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COLLABORATION!

Guerilla Techniques

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Biographies

Celeste Yeakley is an organizational leader with more than twenty years of experience in software/systems engineering and process improvement. She is a broad-based team lead and participant, with proven skills that focus teams by applying creative and innovative business planning processes. She's accomplished in business strategy, business planning, team/project management (certificate in Software Project Management), software capability enhancements, and organizational leadership. As an internal assessor, she either participated or led software process evaluations for organizations in the United States, Brazil and Russia. A University of Texas at Austin graduate with a Master's degree in Science & Technology Commercialization, Celeste has collaborated at small start up companies as well as corporate giants such as Dell and Motorola. She has contributed to her profession by serving on the UT Software Quality Institute board from 1993-2003 as well as in community quality assessments. Her passion is for helping people understand how to work together using established frameworks like CMMI and ISO to their best advantage. She encourages lateral thinking and uses every day examples to drive people to understand the big picture and how it fits into their software worlds.

Jeff Fiebrich is a Software Quality Manager for Freescale Semiconductor. He is a member of the American Society for Quality (ASQ) and has received ASQ certification in Quality Auditing and Software Quality Engineering. He is also an RABQSA International Certified Lead Auditor and has achieved CMMI-Dev Intermediate certification. He has previously worked as a Quality Manager for Tracor Aerospace in the Countermeasures Division. A graduate of Texas State University with a degree in Computer Science and Mathematics, he served on the University of Texas, Software Quality Institute subcommittee in 2003 - 2004. He has addressed national and international audiences on topics from software development to process modeling. Jeff has over twenty years of Quality experience as an engineer, project manager, software process improvement leader, and consultant. As both an internal and external consultant, he has played significant roles in helping organizations achieve ISO certification and Software Engineering Institute (SEI) Maturity Levels. He has led numerous process improvement initiatives in many areas of software engineering including project management, employee empowerment, software product engineering, quantitative management, training program management, and group problem solving. Jeff has worked extensively on efforts in the United States, Israel, Europe, India, and Asia.

Celeste and Jeff are the authors of the recently released book, 'Collaborative Process Improvement', Wiley-IEEE Press, 2007.

INTRODUCTION

Today's economic climate makes it more important to work smarter. Dedicated Quality personnel are stretched to the limit, and time constraints force greater emphasis on effective process improvements. Yet Quality and building Quality departments seem to be the lowest priority in many companies. With overwhelming amounts of work to do and no resources—at least any incremental resources—what is the Quality worker to do? The battle cry to “do more with less” has become “work hard, work smart.”

This paper discusses the framework we used for developing Software Quality Engineering (SQE) Advocates on each of its projects using existing personnel. This paper also addresses the use of process Champions to perform activities at the organizational level. We found that by using Advocates and Champions, a Quality department can extend its reach. In fact, engaging non-Quality personnel in process watching can be rewarding not only to the quality of the end product but also to the overall development process.

In order for a Quality manager to be effective, he (or she) must be prepared to:

- Train non-Quality personnel
- Devise pertinent checklists
- Communicate goals effectively
- Manage by influence and
- Analyze and promote process improvements using metrics, evaluations and rewards

A Quality manager must engage the entire organization in process improvements. This can be done with no incremental increases in resources. The result is improved overall quality in both products and processes.

TRAINING NON-QUALITY PERSONNEL

Training non-Quality personnel is easier than it sounds. First you need to realize that you have to instruct members of the organization in the defined process anyway. By recruiting select personnel—those doing the development and supporting services work—you can build a team that understands the mechanisms of change and the need to engage the organization. We call these individuals Champions. Using Champions is discussed in greater detail later in this paper, but basically Champions are the main points of contact in key process areas such as Configuration Management and Requirements Management.

The other group of people we identified as being necessary to designate a specific role were what we called the Advocates. An Advocate is the day-to-day person who lives with projects and forms the very fabric of project teams. This person's duties directly relate to tracking and

reporting on project progress from a process quality perspective. Both the Champions and the Advocates must be trained.

Our help was requested in improving its quality and process improvement activities. We leveraged the required training by engaging the organization early in process definition and by using pilots. This allowed staff to begin to understand the processes they needed in order to be able to perform process assessments in the future.

