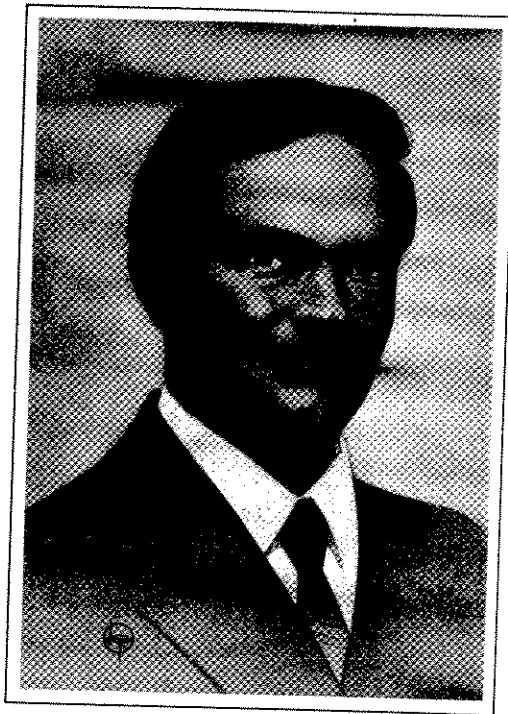


"Speaking Out" on Productivity

MANAGE TECHNICAL PROGRAMS FOR SUCCESS



By James J. Collins, P.E.

Here is a step by step procedure that will help you successfully manage highly complex technical programs. Using a disciplined team approach and a goal-oriented focus, while keeping an eye on costs, you may find that you can "move mountains."

In our evolving world, technology continues to expand, growing upon a developing base of information that each new innovation generates. As a result, the complexity of tasks and projects accelerates in an upward, spiraling manner. Managers, many with little experience in the field of interest, are being assigned the responsibility to manage and direct complex programs.

There are many ways of managing technical programs. But, two key tasks must occur at the start of any technical program. They are inter-related, but depending on the concept, the order of execution may vary.

Point of focus. The primary task is to identify "a point of focus." This is critical to the successful completion of any technical project. It consists of a cogent, one-line statement of the purpose of the program. This may be by far the most critical and most difficult item to generate. If must focus effort of the entire team on the end product; it must give direction yet must not constrain the team in finding a solution.

This is the generalist's direction, outlining the purpose and goals of the basic technical program.

President John Kennedy set the point of focus for the Space Program when, in 1961, he said to Congress: "This nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth." His very brief statement explained the basic purpose of the program, focused on the end result, yet did not put constraints on its direction. He did not state that we would have to use liquid fueled-rockets—or rockets at all. His point of focus directed all members of the Space Program to the end result and allowed significant latitude in optimizing performance, which resulted in success.

Technical specification. The second task is to generate a technical specification. This document must outline all the various aspects associated with successful completion of the project. It should build upon the basic point of focus and specify, in detail, each of

the attributes required for the program or device. In a complex program, it can identify the size, the time of expected completion, the location where necessary events will unfold; it can identify environmental conditions, capacities, a design-to-cost target, and all phenomena associated with the end product.

Generation of this specification is a crucial part of the technical program. Every line item in it must be questioned, discussed, and evaluated. Meetings must be convened with all key participants—customers, management, technical program personnel, consultants, and vendors as required. The effects on costs, delivery schedules, and performances must be reviewed for each element of the specification.

Each element of it must be recognized as a cost driver, because every added requirement will cause equipment, hardware, or labor to be expended. The additional, or more stringent, requirement must be evaluated, verified, and tested, before it's accepted into the specification. Also, activities associated with the requirements must be closely watched. All of these costs can be reduced by tightly controlling the specification at the early evaluation stage.

A note of caution though: Many technical programs have foundered because unrealistic and irrelevant specifications were cast in concrete at the earliest stages of the program without understanding the effects on cost or schedule. Frequently, relieving an arbitrary specification detail can significantly reduce cost and enhance the ability to meet end item requirements.

Fine tuning. Good managers must be good "askers" of questions. They must question every aspect of the specification; whether it can be relieved or, more importantly, removed. In

all cases simple is better. However, managers must identify all of the minimum requirements for successful completion of the program. This is the area where discussion and negotiation with customer and management must be thoroughly carried out. Assess and evaluate trade-offs, options, and delivery effects; and appraise the primary demands on manpower, costs, and assets.

As previously mentioned, creating the point of focus and specification can often be interleaved. Many times a Technical Program Manager must evaluate program specifications presented by a customer and then generate the point of focus. But the presentation to the team should start with the point of focus and then expand on the specifications. The general direction that the project will pursue must be emblazoned in everyone's mind. Thereafter, project evaluations must return to the basic premise with an assessment, "does this activity support the point of focus?" If the answer is "Maybe" or "No," then view the task as suspect; all efforts and costs should be suspended unless someone can show a valid reason for pursuing the activity. In this manner efforts of the program are regularly redirected to the correct track.

