Improving Agile Using Total Quality Management

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Abstract—This paper discusses about the needs of TQM for improving quality in agile process. Here, it briefly explains the TQM assurance compliments well in agile methodology. TQM is based on the participation of all members of an organization to improving processes, products, services, and the culture they work in whereas in Agile development requires empirical process control that relies on continuous inspection and adaptation of the process used.

Keywords—Total quality management, Agile methodology, continuous process improvement, statistical process control, software development processes.

I. INTRODUCTION

Total quality is a description of the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. Total quality management can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization. Many of these concepts are present in modern QMS, the successor to TQM. A major thrust of TQM is continual process improvement. Continual improvement drives an organization to be both analytical and creative in finding ways to become more competitive and more effective at meeting stakeholder expectations. TQM requires that an organization continually collect and analyze data in order to improve decision making accuracy, achieve consensus, and allow prediction based on past history.

II. AGILE APPROACH

Agile Project Management is one of the revolutionary methods introduced for the practice of project management. This is one of the latest project management strategies that are mainly applied to project management practice in software development. Therefore, it is best to relate agile project management to the software development process when understanding it.

From the inception of software development as a business, there have been a number of processes following, such as the waterfall model. With the advancement of software development, technologies and business requirements, the traditional models are not robust enough to cater the demands.

Therefore, more flexible software development models were required in order to address the agility of the requirements. As a result of this, the information technology community developed agile software development models.

'Agile' is an umbrella term used for identifying various models used for agile development, such as Scrum. Since agile development model is different from conventional models, agile project management is a specialized area in project management.

The Agile Process
It is required for one to have a good understanding of the agile development process in order to understand agile project management.

There are many differences in agile development model when compared to traditional models:

- The agile model emphasizes on the fact that entire team should be a tightly integrated unit. This includes the developers, quality assurance, project management, and the customer.
- Frequent communication is one of the key factors that makes this integration possible. Therefore, daily meetings are held in order to determine the day's work and dependencies.
- Deliveries are short-term. Usually a delivery cycle ranges from one week to four weeks. These are commonly known as sprints.

Agile project teams follow open communication techniques and tools which enable the team members (including the customer) to express their views and feedback openly and quickly. These comments are then taken into consideration when shaping the requirements and implementation of the software.

### III. TQM

**Total Quality Management (TQM)** is a popular customer-based methodology of quality control and improvement derived from Japanese industry since the 1950’s. It offers a unique approach for managing quality of a product or process while looking to customers as the major source of quality definition. In other words, TQM principles are based on customer requirements and standards to establish a continuous and dynamic process for product improvement. The methodology lets create an effective working environment where every person strives to consistently improve the product or process. Because TQM is a *customer-oriented methodology* it requires every project team member to be completely involved in the improvement process. Every employee should focus on improvements while trying to enhance their personal productivity.

The word "total" means the total of everything in an organization. That is, it covers every process, every job, every resource, every output, every person, every time and every place. According to the American Society for Quality Control (ASQC), total quality management (TQM) "is a management approach to long-term success through customer satisfaction. TQM is based on the participation of all members of an organization to improving processes, products, services, and the culture they work..."
in. TQM benefits all organization members and society. The methods for implementing this approach are found in the teachings of such quality leaders as Philip B. Crosby, W. Edwards Deming, Armand V. Feigenbaum, Kaoru Ishikawa, and J.M. Juran." [Bemowski, 1992]

The Department of Defense also provides a concise and accurate definition as below TQM is the application of quantitative methods and human resources to improve the material and services supplied to an organization, and the degree to which the needs of the customers are met, now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement.” [Department of Defense, 1991]

Principles and Key Components

Total Quality Management contains its own system of productivity tools. The first three principles of TQM are as follows:

- It requires everyone in the company to be completely involved and it covers all company activities.
- It requires that the standards are set by customers, and that all practices conform to those requirements.
- It requires that quality is monitored and controlled for optimum results.

