

[The author is an expert of software quality. This is the first of a series of articles on interesting topics related to software quality. While only the very basics are touched upon in this first release, detailed info on CMMI, metrics, benchmarks, audits and appraisals, ISO 9001, EFQM and other topics of readers' interest will be covered one by one in this series. Readers are welcome to suggest new topics and share their comments with the author at ribhu@gmentors.com].

Software Quality Basics:

“Everyone is for quality; no one is against it- but it rarely happens by itself. Quality improvement requires a long-term commitment of time and effort. For these efforts to succeed, each one of us in the organization must become involved.”Philip B Crosby.

Very true- no one is against quality but it rarely happens by itself. In fact it doesn't happen unless the management and all others in an organization get involved in it. Let us start with what quality is and why there is no alternative to it. Joseph Juran, the famous quality guru defines quality as **“Fitness for use”**. Fitness of the product or service for the end user (internal or external customer) is one way of defining quality. An end user may find a product fit for use in one situation and unfit in the other, e.g. a shirt fit for use as part of the office wear may be unfit as a party wear. In the second situation it can't be defined as a good quality product. Second definition of quality comes from Phil Crosby and it is **“Conformance to Requirements”**. Remaining focussed on internal and external customer requirements, business requirements and process requirements is the key to success. This definition is more suitable to software development organizations, software being intangible by its very nature. Since you don't 'see' software, it is highly important to remain focussed on requirements throughout the software development life cycle in order to ensure delivery of 'right software' to the customer. There is no universal definition of quality and a few more definitions are available. I find the definition given by International Organization for Standardization (ISO) to be most suitable for software organizations. ISO defines quality as **“The totality of characteristics of an entity (product or service) that bear on its ability to satisfy stated or implied needs”**. While stated needs or requirements (e.g. those mentioned in the approved SOW for a software development project) are important and contractually required to produce a product or service, equally or even more important in most software related work are the “implied requirements”: those which are not 'stated' but are important to satisfy the customer, business and process needs.

Objective of quality is to enable us to lead a hassle free life. Where to lead a hassle free life? Answer is **“at home and at work”**. Quality gurus like Edward Deming, Joseph Juran and Phil Crosby acted as role models by leading a hassle free life right upto their end. All of them actively contributed to the society at large and the cause of quality for human kind till the very last day. The fifth edition of Juran's Quality Control Handbook was published when he was 97 years old and he was working hard to complete a text book when he died at the age of 103 years in February this year. So my message to the readers is: don't take quality merely as a means to achieve certifications. Leading hassle-free is the objective of quality, not merely

getting certifications. Certifications are at best the initial milestones to achieve ongoing process and product improvements to enable meeting business objectives. Vision of customer satisfaction through ongoing quality improvement and consistent management commitment it needs is rarely evidenced in organizations. No wonder, those who work on this vision are the organizations which set standards for others. To view quality as a means to improve only a few of the parameters of a product or service is also a short sighted approach as after achieving such goals, the organizational focus shifts leading to next set of problems. After achieving such short sighted goals, immature organizations conclude they have achieved quality and start focussing on 'more important aspects of their business'. This approach only guarantees failures and resulting frustrations.

Overall quality of an organization, a product or a process never remains at a level flight. It either improves or deteriorates. Improving quality needs consistent commitment from management and others in the organization. Quality starts deteriorating as soon as it loses management focus.

There is another aspect of quality: the "Personal Quality". Experts like Claus Møller from Germany have researched and come up with concepts like "Personal Quality is the basis of all other quality" and "Personal Quality is Crucial to Your Self Esteem. Self Esteem determines your well-being, efficiency, attitudes and behavior". Personal Quality thus leads to better departmental quality, product quality, service quality and therefore overall organizational quality.

Let us now come back to conformance to requirements (or meeting stated and implied needs) in a software organization. Remaining focussed on requirements right from the project's proposal stage, throughout the development life cycle and during maintenance and support phases is the only way out to succeed in software business. The term 'requirements' encircles all types of requirements, including but not limited to customer specified requirements, business requirements, process requirements, statutory and regulatory requirements, commercial requirements, contractual requirements e.t.c. If the customer does not specify information security requirements but your company's process or law of the land requires them, you must meet them in order to succeed in business. Employee requirements, training needs, work environment requirements, configuration management needs, reporting progress to customers and your own management.....the list may be fairly large and complex. Does it mean it is cumbersome to meet all these requirements? Once identified, meeting requirements should not be too cumbersome. Yes, you have to find time to identify requirements and evolve an adequate review mechanism to ensure changes in requirements are also being captured and met on an ongoing basis. Even overlooking a small requirement or requirement change may cost you dearly in terms of product reliability and customer satisfaction.

