Boot Camp for Project Managers

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In 1979, a DC-10 crashed shortly after taking off from Chicago-O'HARE. The plane literaly lost an engine. The event was extremely rare and infeasible to duplicate in a flight test mode. Flight simulators were assigned to discover what the pilot could have done differently. After repeated trials, a solution was found. It can't restore the lost lives, but it gives hope to airline passengers today. Every DC-10 captain is now trained in the recovery maneuver and has practiced it in a simulator. Others may live because of that training.

How does our training stack up in project management? Project Managers deal with significant issues on a daily basis and can benefit from effective training. We do not suggest that Project Manager training is normally a matter of life and death, but we know that it affects the life and death of projects. In this paper, the authors examine some inhibitors to effective training and report on their experience with simple simulations in teaching project management.

The training reviewed is effective because it creates conditions modeling real aspects of the project management experience. During the training, the participants:

- Complete multiple projects in teams that must meet, form, and perform quickly
- Practice project fundamentals, generating and applying ideas and receiving immediate feedback
- Use that feedback to test ideas in a caldron. The immediate need for leadership rewards dynamic solutions.

From our experience, we conclude that the simulation method can:

- Provide a shortened learning curve
- Illuminate real behavior more effectively than the working environment
- Stimulate invention and creativity by reducing the perceived price of failure.

In our areas of practice, the majority of Project Managers come to the project management role with technical backgrounds. This education and experience, whether in engineering, research, systems development, construction, or manufacturing leaves them ill equipped for the problem of managing complex projects effectively.

Like all of us starting life, new project managers start in that role as what Mike Vance calls Unconscious-Incompetents (Vance, 1982). They don't posses the skills or knowledge to manage projects effectively, and they lack the awareness to even describe what they need. By the nature of selection processes, surviving project managers tend to move toward acting as Unconscious-Competents. An unconscious-competent is a person of skill or technical ability but who has limited understanding of how he or she gained that ability. In a technical sense, this is the student who examines an integral calculus problem and sees the solution without conscious thought. In athletic performance, there is the baseball player who hits .400 but whose only formulation of advice to new players is to "put the bat in front of the ball." Such people lead in performance, but they usually do not make great teachers or team leaders.

As in athletics, so with Project Management. The best coaches, leaders, and teachers come from the ranks of the Conscious-Competents. They have skills and are very aware of the effort they devoted to developing and refining those skills.

For several years, the authors have been teaching classes in project management aimed at moving project managers with a strong skill base toward the Conscious-Competent quadrant. These classes incorporate a number of methods to help these project managers see the deficiencies in their own behavior and develop plans for improvement.

This paper deals with small-scale simulations in the classroom. Such models are use to stimulate thought and observation. The simulations highlight a number of characteristics shared by project managers and motivate self-awareness of those traits.

The Inhibitors

Some observed inhibitors of effective leadership by project managers are:

- Over-reliance on technical means
- Under-recognition of the importance of social processes
- Design and operation of systems detached from their operating environment
- Restriction of their training exercises to lecture and individual exercises
- Limited numbers of cycles of learning.

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At best, new project managers may have succeeded in solving problems in small teams. Team dynamics were relatively simple, and technical solutions provided quick fixes. This background reinforces a tendency to have faith in the technical and avoid wasting time on team dynamics and communication issues.

As graduates of technical processes, project managers tend to over-emphasize technical means and under-emphasize social processes. The two are not universally paired, but they will be dealt with here that way. Project managers get together in technical conferences and argue over the benefits of the resource allocation algorithms used in different scheduling programs. Of course, if their time is used that way, managers don't spend time determining if the schedule is looking at the right problem. In technical discussions, people are often regarded as a variable in the equation and not as the controlling factor.

The problem this presents might be summarized as the difference between the systems designed and the systems in use on a project. On one occasion, an author attended a presentation on the integrated cost and performance measurement systems of a major EPC contractor. The essence of the presentation was that, by measuring thirty critical events associated with every activity of construction, three hundred measures could be calculated on a report to show progress. In theory, the measures dealt with every conceivable project condition except the problem of how to keep up with measuring thirty events across every activity.

Some time later, the author was involved as a subcontractor on a project for this firm. Thirty events were not being accurately assessed for each activity, but somehow the three hundred measures were still being published. Of course, they were now totally meaningless. Unfortunately that didn't keep them from being used for violent ends. Every day the subcontractors were beaten up over the measures which had little basis in fact. Huge amounts of time were spent in mounting defenses against pointless attacks. In the meantime, the project was crashing around the project team. In the end, every major performing contractor filed claim on the project, and the owner got his project significantly late.