We recruited individuals from all levels. We looked for persons with seniority and superior technical talent and human relations skills. Those who were on probation, were mediocre performers, or were not respected within the business were not recruited or accepted. Testers, developers, and program managers all entered the arena of Quality at the same level. Although the individuals remained in their current reporting structure in the business, they also reported to the Software Quality Engineer, as shown by the dotted lines in Figure 1.

This dotted-line reporting was acknowledged and accepted by both the business and the Quality department. Our SQE position was staffed with an experienced individual with an engineering degree and 10 years of SQE experience.

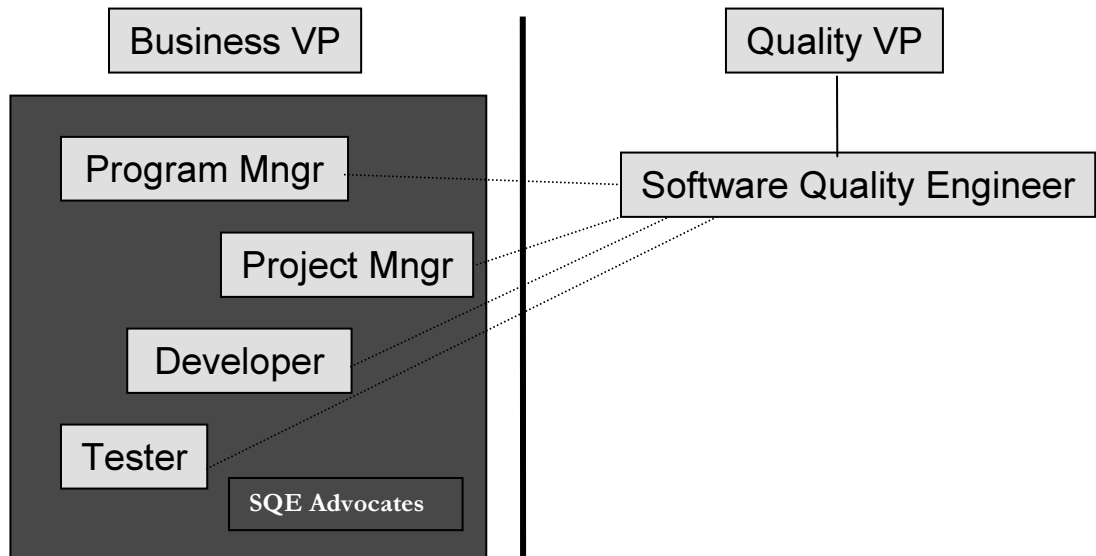


Figure 1. SQE Advocate Reporting Structure

Once the Advocates and Champions were recruited, they had to be trained to perform their new tasks. The 12 to 20 hours of training illustrated in Figure 2 was accomplished over a two month period and largely occurred during luncheons. Although few of them had ever participated in Quality activities, they soon would be performing these tasks.

Not knowing what future industry standards we might be asked to follow, we chose to use the Carnegie Mellon’s Software Engineering Institute (SEI) models. Other development methodologies supported by SEI and ISO were considered when we developed our processes and were mentioned to the group, but we chose to stay focused on the SEI guidelines.

For SQE Advocate training, our first proposal was to subcontract all training to an outside source. We investigated hiring a subcontractor from two local training houses to assist with SEI training classes. The classes would be conducted in person domestically and via net-meeting at all the off-shore sites. This fee would literally double if the classes were to be specific to our group. To train all our Advocates, we required six classes at two domestic locations and at three remote locations: Romania, India, and China.

Fortunately, we discovered that we had the talent in-house to establish our own curriculum and delivered the six classes noted in Figure 2 at each site. The training curriculum for each class was coordinated with and received approval from our company’s university.

Class Title	Audience	Class Length
SQE Advocate Roles & Responsibility	SQE Advocates	2 hours
Performing Assessments	SQE Advocates	2 hours
Software Configuration Management Plan	SQE Advocates	2 hours
Software Quality Assurance Plan	SQE Advocates	2 hours
SEI Overview	All	4 hours
SEI Key Process Areas	SQE Advocates & Champions	8 hours

Figure 2. Training Classes

All class materials and attendance was routed back to Human Resources for historical purposes. This resulted in the curriculum accepted by Human Resources as accredited training for individuals.

