KPA
Insights through analytics

The Israel ESPINODE

Software Process Improvement Series

Part IV

Organizing for Quality Management[1]

In organizing for quality management, it is essential that the structure be organized to focus on the fundamental purpose of quality management: achieving continuous process improvement. Quality, as practiced by most software organizations, is focused on problem correction. Problem correction, while essential, only serves to remove the defects that have been embedded in the product as a consequence of the production and/or development process. When properly organized for quality management, the focus is on problem prevention. Problem prevention, on the other hand, serves to improve the quality of the product and improve the competitive position of the organization.

Problem prevention has two aspects: (1) Preventing **recurrence** of existing problems, and (2) preventing **introduction** of new problems. In other words, problem prevention results in quality improvement. Quality improvement can be considered to be of two types: **reactive** (driven by problems) and **proactive** (driven by the desire to improve quality). Reactive quality improvement is the process of understanding a specific quality defect, fixing the product, and identifying and eliminating the root cause to prevent recurrence. Proactive quality improvement is the continual cycle of identifying opportunities and implementing changes throughout the product realization process which result in fundamental improvements in the level of product quality. It is a continual process.

Quality improvement necessitates some organizational structural changes. The first is the implementation of a **Quality Council**. Other names used for such forums are Continuous Improvement Committee, Quality Board, and Quality Management Forum. Sometimes, the role of the Quality Council is split between management and the lower level performing organizations. In these cases, management may assume the role of a steering committee, whereas the performer level may be responsible for overseeing the details of the process improvement activities. Specifically, in software development and maintenance organizations, it is common to find Software

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[1] Adapted from the book by Kenett and Baker: **SOFTWARE PROCESS QUALITY: Management and control**, M. Dekker Inc., 1999

Engineering Process Groups (SEPGs) or Software Engineering Committees which operate in this capacity of Quality Councils. The management steering committee may set process improvement goals, provide budgets and other resources, and be the final approval authority for the proposed process improvement projects, and the SEPG or Software Engineering Committee will act as the administrative arm of process improvement.

To facilitate the accomplishment of these responsibilities, an additional organizational entity must exist: the **Quality Improvement Teams** (QIT). These are ad hoc teams that are commissioned by and are responsible to the Quality Council to implement specific process improvement projects. The improvement process itself transitions through several steps. They are as follows:

- Problem recognition
- Project selection
- Diagnosis
- Preparing the people
- Implementing the solution
- Maintaining the improvement

The selection of an improvement project begins with an informal analysis or a structured assessment, which determines the current status of the state of practice within the organization. The results of the analysis, or assessment, are a set of findings, which characterize the strengths and weaknesses of the processes currently operating in the organization. The weaknesses suggest the need for improvement. As a consequence, there is usually a need to nominate improvement projects. The action planning which results from the assessment establishes priorities for process improvement and for the selection of improvement projects. Those which are initiated first should be those which are likely to have a high return on investment (ROI). Various analytical methods can be used in conjunction with the planning process. These methods can include, for example, Pareto analyses, Process Mappings, Impact Analysis, etc. Pareto analyses may be based on potential reduction in Cost of Quality (COQ) or simple ROI. Other factors which enter into the picture with regard to prioritization may include ease of implementation or urgency to implement a change (e.g., sudden drop in quality, increased cost of production or customer mandated requests.).

Having selected and prioritized a set of improvement projects, it is then necessary to secure management approval. This involves preparing project descriptions and providing cost/benefit estimates for each proposed project. A quality improvement team should be identified for each proposed project, as well. To ensure that the quality improvement effort will succeed, it is necessary to obtain the commitment of management to provide the needed resources, including the commitment of time for the personnel having the required skills and capabilities to implement the project. Accordingly, the project descriptions will identify members and assignments for the implementation team.

Once the process improvement project begins, the existing process to be improved needs to be studied in detail. This may include developing models of the process and forming theories

about the causes of the problems observed. Theory development may utilize techniques such as brainstorming, cause and effect diagrams, and force field analyses. The most promising theories should then be selected and tested. This can be accomplished utilizing Pareto analyses, conducting experiments, and collecting and analyzing new data The intent is identify the root causes of the process problems and propose solutions. When the process improvement projects were identified, first cut solutions for the problems were proposed. This effort results in a refinement of the proposed solution -- one that is based on detailed data.