A "technical" design for control systems had once again missed the people needs. This observation might be likened to the problem presented by arguing about burglar protection provided by the strength of a lock on the front door of your house, when the weather stripping often prevents the door from being closed. Security is provided not by locked doors, but by closed locked doors.

Project Managers can be a lot like a character from *The Mote in God's Eye*, by Larry Niven and Jerry Pournelle. The character is called the engineer. The engineer improves everything he encounters but ultimately creates an unlivable environment (Niven, 1987).

In our experience, most engineers and many project managers do not make good systems designers or implementers. Their work product is too fragile and will not stand the test of harsh reality. They accept complexity as an easy out and then watch the systems crash, blaming the operators. They design systems that work partially at low load but fail when they are most needed, under high load. They don't thoroughly stress test the systems. They improve the parts of a system by cute little tricks and then wonder why average people can't make them work. Most often, the fault is not in the average people; it is in the system design (Norman, 1988).

Over confidence for technical means hides the common problem of failing to test technical means against reality. In the example above, the EPC contractor probably never saw a connection between a system that couldn't work and a project that didn't. The problems were treated in separate compartments. Asserted solutions were deployed but never tested. A colleague once remarked that our best designs were pointless unless we recognized that they would be implemented by average men of average skill who didn't particularly want to be working at that task. His point was valid. The best solutions are not just technical; they are bullet proof.

Good training design must provide stress testing of ideas.

Most training exercises that technical people participate in typically fail to accomplish their purpose for two reasons:

- They are too narrow.
- They are limited to individual performance.

The too narrow aspect comes from the nature of the technical issues. For instance, manual calculation of a two hundred-activity schedule network might well take several hours. Loading a similar schedule into a computer program and adjusting for an update again might take several hours. For this reason, our exercises don't typically deal with that scope. We examine fragments and leave the comprehensive extension to the imagination. In a simulation exercise, the comprehensive level can totally overwhelm the methods being taught.

A colleague contrasted the methods presented in an estimating class with his experience under the time pressures of a real job. He said, "In class we were worried about missing a window, or about miscoding our takeoff of a 2–10 x 6–8 door as a 2–8 x 6–8 door. In my work as an estimator, I am much more concerned about missing a floor of the building."

Project managers tells us of engineers who design different columns for each floor of a four-story building to

optimize weight, missing the cost of extra connections and erection labor. An engineering associate tells of a design highly optimized for weight that vibrated unacceptably. Another remembers a structural design that entirely missed a floor of a building.

Narrow exercises lead to this extensive suboptimization of the system while optimizing the parts. Classroom project management exercises dealing with fragments are not developing understanding of project strategies.

Since typical exercises are conducted with people who don't know each other, we sidestep the problems of group dynamics by providing exercises that can be solved individually. Even for those exercises declared as team exercises, the real dynamic is usually the emergence of a leader who does the work and a team that copies. Technical people shine in that environment. A problem for technical people when working with groups is developing patience in dealing with slower people. They might call it a group exercise and not deal with slower people at all—just bulldoze them aside in the name of technical skill.

One author encountered a description of this in an unexpected place. As an advisor to an academic program, he was told by the dean that the school intended to drop team activity from a capstone course. According to the dean, "The students don't work together well. Typically, one student puts forth most of the effort and the others slide."

The fragmentary nature of the problems examined in typical exercises suggests another problem: The limited cycles of learning available in work environment. A summer student working on a telephone survey might finish twenty surveys a day. Each call can be a challenge to find the means of making connection, each survey a learning opportunity. Project managers, on the other hand, usually see the consequences of their action very slowly. An early experience in a one-year project might be followed by a series of two-year projects. A project engineer with ten years experience might have seen only a handful of projects and may never have performed in the same role twice.

Real learning occurs when what we presume to be right is challenged by events. The person with experience in five roles in five projects has not had much opportunity to deal with that kind of challenge. Experience has shown that the skill of a pilot is directly related to his time in the seat and the number of missions flown. Since the cost of real missions is so expensive, pilot training uses simulators; a relatively low cost approach to creating cycles of learning.

The authors have faced each of these problems in the design of their project manager training. The result is project manager training that depends heavily on simulating project reality. Time pressures and a real risk of very public (but low cost) failure allow team members to taste the reality of the project environment. We believe strongly in the use of simulations and have received considerable support for that view in our experience as teachers.

Consider the comments of former students:

- One former army officer from the Corp of Engineers: "The army spent a lot of time and money on training me in project processes, but I never felt the sweat on my brow and the knot in my stomach there that you induced with your silly little games."
- A professional trainer: "This was the best training I have seen in a decade. Among other things, my own observation is that every team I participated in led to introspection about what I contributed to that failure. For the first time, I understand that my dominating behavior made the team follow my lead to failure."

