A Process for Measuring the Quality of Software Consulting

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Abstract

This paper describes an innovative, copyrighted process implemented for measuring quality for situations where software project work is done by consultants hired through an agency. The program was conceived by George Birdsong, III, founder of Systems Partners[1]. The process has been implemented over the last three years and is used by clients and consultants of Systems Partners. This paper provides a brief history of the quality program, the main elements and mechanisms in the process, and a description of some of the results obtained and lessons learned.

Keywords and Phrases: measurement of quality, critical success factors, software quality in consulting projects.

Background

A lot has been done and written about measurement of software quality over the last twenty-five years. Recent emphasis has been on defining, managing, measuring, and improving the process of creating the software. These processes focus on the product and the methods for its creation, leaving out the human element that is fundamental to all projects. Interpersonal communication is paramount in a consulting relationship, and it is this human element that is the focal point for the measurement process for tracking the quality of work. This interesting departure from the historic approach has substantial advantages and has been effective in maintaining excellence in client-consultant relationships and the end products.

The avoidance of measuring the human factors may be due to the separate personnel policies in most companies governing measurement and feedback of employee performance. The implementation and effectiveness of personnel policies vary from company to company, and even department to

[1] Systems Partners, a member of the National Association of Computer Consultant Businesses (NACCB), was headquartered in Orinda, California. Founded in 1990, they placed hundreds of data processing and software engineering consultants at an extensive list of Fortune 500 clients. Systems Partners developed this copyrighted program to measure and improve the quality of their contracting services.

department within most large companies. Consultant services are becoming widely used in the software arena, yet the policies and procedures are almost never applied to consultants. Although software development is really a human undertaking, it has been argued that assessment of personal performance is best left to human resources, and not included in the realm of quality assurance at all. Therefore, measuring performance has been avoided by quality groups, and the performance is often not measured at all. This applies especially in instances where the person performing the work is not directly an employee.

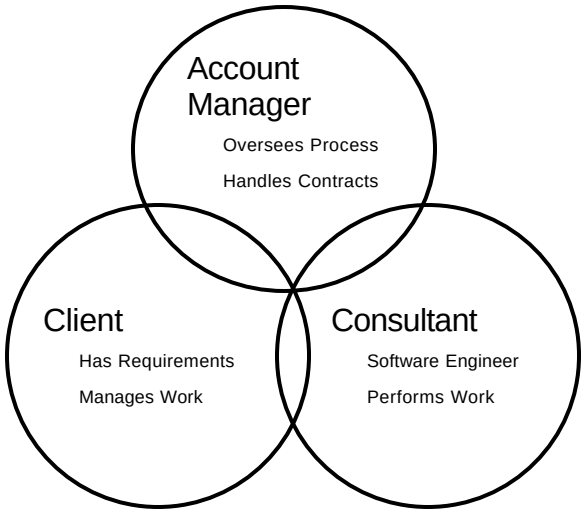
The Systems Partners Quality Program

The benefits desired from the System Partner's quality program are to increase the consultant's effectiveness, improve communication, identify priorities, reduce ambiguity, and monitor consultant performance. The program also provides a framework for improvement in future contracts, both with the client and the consultant. The program has five main goals. The first is project success, to assure that the client ultimately gets what they need. Second, is to describe what good quality will look like to the client. The third is to actually measure the quality provided. Fourth, the process records the history of the relationships with the client and the consultant. The fifth goal is to provide a mechanism to reward good work by the consultants, as measured by the program.

Brainstorming sessions with clients and consultants experienced in the staffing and managing of software quality assurance contracts was used in the early stages of designing the quality program. The plan was to create a program that could measure quality results in consulting without stifling innovation. Some of the participants were skeptical and thought measurement of consultants was unnecessary, inconsistent, or even detrimental. Others thought it was an excellent idea, but that setting and measuring consultant performance was beyond the state of the art in software quality assurance.

Early Testing of the Program

Five large companies in the San Francisco Bay Area were selected for the initial use of the procedures, and after revising the program, a Beta test was run with a local Fortune 10 company. Although the program was extremely successful through early use and Beta Test, Systems Partners felt that additional outside expertise would facilitate fine tuning and polishing the processes. They brought in a software quality consultant to formalize and document the procedures. The end result was a process with simple procedures that effectively measures and monitors the quality of services provided.



