Do Engineers Need to be Trained?

Training Your Staff on the Cheap

By Neil Potter

Introduction

Over the last 20 years, Mary and I have seen the subject of training treated by companies in many ways. This ranges from viewing training as an essential activity to remain competitive, to a totally unnecessary task and hindrance to making a profit. In this article, I examine the potential needs for training and some of the options companies have used to make training efficient.

Is there a need?

Your medium-term goals might include reducing costs, cycle time, and project surprises, or increasing quality and customer satisfaction to differentiate your company from the competition. You might also have serious schedule or quality challenges that need to be addressed quickly. If your organization is not currently performing at the level you desire, you probably have a need for some new skills and some type of training.

Is training worth it?

Training is worth the time and money if that investment can be recouped. In my experience, one only has to learn and perform a few new skills to get that investment back, either from the mistakes no longer made, or the speed gained from the new skill. The investment then pays back over a lifetime.

For example, over the last year we have worked with several companies having difficulty eliciting and writing product requirements.

A few of the key issues each group faced were:

- Current requirements documents contained on average 10 critical defects per page
- The defective requirements documents were being handed off to remote development sites thousands of miles away to be coded
- Too much time was spent emailing back and forth to clarify the requirements
- Too much time was spent testing, fixing and retesting the software to get it right

To address these issues, a workshop was conducted that took less than two days. In the session, students applied the skills to their current requirements work. For the requirements addressed, the result was a significantly clearer document, and a reduction in defects.

We only had to save each group 16 hours of effort at any time downstream, and the investment would be recouped. We taught them a few critical questions to ask when eliciting user needs, a diagram to visually communicate the system scope, one question to ask to reduce the number of coding defects developers would make, and a template to organize and convey the requirements to customers, developers and testers. We estimate that they saved at least 16 hours of effort downstream during the class itself simply by deciding that the current spec was not good enough to hand to anyone. If they had sent it out, numerous emails and re-testing cycles would have been needed to address the issues.

Below I list some suggestions of how new skills and techniques can be brought into a group.

Only employ skilled people

Employing skilled people is a very efficient way to improve company results. Hiring a person that has sound planning skills, understands fluidics, or has expertise in requirements elicitation can avoid many headaches.

The downside is that they might be skilled in only one small subject, and not skilled in all the tasks you want them to perform. For example, does the new planning guy know your estimation technique or how your company plans

projects? Does the new requirements lady know how to use the new requirements tool effectively to coordinate requirements across five time zones and 100 people?

If the new person is working in a small team, then their skills can be shared among the team fairly effectively. However, if you need the new skills transmitted to a group of 200 people spread across three locations, then employing one skilled person will have limited impact.

Employing skilled people, or people with a college degree, will give you a little of what you want, but there will be lots of gaps.

Self-study

A common statement I hear for training implementation is, "We give them documents to read." This works well if a) the volume of documents is not overwhelming, b) the documents are actually read, c) the documents are understood and d) it is not critical that the documents are understood first time.

Self-study certainly has a place in the toolkit, but also has many risks. How comfortable would you be in the hands of a pharmacist who had completed the "self-study" class! Self-study is more likely to be successful when used in combination with other training and skill evaluation methods.

For example, a while back, there was a certification I wanted to achieve with Carnegie Mellon University (CMU). The qualification was very new and there was no defined curriculum or training class available. The only option was self-study, and this had a large benefit of being inexpensive. However, CMU would not have been satisfied with a declaration from me that I had mastered the material. Instead, they had a mandatory oral exam with a pass/fail result.

Mentoring (on the job)

Mentoring is probably the next cheapest training solution. If it is thrown together, unplanned and is really no more than telling a new person to ask a designated expert when they have questions, then there is a very high risk of obtaining a very poor result. If it is well planned and executed it can be very effective.

For example, recently I took on the duty to edit the Scout newsletter for my son's troop. I was unfamiliar with Microsoft Publisher and the process the previous editor went through to collect information, create, review and send the newsletter out. The previous editor was Mr. Mentor and insisted that we meet at Starbucks and develop the next newsletter together. He had written down the steps needed to get the newsletter out each week. He also included suggestions for how we could share the distribution list so that he could be a backup editor when needed. He then mentored me on the next four newsletters over 30 days. Needless to say, it worked fine.

Mentoring can be totally ineffective when the assigned mentor does not want to be a mentor, the mentor is unavailable, or the new person is not aware of skills he or she doesn't have and does not ask any questions.

Computer-based training

Computer-based training is a good choice when the size of the audience is large and the time invested in the training is affordable. For example, one client developed a series of PowerPoint files with an audio track recorded with each slide. Students would download the file, watch the show with the audio narration, and then take an online test to verify understanding. For small, self-contained subjects, such as risk management, ethics, tool use for beginners, and participating in peer reviews, this was an adequate training medium.