Our simulations use simple models, built in a team environment to illuminate project processes in the context of building complete projects. Some of the factors typically explored are:

- What is the relationship between planning and project success?
- What constitutes effective planning?
- Are pressures to start work without an adequate plan real or imagined?
- What can you do to increase the effectiveness of interteam communication?
- How effectively do you communicate among interdependent teams?
- What impact can poor material management have on project success?
- Can a project team be managed, or must it be led?

Exploration of these points, and others, is driven by the facilitator but experienced by the class. The key to learning is often found in an effective debrief conducted under the direction of the facilitator. The exercises work best when the actual behavior of the participants during the exercise can be used to highlight the points being made. Usually, the participants themselves will find many of these points. The facilitator can supplement these points with additional items he has identified and let the participants expand on the whys and wherefores of these things happening. By this means, the simulations have proven flexible in adapting to specific areas of concentration chosen in advance by the facilitator.

Perhaps the best way to show the impact that can be felt in this type of training comes from some observed points from the simulations bearing on areas of project management.

Those points dealt with here are:

- Action without direction, or projects going down blind alleys

- The impact of change in a project process
- Reluctance to experiment, a curse of performance
- Project communication
- Lessons in how project leaders arise
- The formation and dissolution of teams.

A common theme in our simulation rules is that planning costs less than construction. For convenience, we use a ratio of ten to one. We then drive the project by cost factors. In such a system, one might think that only the mentally enfeebled would propose construction without planning. We offer no such judgment. Over and over again, we start with groups who begin construction with no planning and tremendously overrun their budget. Significantly, they do not complete the model faster than teams that do effective planning.

Some examples from simulations:

- A team developed a quick plan and started construction. After failure in their first attempt to complete the model, they finally asked themselves if a good plan would have helped and if they had made any use of a plan.
- In an exercise with a mandated planning period and a crystal clear objective, a team member observed two thirds of the way through the planning period, "Gentlemen, we are not even close to formulating a plan that would accomplish our objective. We ought to look for an alternate direction and reformulate our plan." The team rejected him, formalized a useless plan, and failed in execution.

Unfortunately, we can provide dozens of examples from real projects. Project managers do not plan effectively, and they repeatedly excuse ineffective action on the grounds that it is action. Their cry is "What more can we do?" Through simulations, we answer that question by showing them the impact of effective planning and some techniques for accomplishing that planning.

In what is traditionally our first exercise, part of the exercise deals with a midcourse change in the project design. The team must first recognize the change and then deal with it while the project effort is ongoing. Teams vary greatly in their ability to do this.

A somewhat extreme, but not unique, example was quite dramatic. Upon completion of the model, the team leader threatened to assault the facilitator for failure to provide timely notification of the change. When the facilitator stated that the change notification had been made at a specific time, he was denounced as a liar. Meanwhile, a team member was sliding so far down in his chair as to be virtually under the table. After the second interchange between the facilitator and the leader, a small voice from below the table remarked, "George, we had the change. I just didn't get your attention when I read it."

Some points about change are driven home clearly by this type of exercise. An attorney observing the process stated that if a jury had seen it, they would have understood how change impacts effective action and doubled their awarded damages.

The first reaction on recognition of the change is often calls of, "Claim! This project must go on T&M." In the after action, observations of real behavior often bring a chorus of "ahhh!" as some understanding dawns.

One of the authors routinely asks how much time was added to project completion by the impact of the change. Realistic answers are often in the range of five minutes, a huge impact for a model that has been built in the same exercise in one minute. Then comes the follow-up question: if the change had been dealt with effectively, how long should it have added to the construction time? Normal answers center around thirty seconds. The punch line then is "As the owner, I should pay you for every legitimate cost you incurred as a result of my change, but your ineffectiveness in dealing with the change is not a legitimate cost."

The impact of change is real, and the need for effective processes to deal with change is also real. Both must be recognized in our project processes. We are impressed with learning that the impact of change can be observed in a compressed timeframe.

The accepted definitions of project management often emphasize the unique nature of each project problem. This very definition weighs against the concepts of experimentation. It sometimes seems that project managers delay the start of an operation until there is no alternative but to gut it through. Thus, they are provided with the built in excuse that they no other alternative.

Such behavior is often observed in our simulations. In one particular exercise, we encourage experimentation during the planning cycle in order to improve the performance that counts. We find that audiences dominated by project professionals are much less likely to experiment, and are much more likely to fail, than other audiences do.

The classic case is a team prodded and poked into experimentation that then completed the exercise within the time limit on the first attempt. Thus, short circuiting considerable busywork they had outlined.