Implementing change is not done easily. People in an organization may often talk about the need for change, but often, the changes they would like to see are changes that "other people need to make." In order to implement change effectively, it is essential to be cognizant of the people aspect -- cognizant of the fact that changes are likely to cause disruption: disruption in how people perceive things, and how they behave. Energy levels vary over time as organizations move to achieve acceptance after a challenge to the status quo has been initiated. A striking analogy to how organizations react to change can be derived from a model developed by Dr. Kubler-Ross [*On Death and Dying*, New York: Macmillan Co., 1969], which describes how people with fatal illnesses prepare themselves for death. The model is pictured below. Many organizations will recognize specific examples of how they faced the challenge: going through the stages of denial, anger, bargaining, depression and finally acceptance of the much needed change.

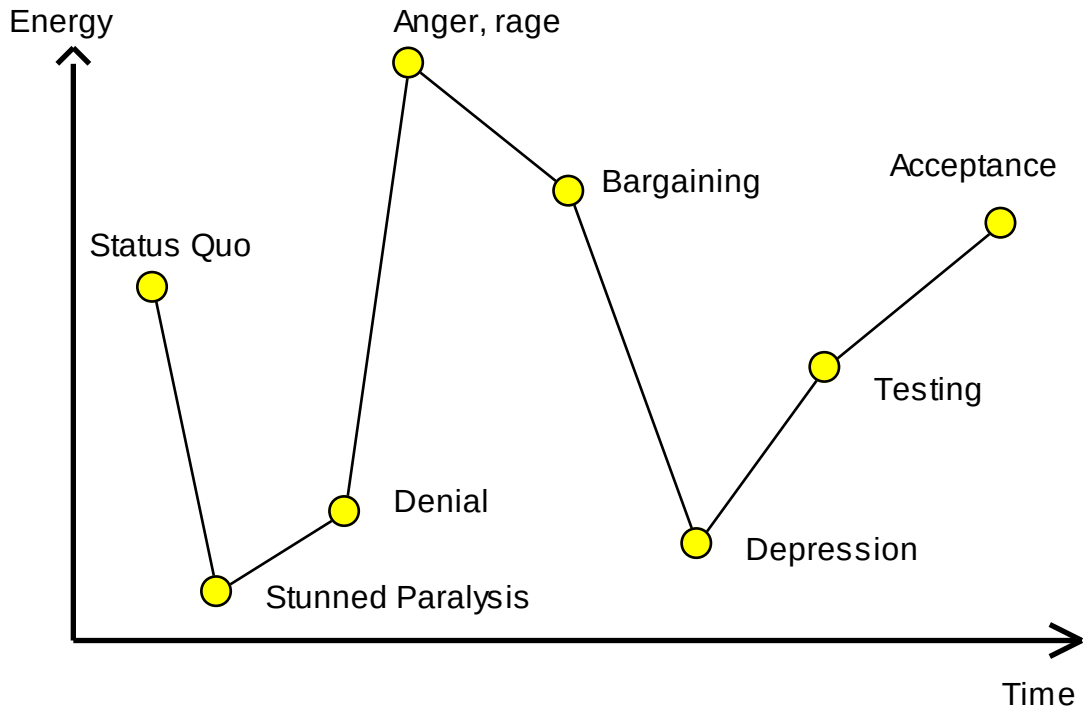

Figure 1: Reaction to Change

Process improvement projects are structured to improve specific problem areas. For instance, if the requirements definition activity results in poorly defined requirements, designs and subsequent implementations in code will be in error. Process improvement in this case would focus on improving the ability to define requirements more accurately.

After the process change, management must evaluate the effect of the change relative to the original goals. If the changes lead to improvements, then steps are taken to make the changes permanent. We standardize the changes. If there has been no significant change, then other possible causes must be investigated. Changes could include changing standards, work methods, suppliers, or providing new training to developers.

Once a process has been improved, the improvement must be maintained. We monitor the process to make sure we hold the gains we have made. Data collection for monitoring is expected to be a regular task of the people involved in implementing the process.

Part V will make the link between software process improvement, ISO-9000 and CMM.