Relationship Between Participants

The program itself focuses on two key individuals: the client and the consultant. The procedures are simple so they can be used by clients and consultants without training or further preparation. The focus is to identify priorities and expectations, then measure progress based on the identified criteria. Continuous communication and feedback to all parties closes the loops and monitors the quality of services provided.

How The Quality Program Works

The quality program goes through three main phases for each consultant/client relationship: initial planning, project administration, and final reviews. The quality measures are incorporated into a customized time sheet for each consultant/client relationship.

Planning Phase

During the planning phase, information is documented as part of the contract itself and the quality program is used as the mechanism for setting the project expectations. In this phase the focus is on identifying the deliverable work products and important factors that the client desires. The account manager and client work together to identify the major success factors for the job. Although the process only takes 30 to 60 minutes to explain and work through, it provides the critical foundation for success of the project. Understanding and articulating the requirements, priorities, and expectations is key to success in any working relationship. The granularity of the tasks and outcomes is fine enough that interim milestones are often identified.

Results from the initial planning include a list of important elements to be monitored and measured, and methods for measuring and identifying good quality for each. The client is asked to think of three to five key items that are critical to the success of this particular project. The clients actually choose anywhere from three to a dozen success factors. Items range from "Meets specific milestones" to "Communicates Effectively" to "Presents a professional image." A checklist is provided with two dozen suggested items in eight categories, but clients are encouraged to create any other items that are important to the specific project. By focusing on only a few elements, the really critical success factors can be identified and articulated. Even subjective items are allowed, as the client is asked to identify how each will be measured. This allows clear communication of expectations and priorities dealing with how the jobs are to be done.

Once the client and account manager have identified the deliverable work products and critical success factors, the consultant can be selected. The account manager reviews the information with the consultant and gains agreement before project work begins. This clear communication of expectations and deliverables results in a very high degree of focus and success in the work.

Ongoing Rating and Review

Once the work is underway, the program is administered by the account manager and monitored on a continual basis. The time sheet is customized for each consultant and project to list the success factors and provide space for the client to rate the performance during the accounting period (usually twice a month). When the client fills out the time sheet for the consultant each period, a rating is given on each of the identified measures. Both the consultant and client are presented with graphs of the ratings on the project so they can evaluate how well the project is progressing. Since the

process is automated and built on top of already existing contacts and procedures, very little additional effort is needed to gain the advantages from measuring the critical success factors.

The rating is done on a scale of 1 to 4, with 4 being 'Excellent,' 3 being 'Above Average,' 2 being 'Satisfactory,' and 1 meaning 'Needs Improvement.' The ratings can be changed as the project unfolds, so N/A is used to indicate when the criteria is not applicable.

The time sheet information is processed for both the billing and the quality ratings. This provides timely feedback on performance, and communicates exceptions to the parties involved. When ratings drop too low, the account manager takes immediate action to ensure that all parties are aware of the situation. When corrective actions are required, very little time has been allowed to pass so extra effort to get back on track is minimal. This also identifies problems early so contingencies can be put in place when required.

The Final Project Report Card

The final phase is triggered upon completion of the project. All three parties involved with the contract fill out evaluations of the project results, measuring the quality of the relationships as well as the delivered products. This information is combined with the quality measures taken throughout the project to produce a final summary "report card" that is presented to the client and consultant, and becomes a permanent record kept by Systems Partners to evaluate the quality of the work performed and to improve the chance of success for future contracts.

Benefits From The Quality Program

Since the program started in early 1993, hundreds of people have participated and benefited by using it. By using the program as a framework for open communication, the objectives and priorities for each project have been clarified. The account managers have been able to consistently identify the client needs and match consultants' abilities to best satisfy them. This has both simplified the job and increased the success in matching people to tasks. It has made clients think seriously about the work products they desire from the consultant and the critical success factors in accomplishing the tasks. It has also made consultants aware of what's important to the clients so they can concentrate on doing the right things in the expected manner. Timely feedback on performance has allowed early detection and correction of problems, so Systems Partners has effectively eliminated major difficulties in the consulting relationships.