Large gains in performance are not feasible in organizations that put a high price on small failures. Project managers can and do learn from observing processes in experimentation.

In our exercises, we normally observe evolving team leadership without intervention. Project teams usually reflect the communication style of the leader who emerges. Often the leadership settles on the individual perceived to have the highest rank in the group. When this happens,

his unconscious communication style can be expected to control the team.

A good example of the expected result, and what is needed to overcome it, comes from an exercise we observed. A team of four consisted of two pipefitter foremen, a new engineer (Eric), and a senior superintendent (Stu). At the start of the exercise, the superintendent announced the approach that would be taken. The foremen immediately assented. As they traveled down this path, it became obvious that they were not getting where they needed to go. The engineer spoke up. "Stu," he said, " I think we should consider other methods." "No, we're doing it this way." Again, "Stu, I think we ought to consider the alternatives." "Who asked you?" Once more, "Stu, I don't think this is going to work, can we talk about what else we might do?" With arms folded and fists clinched, Stu finally said, "OK, mister smarty pants college kid, what do you want to say?"

Eric's method was ultimately adopted, and it was successful. Memories fade. Eric remembers four attempts, we observed three. What we appreciate, though, is that this cycle on a real project would likely have been measured in weeks, not minutes. In Stu's normal environment, Eric would have been even less likely to be heard, and on reflection Stu understands this! The observation of communication patterns helped teach some lessons that would not have been as effective in a different setting.

In our experience, the United States Army often tells young lieutenants, "By Act of Congress and authority of the President, you are now an officer and a gentleman." The total message is complex but necessary. Fortunately, the Army has long understood that it is not that easy. They have very intentional programs designed to select, train, and mentor leaders. The project management business needs to do much more than we typically do in this area.

We would not suggest that our simulations be used as selection exercises, or as the sole training exercises for project leaders, but we have observed notable examples of good (and bad) team leadership and have been able to help others see them as well.

Our favorite example comes from a manager of construction doing an exercise with a group of young engineers. This manager had just returned from a temporary assignment directing a one-month refinery turnaround involving twelve hundred craftsmen people. During the construction phase of the exercise, he took control and became not just the lead builder, but the only builder. The room resonated with his voice sounding like a movie surgeon requesting tools: blue four, red three. One of the engineers fed him parts. The others stood back in awe. The team failed.

We asked the critical question: Is that your style of leadership in action? Is that how you led the turnaround? His answer was a reluctant "probably." Now we fast forward to 1998, when circumstances require this same construction manager to act as project leader on the biggest turnaround in several years. He puts a team on site and dispatches himself to be present at the start of the turnaround, announcing he probably will not be back for three weeks. A few days later, he is back. When asked how it was going, he replied, "My project team has it under control. My presence is unnecessary."

Was this a behavior change? Absolutely. Did the "silly little exercise" have some impact on starting the transformation? Unquestionably.

While the literature is limited on team processes, generally some of the available literature deals with the problem of team formation and the difficulties involved. If it were all that difficult, our projects would not get done. Still, if we pay a little more attention to team dynamics, we will get better results from our projects. In our seminars, we teach about the problems of team dynamics, but in our simulations we see the lessons absorbed. Effective project teams do not happen instantaneously or effortlessly. They are also not miraculous events. If we intentionally foster the right atmosphere and culture, we can facilitate the formation and success of teams.

In our simulations, we often observe the dynamics of teams with telling impact. Several years ago, one of the authors ran a series of three team simulations aimed at teaching continuous improvement concepts. A team prize was to be awarded for the best overall performance in the third exercise. Exercises one and two went smoothly, with improvement happening for each of the teams involved. Still, the effect was somewhat diffused by the best score in both rounds going to a team of two project manager and two project engineers. They did well, and going into the third round they were somewhat cocky.

Back in the pack was a team consisting of the head of marketing, an insurance administrator, and two secretaries. This group recognized that their team functioning was more important than their technical skills. They developed their teamwork and won the contest. The other project management team also improved, but it wasn't enough.

In managing projects, we accept as a given that teams will form and perform if the vision is sufficiently clear. A good dose of intentional development of team dynamics and a sense of celebration make it happen intentionally. We observe this at work in our simulations and, more importantly, so do the team members.

In summary, the key to overcoming obstacles to effective education of project managers is:

- Recognition of an improvement need
- Belief that intentional efforts aimed at improved training will bring a payback
- Building a culture that encourages small failures in the interest of learning
- Good training design with realistic exercises addressing the broad range of issues, not just technical ones
- Effective execution.

We have seen enough to be encouraged that improved training of project managers can and should be accomplished. We believe that effective simulations will play a big role in the ultimate success.

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