In order to ensure that this training effort would be utilized during the next several years, we also investigated hiring a local firm to record the training for future use.

Instead, we developed customized PowerPoint curricula for each site, and the local Champions provided voice-overs. These classes were recorded on CD, and featured our Champions’ names and voices. We also customized the training to include supporting tools and processes. The result was a training program digitally captured for future use.

Once our group of Advocates had been established and technical training had been accomplished, we discovered that their skill set still lacked traits necessary to effectively perform the SQE tasks required:

- Quality background
- Public relations, professionalism, communication skills

- Organizational skills
- Assessment background
- Vision of overall process

QUALITY BACKGROUND

One of the first things that we noticed when working with non-Quality personnel was that they feared they would be seen as the bad guys of the project if they took on a Quality role. Most non-Quality personnel with this background are very hesitant to take on a role of this sort. In fact, in our own organization, the test group had an overly heavy burden of being the initial SQE Advocates.

We mitigated the police problems this way.

- We hosted weekly training and process forums. In order to recruit future SQE Advocates, we had to train all personnel on the basics of the SEI models.
- We educated management. Convincing management that Advocates are management material was one of the first steps we undertook in order to raise awareness of the Advocates' critical role. After a bit of training, management bought in to the idea and realized that Advocate personnel understood the overall process better than most.

PUBLIC RELATIONS, PROFESSIONALISM, COMMUNICATION SKILLS

Of course, it is easy to train on the specifics of a particular methodology and guideline—compared to trying to train behaviors! SQE Advocates' personalities and communication skills are certainly as diverse as those found in the engineering populations with whom they work. Not every person is adept at tactfulness, professionalism, or managing the project team. These are the very skills essential to communicating process issues and getting results.

You can mitigate these gaps with coaching and training. By role playing discussions with Advocates, you can teach them how to communicate both good and bad news. It is important to be able to deliver constructive criticism concerning process adherence. Several good books offer excellent information on communication and accountability. We are currently using *The Oz Principle* by C. Hickman for training.

ORGANIZATIONAL SKILLS

Lack of organizational skills can create more chaos than the process chaos you were trying to avoid in the first place! Signs of organizational issues include not being able to find process assessment information easily, not informing the team of results in a timely manner, and conducting assessments only sporadically.

Particularly valuable organizational helpers are checklists and adding the SQE Advocates activities into your project management schedules.

- By providing appropriate checklists (refer to the Devising Pertinent Checklists section), you make the work easy and help in the organization of information. You don't have to rely on individuals setting up their own reporting scheme.
- By building SQE Advocate activities directly into your project management scheduling tool, both you and the Advocate can track when to do an assessment and what processes need to be assessed.

THE AUDITING MINDSET

Your chosen SQE Advocates might demonstrate more auditing personalities than you really want! Evidence of a problem might be demonstrated by an Advocate writing up projects on non-issues or being dogmatic about your organization's chosen processes. Alternatively, an Advocate can try to be the good cop by forgiving blatant non-compliance. Other symptoms of the lack of an appropriate assessment mindset are that your Advocate is simply lost about what to do. This can be followed by a general reluctance to accept a process role.

We addressed these problems in the following ways.

- We provided extensive checklists and activity description.
- We held monthly SQE Advocate meetings. In this meeting all Advocates joined Quality personnel in a general discussion. This forum provided a free-flowing question and answer session as well as training opportunities.

VISION OF OVERALL PROCESS

By having a cross-functional group of personnel populate your Advocate Program, the vision of the overall process can easily be realized. When personnel from Sales, Marketing, Test, Development, and Program Management sit down at a table and discuss how to perform SQE activities, it quickly becomes evident what the overall objective is. The negative repercussions of omitting certain activities are also quickly and effectively communicated.

DEVISE PERTINENT CHECKLISTS

As soon as you are certain you have the most effective process, someone will find a way to improve it. This continuous improvement is a good thing—although change is usually uncomfortable. Every aspect of ensuring Software Quality is an evolutionary process. Methods to help your group cope with the evolution include the following:

- Using diverse user groups
- Piloting and refining checklists
- Executing continuous process improvements
- Migrating activities into an automated management tool

USING DIVERSE USER GROUPS

The key to the SQE Advocate Program is diversification. To have marketing, engineering, and test conduct a round robin concerning configuration management, is an eye-opening experience. When developers, testers, and managers brainstorm a new process for requirement management, you can feel the electricity in the air. Before the meeting is over, each individual is able to think about the issue in a completely new way. Cross-pollination of ideas is an invigorating experience. We noticed that individuals wanted to continue discussions long after the meeting was over and always arrived fully prepared for the next meeting.