Clients have benefited by getting well qualified and knowledgeable consultants for the projects. They also are assured of having consultants who understand the job requirements and are able to focus quickly on the creation of deliverable products. The consultants understand the milestones and are more effective, thus saving time and money for the client. The administration of the time sheets and quality elements is simple for the clients, and the addition of the quality program does not significantly increase administrative time requirements.

The consultants have benefited as well. Their understanding of precise expectations and work products has made them more effective and efficient in their work. They get special recognition for the achievement of goals and a bonus program as well. Rather than using purely financial incentives for bonuses, Systems Partners provides specialized courses for the consultants. These classes are in particular

technical and managerial subjects of interest to the consultants.

A major benefit has come from the increased clarity of assignments. The clients and consultants have both benefited tremendously from the program in this way. This has cut rework and wasted efforts, and improved the quality of the end products. The amount of time spent in understanding the client requirements has not noticeably increased, but the quality and consistency of the communication have improved markedly.

Some Lessons From The Quality Program

A sample of 26 consultant's ratings over a period of months was analyzed to see how well the program was working, and examine some of the assumptions. The information was tabularized and some operational and statistical questions were answered. Some of the lessons learned and discoveries made are presented here.

Maximum Number of Measures

Although the clients were asked to identify three to five criteria, many of them selected more than that. One thing the data showed was that the number of criteria selected and tracked makes a difference in how well they are used. The ratings were consistently recorded when 7 items or fewer were tracked. In each situation where more than 7 criteria were identified, not all of them were tracked. This seems to indicate that a maximum of seven criteria can be reasonably rated at one time.

Corrective Action

A close evaluation of the ratings also showed one consultant with consistently declining scores. The management process was working, and corrective action was being taken as the sample period came to an end. Other declines in scores were from Excellent to Above Average — still an acceptable level of performance. The Needs Improvement rating was never selected to indicate performance, showing that all consultant performance was at least Satisfactory.

The two cases to date where there has been a significant decline in a consultant's scores have demonstrated the positive power of quick feedback. In one case the consultant was encountering personal problems outside of work that were worked out and performance returned to normal levels. In the other case, early detection of possible problems allowed easy rescheduling and reallocation of resources to overcome the difficulties. Other instances of **Satisfactory** scores were temporary situations, or cases where the manager used the rating to really mean that the performance was perfectly acceptable.

Improved Ratings

Further evaluation of the data rating the consultants shows that performance generally improved over the sample period. Of the 138 items rated, 33 showed improvement, 91 were unchanged, and 14 declined. The ratings were more than twice as likely to go up as down, and more than six times as likely to be unchanged. The data has a X^2 (Chi Squared) value of 70, with 2 degrees of freedom, leading to the conclusion that the improved ratings are not due to chance (with a 0.1% confidence).

We also found that 38% of the consultants showed improvement in their ratings during the sampled periods, 35% were unchanged, 19% showed declines in scores, and 8% showed mixed improvements and declines. Twice as many consultants showed improvements in scores over declines. The data has a X^2 value

of 23.76, with 3 degrees of freedom, leading again to the conclusion that the improved ratings are not due to chance (with a 0.1% confidence).

Summary

In summary, clients are taking advantage of an innovative program to expose and measure success criteria in software quality consulting relationships. This program is straightforward and automated, integrated into normal business relationships and administrative work needed for the client/consultant relationship. The program has also demonstrated performance improvements by the consultants during the course of their work.

Biographical: Douglas Hoffman is an independent consultant with Software Quality Methods and Adjunct Instructor with the University of San Francisco. He has been in the software engineering and quality assurance fields for over 21 years and now specializes in identifying the appropriate development processes and tools for software quality based upon specific organizational requirements. Currently, he is Chairman of the Santa Clara Valley Software Quality Association (SSQA), a Task Group of the American Society for Quality Control (ASQC), and Program Chairman for the First International Software Quality Congress scheduled for May 1995 in San Francisco. He was the Program Chairman for the Third International Conference for Software Quality in October 1993, and speaker on software quality at numerous conferences over the past twenty-two years. He is also active in the local section of the ASQC and the ISO 9000 Task Group. He received his MBA from Santa Clara University, and his MS in Electrical Engineering and BA in Computer Science from UC Santa Barbara.