There are ten steps to total quality management. These ten steps are:

1. New strategic thinking must be pursued. A great way to do this is to use brainstorming tools to come up with solutions to perceived problems.
2. Know your customers - you must research their needs. Create a survey, gather the data, and determine who your customers are.
3. Quality requirements will be set by your customers' requirements for quality.
4. Prevention is key - correction costs too much money. By preventing quality problems in the future, the quality improvement process is more streamlined and less costly.
5. Reduce waste and sources of waste - this step is held in common with principles of six sigma. Waste is anything that does not contribute to the immediate needs of the project.
6. The improvement strategy that your company pursues should be continuous. It would not make sense to start a quality improvement project only to quit after small successes.
7. Improve processes through use of a structured methodology. By following a structure, you can minimize time figuring out how to improve processes or when to improve processes.
8. Reduce any variation in your products or services.
9. Balance your approach - make sure that one sector isn't receiving more attention than others.
10. Apply the quality improvement process to all functions.

The process improvement sequence, known as PDCA (Plan-Do-Check-Action):

- **Plan** - Planning a change in your company's processes involves three steps: First you must define the problem, and then you must identify possible causes for the problem. Finally, you should evaluate possible causes through performing cause/effect analyses of the different problems that may arise.
- **Do** - In this step, you implement the identified change.
- **Check** - Gather data on the observed effects of the change. Determine what worked in the implementation process and what didn't work.
- **Action** - Ensure that the improvement is implemented in the process for the future.
Applying TQM Strategies

Total Quality Management lends itself well as a project management methodology. This process improvement strategy can help you to increase productivity and it benefits the quality of the products you offer customers and clients. The PDCA process lends itself well to project management methodology. By combining PDCA, the likelihood of quality improvement success goes up. Finally, by creating a charter schedule, milestones, etc. for the TQM improvements being implemented, project managers can ensure that common project mistakes are thwarted.

Using TQM for Agile Methodology

Agile development, in its simplest form, offers a lightweight framework for helping teams, given a constantly evolving functional and technical landscape, maintain a focus on the rapid delivery of business value. Agile development accelerates the delivery of initial business value, and through a process of continuous planning and feedback, is able to ensure that value is continuing to be maximized throughout the development process. As a result of this iterative planning and feedback loop, teams are able to continuously align the delivered software with desired business needs, easily adapting to changing requirements throughout the process. By measuring and evaluating status based on the undeniable truth of working, testing software, much more accurate visibility into the actual progress of projects is available. Finally, as a result of following an agile process, at the conclusion of a project is a software system that much better addresses to the business and customer needs.

But continuous iteration in project can affect the functionalities of existing operations hence forth tqm will assure the quality in agile. TQM is an integrated organizational effort designed to improve quality at every level. It involves the use of multi-functional teams to identify, analyze, and solve problems, and place special emphasis on defining quality based on how the customer perceives quality. TQM is more a philosophy than a specific method, and incorporates in its fold, various quality measurement, control, and improvement tools. The quality teams for instance remain competent in:

- Histograms for understanding the variation appearing in the project through continue improvement.
- Scatter charts that make explicit the relationships between factors
- Pareto analysis to identify the major problems in the project.
- Ishikawas diagrams to find a root cause and identify the underlying issues.
- Seven run rule control charts that guide the variations to control.

Other methods such as Control Charts, PDCA and Juran’s Trilogy also find its way into TQM. The quality team decides on the application of the tool best suited for the specific purpose.

IV. CONCLUSION

TQM approaches the task easily while developing the software using agile approaches. The development team, the sponsor, and management, can analyze at each point in time how far the development project is from meeting business requirements. The customer ultimately determines the level of quality. No matter what an organization does to foster quality improvement training employees, integrating quality into the design process, upgrading computers or software, or buying new measuring tools the customer determines whether the efforts were worthwhile. Agile approach will be technically enhanced by using the TQM approach hereby; it provides good quality software projects.
REFERENCES