PILOTING AND REFINING CHECKLISTS

Of course, the only way to really validate a new checklist is by applying it to a pilot project. Typically, the pilot project is an effort that is well staffed and on schedule. Picking a project such as this ensures that the checklists are well received and executed.

However, the biggest return on effort is achieved if the new checklists are applied to a problematic project. Use the buy-in of a problematic project to quickly, easily, and constantly display improvements. Project staff will be revitalized when witnessing the improvements on their own efforts.

Transforming a problematic project into a model project is what everyone wants to do. The bottom line is that no one enjoys being part of a losing team.

Checklists are the key to smooth, consistent execution. Having a standardized checklist removed most of the human personality from the assessment equation. While our checklists were initially developed by the Quality group, they were quickly updated by the Advocates. During the first six months of the Advocate Program, each checklist was updated three times on average. Continuous Improvement! Each time a checklist was updated; the update was reviewed and approved by the entire SQE Advocate team.

EXECUTING CONTINUOUS PROCESS IMPROVEMENTS

When questions are raised like *“When will this process be done? How much more work on this process is needed?”* your role, as an Advocate or Champion is to say, *“We will be constantly improving all of our processes.”* At a time when our projects are heavily driven by

milestones and schedules, it is difficult to keep individuals motivated when you never plan for the effort to be finalized.

When establishing and maintaining processes, we have found that the effort is never finalized. Just as we strive to improve our products every day, we must strive to improve the processes that create them every day. We aggressively recruited individuals to participate in the Six Sigma effort. The principles used in this Define Measure Analyze Improve Control (DMAIC) method not only aided SQE Advocates in active, measurable process improvement activities, they also supported SEI measurement activities.

MIGRATING ACTIVITIES INTO AN AUTOMATED TOOL

Coordinating and orchestrating SQE Advocate activities is a full-time job. While spreadsheets can be used to schedule tasks, document compliance, and initiate reports, this is probably the most difficult tool for accomplishing this task. Using a powerful automated program management tool enables you to remove all of the personality from the equation. Assessments and reviews are conducted systematically. SQE activities are standardized for all projects. Progress reports are generated on a daily, weekly, or monthly basis without the project team feeling like a renegade Advocate has figured how to take control away from the team.

COMMUNICATE QUALITY GOALS EFFECTIVELY

In order to communicate quality goals effectively, you must get the correct information disseminated as quickly as possible—and to the right people. The information often moves slowly or not at all between the improvement groups and the guys in the trenches. One effort may not know another effort even exists. Some groups see things changing, but others say, *“These improvement efforts haven’t reached ME.”* This problem was the driving force behind establishing a Software Quality Assurance Plan. Both the SEI and ISO models require supporting the establishment and maintenance of this plan. This document contains the schedule and provides a means of activity coordination. This plan discusses the authority of SQE and the SQE Advocates. To ensure that this is understood by all members of the team, the Program Manager, Project Manager, and Functional Managers are required to review and approve this plan.

Other methods to remedy communication shortfalls—

- Weekly forums
- Project team meetings
- Reporting

WEEKLY FORUMS

Meeting with all members of the Advocate Program on a regular basis is essential. Initially, this should probably be on a weekly basis. It takes several meetings to brief/train the group on the roles and responsibilities; documenting process areas; and performing assessments, surveys,

and reviews. A set day and hour each week helps solidify the stability of the Program. As individuals become more involved with the Advocate Program and its effect on their program, the level of questions and requests for future forum topics will surprise you.

We added a little extra incentive each week by providing homemade hot lunches. This was surprisingly well received. No boxed lunches for us! Many team members confessed that they would not have come if it were not for the lunches. The investment in making these weekly forums enjoyable and fun paid off in process improvement results after only one year.

PROJECT TEAM MEETINGS

One of the Advocate's largest responsibilities is to communicate their activities at their project's team meetings. This meeting is the conduit for flowing information from the Advocate to the project. Advocates typically discussed upcoming assessments and reviews and also highlighted any accomplishments. Team meetings are also the most effective forum for briefing the project about its non-compliance with their processes goals.