Defining tasks. Once the specification is in place, a skeleton plan should be laid out indicating each of the various separate tasks to be done. During this phase, identify those activities that will be done by outside vendors and highlight any critical items which must be purchased.

Against each activity, generate a detailed task description. These tasks descriptions should consist of one-page outlines that describe in general terms the minimum activities to be completed to meet this phase of the program. The document must identify any unique disciplines or skills that may be required. It should highlight the complexity of the

activity and estimate all costs including an assessment of estimated hours, elapsed time, and risk associated with this effort.

Once detailed task descriptions are in place, a time schedule can be formulated. The various efforts can be assigned target completion dates; interrelationships of these efforts and dates evaluated; and the timing determined for delivery of long lead items or those elements which have to be developed or fabricated.

Reducing risk of failure. At this juncture, it should be possible to identify the greatest risk element and the earliest date it will be encountered. Every effort should be made by the program manager to get to this element as quickly as possible. This element will cause the greatest expenditure of effort, time, and money, as well as determine the successful completion of the product.

Most programs fail because the various groups tackle the easy parts of the job first. They are comfortable with these easy tasks and recognize that they can accomplish them with little or no risk. Unfortunately, this action often uses up the majority of available

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time and assets. The groups then encounter the major problem element too late to complete the effort on time. This myopic tendency results in several cost problems; an over-run of the original estimates and unnecessary expenditure of funds.

By driving the groups to do the most difficult tasks as soon as possible, effort and activities are concentrated on the more difficult portion of the program early enough to opti-

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mize resources and keep costs down. This approach also lets the manager make use of alternate technologies if the original solution is found to be untenable. And by tackling the more demanding tasks early, the enthusiasm and morale of the project team are maintained, which has many subtle, positive aspects resulting in early delivery and significant cost savings.

More fine tuning. Once task descriptions are generated by the technical specialist, a series of meetings must be held to discuss and challenge each of the functions identified. Again, the point of focus and the detailed specification come into play. Technical managers must demand a detailed explanation for each of the projected activities. They should challenge the cost, the time, and require alternates to be presented for each task so that the most effective approach can be used.

In this open forum type of meeting, critical comments and alternate approaches should be encouraged from all interested parties. If the program managers encounter an area where they feel technically inadequate, they should not hesitate to bring in a recognized consultant to assist in evaluating the presentation made by the technical experts. This alternate point of view, many times, results in a more cost effective solution to a difficult problem. It also assists the manager in developing a different perspective of the complexities involved in a technical area with which they may feel uncomfortable. It is the technical managers' responsibility to have adequate knowledge of each of the tasks on the program so that they can accurately anticipate and assess the costs. And if an alternative approach is not available, it could indicate that the team's view of the task may be myopic or that there is only a single solution to the problem.

The single solution then, becomes a high risk element be-

cause its successful completion is critical.

Another philosophy which has worked quite successfully can be stated in three lines: If it exists, buy it. Buy it and modify it. Only as a last resort, design from scratch.

Applying this philosophy to most technical projects will result in significant savings in

nated program leader is given all necessary support to succeed in that priority effort.

Once the basic plans are in place, communication is by far the most critical on-going aspect of the program. Regular meetings must be scheduled for all task managers, cost administrators, schedule planners, and any other key personnel with responsibility for

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time and money and greatly reduce risk. Every major element that can be acquired or purchased from a company greatly reduces chances of failure and enhances ability to guarantee delivery of the project ahead of schedule and under budget.

Project leaders should be delegated responsibility for every identified program task. All who are associated with the program should be aware of the leaders' scope of authority. Only when lines of responsibility and command are clearly outlined will a project proceed in smooth fashion. It is a natural tendency to assume that someone else is handling a particular aspect of a job. But there can be no gray areas of responsibility. Inevitably there will be areas of overlap. Different aspects of a program may be vying for the same asset, or one team will have to complete a task which is critical to completion of a second group's task. At these times, a program manager must intervene to assess the effect such ambiguous situations create. Evaluating in terms of the point of focus will, many times, clarify which group, or which situation will receive priority. Once priority has been established, transmit that information to all members of the program as quickly as possible so that they understand the temporary change in direction, and that the design-

the program. This may include outside vendors and subcontractors. Meetings should be held on a weekly basis if possible; however, no less than on a biweekly basis.

All attendees must be prepared to discuss their areas of responsibility; to discuss each of the tasks in their plan, whether immediate or future. Only in anticipation of each task and planning for all eventualities can a smoothly operating program be maintained over any period of time. Each task "in work" or "to be completed" must be addressed; its timing and costs must be formally discussed. All attendees must be "contributors," otherwise their attendance is nonessential.

It is the program managers' task to elicit response from every team member to every major item of discussion. Many times people are reluctant to address an area in which they are not directly involved although they may have experience or knowledge which should be brought to the table. Adept managers will draw out this advantageous source of information by addressing each individual in turn, requesting opinion and comment.

Assigning specific responsibility and subsequent frequent monitoring of all aspects of the program on a timely basis will assure the technical program manager a high degree of success. PE