A few years ago, I completed a 40-hour online Six Sigma Greenbelt class through the University of Michigan. The class was very thorough, with video recordings, audio, exercises and online tests. At the end, you could complete a Six Sigma project and have it scored by the instructors in the class. The cost of creating the class was probably very large, but with a worldwide audience, they had a chance to recoup their investment.

Classroom training

Classroom training is the classic way to provide new skills to people. With good instructors, hands-on use of the techniques applied to current project work, and instructor availability afterwards to answer questions, the results can be very quick and effective.

One of the forgotten benefits of classroom training is the high communication bandwidth it offers. For example, if I am in a classroom setting, I can ask questions of anyone present and get immediate responses. I can frown to show confusion and get assistance. However, if I am getting educated via self-study at my desk, I can frown all day long and nothing happens. I can have questions but never find the person who knows the answer. The speed of communication is very poor and haphazard.

One of the workshops Mary and I run is a project estimation session. Three or four project teams in one setting learn the technique and then practice it. The session focuses on each team clarifying project tasks, assumptions, and requirements. At the end of the two-hour exercise I ask the students how many emails that session would have taken if performed solely by email. They always burst into laughter.

Visibility and accountability is also helped with face-to-face classroom training. It is obvious when students are not paying attention. In contrast, an education session via teleconferencing is very ineffective at monitoring student attention. People are in and out all day long; they do email and hit the mute button while they discuss sports scores with their office buddy.

Train-the-trainer

You can accelerate the adoption of new skills by using a larger number of knowledgeable staff to provide the expertise. Individuals who have a strong interest in promoting a new practice can be especially helpful for both generating interest and helping with training. For example, if you have developed a risk management process, you could teach this to champions who then teach it to others in their organizations. Each manager could identify someone in his organization to be trained to teach the method internally. The most effective choice for a trainer is someone who is highly respected and has the skills to share information with others.

Any train-the-trainer implementation runs the risk of conveying a message different from the one intended. Reduce this risk by spending time with the trainer to observe his teaching ability and to verify adequate understanding of the subject. Keep the message accurate and consistent by providing the trainer with thorough teaching materials, including a version of the slides with teaching tips for the trainer.

Part-time trainers already have full-time jobs that limit their availability as instructors. We have seen many examples when companies have adopted the train-the-trainer approach and, after two months, the trainers were reassigned to other unrelated full-time positions. Unless they can spend a significant time training each month for six months, you will spend much of your time training new trainers.

Expectations for CMMI Levels 2 and 3

If you are using CMMI (Capability Maturity Model® Integration) then you will need to do *something* for training, and it must result in the skills being used. Any of the suggestions above are valid implementations of training (along with other ones you think of). You will likely use a combination of various solutions. CMMI Level 2 expects that at least the processes that implement Level 2 be taught, along with skills needed to complete each project. At Level 3, the training program must be planned, tracked and work consistently.

Summary

Training is no more than learning what you don't know now to achieve the business goals you have established and address the challenges you face. Training, when performed correctly, is focused on raising your day-to-day performance. Remember, you are where you are today because someone trained you.

If you have any questions or comments regarding this article, please contact us at help@processgroup.com, or US 972 418 9541. To find out more about our company, please go to www.processgroup.com.

Are we on Track for CMMI Level N?

By Mary Sakry

When the Capability Maturity Model was new, appraisals were used at the beginning to determine critical areas for improvement. Smaller appraisals were performed along the way to monitor progress. Many organizations now see the idea of frequent checkups as too costly and thus try to maximize their appraisal dollar by waiting to the last possible moment hoping they have achieved Level N.

One side effect of this is that an organization has no clear picture of where it stands prior to conducting a final appraisal. It is common to think one is performing best practices, but not be aware that they have been totally misinterpreted or dropped altogether.

For these reasons it is critical to perform regular checks along the way. Below I describe a few options.

"I think I am ready for my Carnegie Hall debut; at least my cat likes it!"
"Let *me* hear how it sounds first."

Internal review of progress

Some groups have knowledgeable CMMI people on staff who can objectively evaluate progress. Other groups use their Quality Assurance staff to check for process use and thereby have visibility into CMMI adoption. These approaches can be very cost-effective when the staff members have a good understanding of the CMMI and are able to speak up regarding sticky issues they find.

The risk of performing internal reviews comes when practices have been misinterpreted and would not hold up to external evaluation. For example, not estimating with historical data at CMMI Level 3, or avoiding the use of supplier selection criteria at Level 2, would be considered unsatisfactory by an appraiser, but might have been overlooked.

Data used to monitor process execution can provide useful insight into CMMI progress, but can also be misleading. For example, auditing a project at the very end might show apparent use of CMMI practices but not show if they were utilized at the right time.