REPORTING

The Advocate should communicate good and bad news to the project at weekly project meetings. If there is an issue that cannot be resolved with project personnel, the Advocate may discuss the item with the Quality Manager. It is important that the SQE Advocate be empowered by Executive Management to stop a project that is in non-compliance. For this reason, it is better to share Advocates. In other words, an Advocate would ideally be assigned to report on a project to which he or she does not directly report. In the case of two or more projects, the projects would trade an Advocate's time on an independent project. In this way the Advocate can be spared the fear of a backlash from his or her own manager for reporting process non-compliance.

MANAGING BY INFLUENCE

The Quality Manager must put on his or her best consultant hat and step out of the limelight to encourage a non-Quality person to step up and be an example for the group. As Malcolm Gladwell points out in the book *Tipping Point*, you need to recruit a thought leader—someone who is known and respected among the non-Quality community to help speak those Quality words for you and manage by influence. If you cannot locate someone within the project group who is willing to dedicate time to this effort, a new independent-eye may be recruited from outside the project group. But, without question, it is essential to have someone well known and highly respected play this important influential role and lead this activity

Managing by influence involves the following.

- Using Champions

- Engaging upper management
- Ensuring annual goal commitments
- Obtaining executive team participation

USING CHAMPIONS

Having a Champion for SQE activities is an absolute for communication. This person is responsible for recruiting more members to the Advocate Program and for their training. Curriculum should be documented, briefed, evaluated, and improved on an annual basis. Members should be recruited year round. Having a Champion as the point of contact for all activities is even more helpful. The Champion is often the liaison between the Advocates and management. The Champion is also the key source for problem resolution.

The Champion often helps to define new and improved processes that are quickly adopted. Champions for each key process area are also responsible for process documentation, improvement, and training.

During the first 12 months of the Advocate Program, we saw the enrollment increase from 3 to 30, as shown in Figure 3. That is a 1000 percent increase in participation. This growth was directly attributed to the communicated importance from upper management and the positive project impacts of the program that were the subject of many Operational Review meetings.

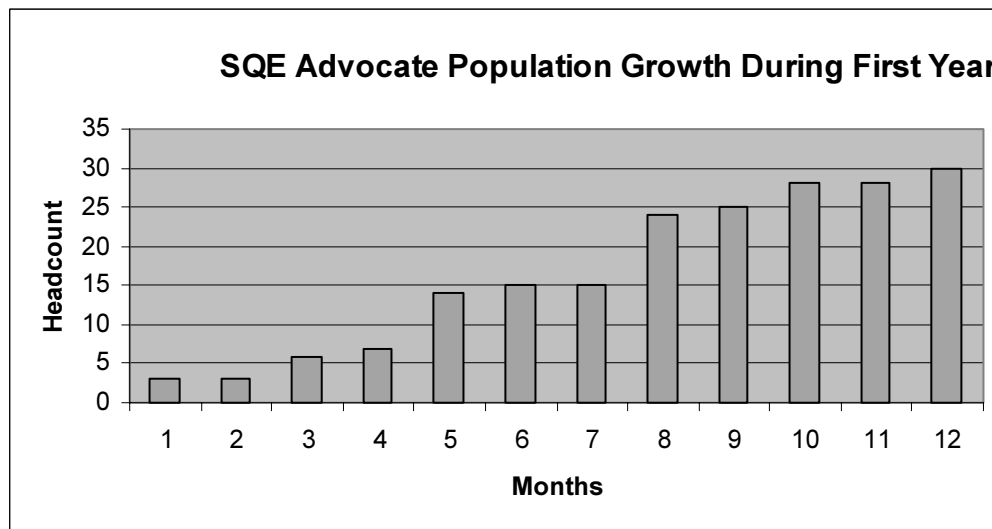


Figure 3. SQE Advocate Population Growth

ENGAGING UPPER MANAGEMENT

The Advocates and Champions must engage upper management. We strongly recommend that Advocates and Champions initiate this action. Upper management has many responsibilities; Advocate and Champion interfaces are one of many that they must address. When communicating improvement plans to members of upper management, management will

likely voice their support and then assume that during the next months, the plan is successfully executed. It is up to the Advocates and Champions to go back to upper management regularly and report the status. Upper management should be briefed on successes as well as setbacks. If not approached again, management may believe that all is well and successful.