Phil Crosby gives **four absolute of quality**. They are:

1. Definition of quality: Conformance to requirements
2. System of quality: Prevention
3. Standard of quality: Zero defect
4. Measurement of quality: Price of non-conformance (PONC)

The term absolute indicates a parameter which does not change. We have so far discussed the first absolute, the definition of quality and the importance of capturing all relevant requirements as a critical success factor for your business. Let us now briefly discuss other absolutes.

The second absolute is the system of quality. Phil Crosby says the system of implementing quality, i.e. conforming to requirements and improving on our effectiveness on an ongoing basis is an approach **based on principle of prevention**. He defines prevention as 'causing something not to happen' which means, in this context, implementing our work processes in a way that prevents misunderstandings, non-conformances and opportunities for error. The principle of building prevention into planning, design, coding, testing, system testing, deployment and post delivery maintenance/ support has to be kept in mind if the organization wants to be successful in business. This approach eliminates opportunities for non-conformances in our techno-commercial and managerial actions, resulting in desired business results in the long run. Organizations which build prevention in their policies and implement those policies with strong management oversight become the leaders in market place.

Now **the next absolute of quality: the standard of quality.** We need a standard against which our performance can be compared. Phil Crosby defines the performance standard of quality as 'zero defect'. Zero-defect is a standard which everyone, including the customer and supplier, can understand well. Let me clarify that it is not 'literal zero defect' as meeting that may or may not be possible in all business situations- especially in software field. If we are able to deliver our products and services within the agreed upon requirements and tolerances for quality, cost, schedule and other parameters, zero-defect is achieved and therefore the performance standard of quality is achieved. Basically, the zero defects performance standard means that non-conformance is not acceptable. We compare the results of measurements to the requirements and take necessary corrective/ preventive actions if requirements are not met. This approach ensures solving the current problem and prevents its recurrence in future.

The forth and last absolute of quality is its measurement. Measurement of quality is needed to get management attention, to set priorities in order to decide where corrective/ preventive action is required and to benchmark with past performance and with other organizations. Measurement tells us how much it costs if we don't improve. The management must know if non-conformance is costing five dollars or five million dollars. This way of measuring non-conformance in terms of money also helps operations and quality managers to get management attention as **people in management understand the language of money**. Phil Crosby recommends measuring quality in terms of PONC (price of non-conformance), i.e. converting measurements like defect density, effort overrun or review effort in terms of money so that right priorities are decided based on facts and not feelings. So if company's bottom line is being hit by 2.5 million dollars per annum because of defects being delivered to customers, management will happily approve your request for acquiring a defect management tool worth half a million dollars. People often measure the wrong things or measure things in ways that don't help them achieve their true goals. They end up measuring just for the sake of measuring, and reporting just for the sake of reporting. The measuring process thus becomes a useless overhead that never yields any benefit. Worst way of implementing a metrics (measurement) plan is to convince yourselves and others to measure so many parameters to 'show improvement'. When a bridge falls down, it is investigated and a report is written on the cause of the failure. This is not so in the computer industry where failures are covered up, ignored, and/or rationalized with the help of metrics programs.

All this knowledge and objectives will not improve quality unless some action is taken for quality improvement. Only by taking actions we fulfil our commitment to quality at our work place or at home. Commitment from management and everyone else in the organization drives quality initiatives. Most importantly, the commitment from individuals motivates others to deliver quality to internal and external users. As far as an organization is concerned, the management commitment is the prime mover to achieve quality and resulting customer satisfaction/ business results. In so many cases, managements fail to remain committed but expect others to achieve quality. This, world wide, is the

biggest barrier in achieving quality. I know a managing director who never acted on escalations from quality function for three and a half years and expected every one else in the organization, including the quality function to achieve product quality. He was an expert in delivering most impressive speeches on whatever subject you want him to speak but would never act on whatever he preached to others. These 'talk world class and act third class' style managers can never be role models even for their own children, what to talk of their teams in the office.

The concepts and tools briefly mentioned above only help if we (it starts with me) make a commitment to improve the way we do things. Working together to meet requirements the first time and every time and looking for ways to improve - that is the commitment each one of us must make to continue on the journey of quality improvement. Don't let the process become an end in itself. It should be an enabler to achieve business results. All the very best for your journey towards ever improving quality at work and at home.....

References:

1. *TQM concepts and Quality Education System of Phil Crosby*
2. *Personal Quality concepts explained by Claus Møller*
3. *Juran's Quality Control Handbook, fifth edition*