Mini-appraisal

There are a great variety of mini-appraisal and gap analysis activities that can be done. These can range from a few hours to a few days, depending on the size of the organization, the number of projects examined and the level of thoroughness needed. I prefer designing a mini-appraisal to narrow in on precisely the information needed and avoid blanket appraisals.

For example, conducting a mini-appraisal on your best and worst projects can give you insight into how well the practices have been institutionalized, and how far you have come. Mini-appraisals can also point out areas of overkill. These are situations where there is too much process and documentation that is not warranted by either your business situation or by the CMMI. For example, a 10-page process to estimate two-hour jobs, or a 12-page Quality Assurance process that takes longer to perform than the work it is checking.

Mini-appraisals can be performed with and without a Lead Appraiser, depending on your expertise. You should also be able to email your appraiser at anytime and check interpretation issues.

Summary

In the end what you want are opportunities along the way to catch misinterpretations, missing practices, problems with implementation, frustrations with usage, and superficial adoption. As you travel on your CMMI journey, plan for checkpoints to see where you are and what corrective actions might be necessary.

Practical Solutions for your Project Challenges

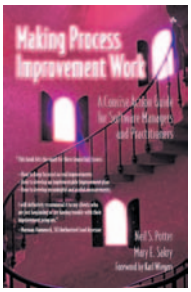
- ❏ **Understand customer needs. Clarify product requirements early.**
  This two-day workshop, IN SEARCH OF EXCELLENT REQUIREMENTS, teaches software engineers, managers, requirements analysts and user representatives how to gather, document, analyze and manage customer requirements for software applications and solutions.
- ❏ **Manage projects effectively. Meet project deadlines and reduce risks.**
  This three-day workshop, PROJECT PLANNING AND MANAGEMENT, teaches project managers and their teams how to meet deadlines through better estimation, reduce surprises using risk management, schedule work for better optimization, understand and negotiate project trade-offs, and track progress.
- ❏ **Meet project deadlines. Scope and estimate the project work.**
  This one-day workshop, PROJECT ESTIMATION, (a subset of Project Planning and Management) helps teams develop more accurate estimates.
- ❏ **Avoid schedule delays caused by needless product rework. Find defects rapidly.**
  This two-day workshop, INSPECTION (PEER REVIEWS), teaches teams to efficiently find defects in code and documentation. (Includes moderator skills.)
- ❏ **Hands-on SEI CMMI. Perform a CMMI gap-analysis.**
  The following workshops are available:
  ❏ SEI CMMI: Overview (half day), LEVEL 2 (one day), LEVEL 3 (two days)
  ❏ SEI INTRODUCTION TO CMMI (three days)
- ❏ **Identify critical changes to improve organizational results. Benchmark against the CMMI.**
  A PROCESS APPRAISAL examines your organization's engineering and management practices and generates a focused list of the critical areas for improvement. Our SEI-authorized Lead Appraisers conduct customized CMMI-based appraisals.
- ❏ **Understand how to save money, produce more and work faster.**
  In this workshop, DOING MORE FOR LESS, engineers and managers analyze their work activities and create a prioritized list of where time and money can be saved. A draft action plan is created.
- ❏ **Clarify and refine business/project measures and analysis.**
  In this one-day workshop, MEASUREMENT AND ANALYSIS, engineers and managers define their objectives, measures and analysis activities.
- ❏ **Systematically evaluate decision alternatives.**
  In this half-day workshop, DECISION ANALYSIS AND RESOLUTION, engineers and managers use a decision process to evaluate alternative choices and make a selection using weighted criteria.
- ❏ **Goal/problem-based improvement.**
  This two-day workshop, MAKING PROCESS IMPROVEMENT WORK, provides a systematic approach for organizations to improve their development capability.
  It includes: getting management support, focusing the organization on the critical issues, planning the improvement and effecting change.
- ❏ **Manage your supplier.**
  This one and one-half-day workshop, SUPPLIER MANAGEMENT, teaches engineers, managers and vendor managers how to define a product to be outsourced, write a supplier management plan, select appropriate vendors and manage the project to completion.
- ❏ **Tailored assistance. Dedicated phone-based assistance.**
  This service consists of customized education and coaching on your specific problems (e.g., meeting deadlines, quality and cultural change.)

*Detailed information on our services is available at **www.processgroup.com**.*
*Contact us at **972-418-9541** or **help@processgroup.com** to discuss your needs.*

Come see our book!

Also available in Chinese and Japanese.
See www.processgroup.com/tpgbook.htm

Here is the book's Table of Contents:



The Process Group

Telephone number: 972-418-9541

Fax number: 972-418-9541

E-mail: help@processgroup.com

Web: www.processgroup.com

POST back issues are online