One key tip for the Quality Manager: never assume that upper management Gets It just because you've explained it to them. Advocates and Champions should plan on monthly status updates and formal reports.

ENSURING ANNUAL GOAL COMMITMENTS

By using a vehicle such as a Balanced Scorecard to communicate annual goals, you can ensure that testers, engineers, and managers are aware and supportive of the Advocate effort. It is wise to make the goals of the Advocate program as visible as the engineering goals. The rewards associated with engineering goals should map to the rewards associated with Advocate goals. It should be communicated that the achievement of Advocate goals are essential to the success of the company.

OBTAINING EXECUTIVE TEAM PARTICIPATION

Having executive team members participate in activities is essential—even if executive team members only attend team briefings. Having the executive team meet with the Advocates and repeatedly reassure the Advocate that they are empowered to stop the project if the project is found to be non-compliant is important to the success of this effort. It is also important for Advocates and Champions to attend the Upper Level Management Briefings on at least a monthly basis.

Making Advocates and Champions visible in the executive environment is as important as having executives visible in the Advocate environment. Better yet, if you have the ability to fast track an Advocate or Champion to more responsibility, their peers will take notice, and this will cause individuals to actively pursue one of those positions as it will be seen as highly regarded by management and a way to career success.

ESTABLISHING MEANINGFUL METRICS, EVALUATIONS, AND REWARDS

Because our effort revolved around the SEI guidelines, we measured our progress according to that scale. We set up SEI assessment polls on our internal web site and posted green/yellow/red status charts, as shown in Figure 4. The entire population could view these results. Before we knew it, projects were vying for the top spot. We measured compliance by percentage and tallied the results. Many organizations share this information only with the team. We found that the culture thrived on competition. First, they were excited to get all green. Then

they competed to have the highest percentage for compliance. It added a lot of fun to the metrics experience to announce weekly status.

	REQ	PP	PMC	SUB	QA	CM	
Project A	Y	G	G	G	Y	Y	83%
Project B	Y	G	G	R	R	Y	70%
Project C	Y	G	G	G	R	Y	76%
Project D	Y	Y	Y	Y	R	R	68%

Figure 4. Stoplight Chart (Red, Green, Yellow)

Evaluations were key to getting every person’s attention. Because of our need to keep management informed and because we had specific and measurable goals to obtain, it was relatively easy to get all supervisors to add process improvement activities to yearly goals. People who were active in the process improvements efforts were rewarded for their alignment with and support of the group’s goals. In addition, it was obvious that teams that engaged in Quality activities performed better. Comparisons of project team performance revealed that teams that had an active SQE Advocate performed better by delivering better products closer to the time they said they’d deliver them.

Each SQE Advocate was engaged in giving constant feedback to the team by reporting on compliance to specific activities. Teams could benchmark themselves against others as well as compare their own performance to that in the months prior to the improvements.

We used intrinsic and extrinsic rewards and recognition throughout the year. Intrinsic rewards and recognition included public recognition, trophies, plaques, certificates, special parking spaces, pictures on bulletin boards, and names on a list. Extrinsic rewards and recognition included cash, vacation time, bonuses, and major gifts. When initially planning the types of rewards for the Advocates and Champions, 80 percent of the Advocates said they would prefer extrinsic rewards: *“Money is what pays my bills!”* Much to our surprise, as illustrated in Figure 5, twelve months after program initiation, simply receiving a certificate during a staff meeting was everyone’s desire. As a matter of fact, at least once a week, we had individuals approach us and state *“I do not care about a cash bonus; “I want to know what I have to do to have the Director discuss my accomplishments for 10 minutes at the next Operations meeting.”* And of course, this reward cost the business nothing.

Team rewards, which are intrinsic or extrinsic items given to the team, should be the same for all members of the team.

The ultimate reason that rewards and recognition are given is to provide positive reinforcement for correct behavior, with the expectation that the correct behavior will be repeated in the future. Rewards and recognition are best received when they are personal to the individual receiving them.

Management recognition of an individual who has successfully completed an objective can be very positive and can encourage other individuals to strive for excellence.

Reward Preference	Program Initiation	One year later
Extrinsic Reward Cash, stock, gift certificates, movie tickets	80%	5%
Intrinsic Reward Certificates, pins, plaques, t-shirts	20%	95%

Figure 5. Extrinsic vs. Intrinsic Rewards

Probably one of the best rewards is “*Thank you*” when it is sincerely meant. Employees who are aware that their efforts are appreciated are often willing to do more than if they were to receive a large financial reward.

DIVISION OF WORKLOAD

At the initiation of the Advocate program, the first question asked by all parties involved was “*How much of my time will this require?*” Initially, we had no idea, but we stated a target of 10 to 20 percent. A year into the program, we totaled the hours being spent by the Advocates. At first glance, it appeared that 40 percent of the individual’s time was being spent away from his normal tasks. This was alarming. After a deeper dive into the data, we determined that the Advocates were spending 60 percent of their time doing engineering and 20 percent of their time performing code and documentation review for which they were responsible anyway. Only 20 percent of their time was being spent specifically on Advocate activities—Configuration Management, Quality Assurance, and process assessments—as shown in Figure 6.

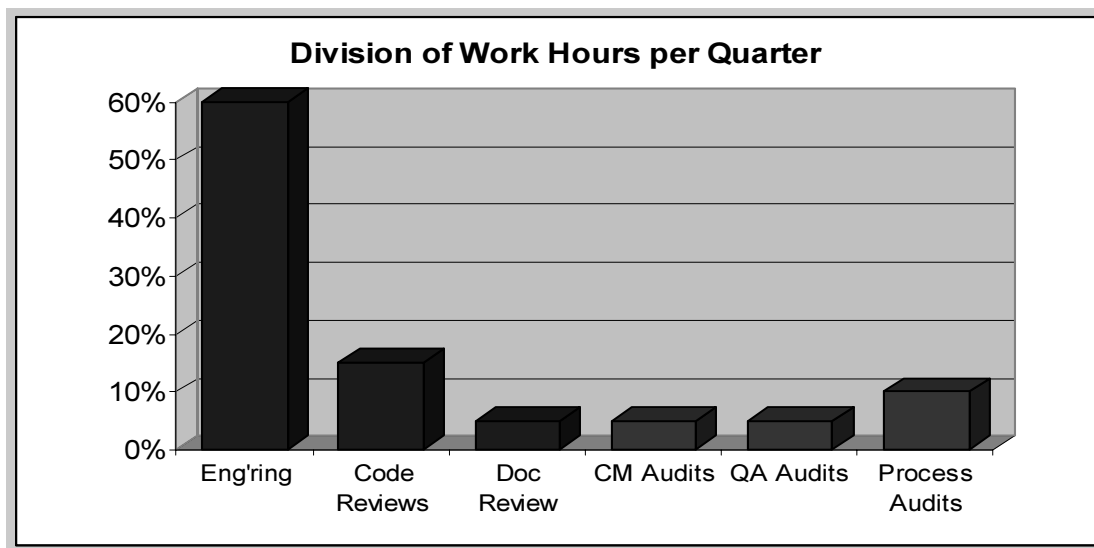


Figure 6. Division of Work Hours per Quarter

CONCLUSIONS

Quality processes seem to pay off in quality products. What organizations miss sometimes is something that Ford Motor Company (and others) discovered long ago; “Quality is Job 1”. It should be woven into all activities of any company but particularly in a software company because there are many ways that software can fail. It can fail during requirements, design, implementation, and test—literally *anywhere* in its lifecycle—but most of all, it can fail with the customer. It just makes sense to insert Quality processes in along the way when building software. An important part of this Quality approach should be in training the organization—the whole organization—about what quality is for your products. Relying solely on an organizational Quality group for overall quality is difficult and can fail if you do not engage the individuals creating the product in the process. Quality should be the thread by which the fabric of software is built. In order to accomplish this, you need to engage people actively in all stages.

In this way, you weave quality in rather than coating the threads after the fabric is woven. That makes quality easier to attain and sustain. If you are fortunate enough to have a Quality group, this approach will only serve to strengthen it.

We found that engaging everyone in the organization in Quality work resulted in quality results. By training the entire organization and enlisting our techniques, we were able to not only do more with less but work harder and smarter. The payoff was in the bottom-line benefit to the company.

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