# PARTICULARITIES OF QUALITY EVALUATION IN A SOFTWARE COMPANY

**Lecturer PhD Cătălin AFRĂSINEI**
***"Babes-Bolyai" University of Cluj-Napoca***

*Abstract:*
*Quality management is a management domain very discussed and disputed nowadays and this is the first sign it is a very modern, needed and present concept in theory and practice. Some are seeing it as a solution to prepare things in the way they are needed, and the instrument which might guarantee a proper environment of keeping them in a specified and constant form. The application of quality management is a quality management system that has to be designed, developed and implemented to achieve the aim of quality. The article has the purpose to briefly present what a quality management system should mean in a software company, why it should be periodically evaluated and how it might be done. In the second part it points out the characteristics of the audit as a general evaluation instrument and the main contribution consists on the author's endeavor to mark out the particularities of an audit process carried out on a software company, considering the fact that particularization increases the changes to easier and earlier succeed with such an activity on a practical basis.*

*Keywords: Management, quality management, software quality, quality evaluation, quality audit*

## Introduction: the need of quality evaluation and improvement

Quality is an abstract term in the most of the cases due to the fact that it is something non-material, „invisible" but still present. Quality is difficult to be identified but we all remark it, we feel its presence, because it appears through a particular combination, an optimum one under the present circumstances, of all elements and factors (material and non-material) involved into an ongoing activity or process. In the same way we feel the lack of quality. A little detail, insignificant at the first sight, could break the balance and triggers some chain reactions inside the whole system responsible to create an output. It's the so-called „effect of rolling snowball".

These ideas are perfectly applicable into quality management concepts, especially the concept of total quality which involves the entire organization. Software companies don't make exception in this case. Their output, the software application, is the result of a specific range of processes. Because the processes are strongly interrelated, if something goes wrong somewhere in the flow (the quality is poor at that point) this will propagate and magnify some negative effects which will affect the quality of the software product.

Therefore, quality has to be assured and periodically assessed to be sure the quality is continuously improved and kept at the established level. Because the software applications have more and more importance in today's business and administration domains, the need to guarantee quality software products is a necessity. A software provider is morally and juridical responsible for the quality of software instruments. That's why a quality management system which exists in a form or another in almost every

software company has to be evaluated with responsibility. The management of such a company should look for the proper evaluation method and adequate instruments according to its dimension, financial power, abilities and so on.

The process of evaluation involves time, effort and costs. If a company is just about to initiate the evaluation process for the first time, is not wise to try to get too much and too fast. Because each new activity needs proper abilities, instruments and a little experience, it's better to start on evaluating a process or a software project instead of trying to measure everything (Afrasinei, 2009).

Of course, it's not enough to have a good evaluation instrument. No matter how easy to use it is, you have to know how to be best served by it. It's not enough to own a Stradivarius viola in order to be a completed artist. Some effort to learn to use its entire qualities and a dose of talent is need of course.

## Some evaluation and quality improvement methods applicable on software industry

An essential aspect of quality is the measure of its level. The question is: „when we can say the quality level is sufficient?" Because when the quality level is assessed, we compare it with something else, with some standard and according to this standard we can state the quality has a high or low level. But who is the one who says the reference standard is the correct one? Correct answers to these questions have to be found out before we could try to make an equitable appreciation of the quality level.

However, the technical literature presents a list of methods available for quality evaluation and improvement. Considering the specificity of software domain, we consider that at least the following methods are applicable or presently applied in practice. In the following we've made just a short description of their main characteristics, being not the purpose of this article.

**Benchmarking** is defined as being the activity of evaluating the internal services and processes and then compared to others performances (Asher, 1996).

Benchmarking is about identifying the performance problems or gaps and their elimination through applying the best practices coming from outside companies, accepted as leaders or references. In other words, it is an analysis of weaknesses and vulnerable points.

Software companies usually do this activity, maybe without sensing it's about benchmarking, when they compare their products with the existing ones on the market, when they decide to penetrate new market segments, to access new customer categories etc.

Robert Camp in his book "*Benchmarking - The Search for Industry Best Practices that Lead to Superior Performance*" (Camp, 1989) illustrates the difference between competitive behavior with and without benchmarking practice.

Organizations which don't adopt benchmarking are characterized by an inside orientation, with a poor image about their strengths and weaknesses, a reactive attitude toward competition, a low perception of real clients requirements, no innovation-based orientation.

**Process simplification** could be considered a method to have better, simpler and smoother flow of activities and processes which finally increase performance.

There are situations when processes of an organization have been developed by the time and they have become more and more complex.

Process simplification is an act of elimination the non value added work, supplementary and unproductive work with the purpose the tasks will be eventually accomplished at the most proper moment and place. The aim is to create short processes (as number of

operations, involved persons, tasks and responsibilities), as simple as possible (with no negative quality impact on results), which are efficient regarding errors elimination and costs decreasing in general.

In table 1 there are synthesized several advantages and disadvantages of using the method of process simplification.

**Table 1**

**Advantages and disadvantages of using the method of process simplification (proposal)**

| Advantages | Disadvantages |
|---|---|
| Process simplification creates the perception the changes are small and incremental and easier to be accepted by employees. | Process simplification might be a too slow and time consuming method under some particular circumstances. |
| Small changes don't create the feeling of threatening to all those involved into this activity. | Process simplification might inhibit major improvements. Often it seems to be much convenient to adopt the policy of „small steps" promoted by process simplification method, which means small improvements but also small failures. |
| Process simplification implies the ones directly responsible for that process so as the necessary changes are easier accepted and implemented. | |
| Participation of entire team to the changing implementation is an integer part of the process. | |
| Simplification means an error analysis, current performance measurement, and then the changes setup based of this objective background. | |

**Quality standard** adoption is another option available for a software company. Existing quality standards represent a valuable knowledge database to find out the ways of implementing a viable quality management system. A quality standard like ISO 9001 includes important and accepted quality principles that are applicable in companies including those from software industry. That's the reason why more and more such companies have implemented and certified their quality management systems, besides the fact that this kind of certification gives them much trust

and accessibility to auctions of acquiring new projects and much more other advantages and maybe a little bit more complexity.

Regardless the method used to evaluate and improve a quality system, whether it is certified or not, the quality has to be periodically evaluated. One of the techniques available is the quality audit, discussed and detailed in the following.

## The use of audit for compliance assessment

Besides the fact that the concept of audit is considered a „fashionable" activity by many of business men, there is still a good way to reasonably and responsibly reach to some knowledge based conclusions using this kind of activity.

Audit is considered an essential instrument of quality management because the one who uses its results ***could discover new opportunities for improvement***. If the audits are applied even in the first phases of quality management system implementation, they become ***an effective tool of measuring the evolution stage*** of system implementation as well as a direct way of ***sensing the personnel attitude*** toward this probably new system.

The employees have to perceive and accept the necessity of having regular audits. That's why the employees have to be encouraged to come up with improvement proposals and action plans to correct the discovered inconsistencies, unconformities during audits.

Certification of quality management system, a process that has become more and more important during the past years, includes a specific activity which consists on auditing such a system by comparing it with the existing European and international standards, applicable on that domain.

In quality management domain, the term of audit is used to designate the activities of checking the quality of products, services and processes existing in an organization or the evaluation of the quality management system as a whole.

Quality audit is, according to ISO 9000:2000 standard, a systematic, independent and documented process carried out with the purpose of getting audit proofs and facts (records, statements about the facts or other information, relevant and verifiable), which are assessed later on, objectively, in order to determine the accomplishment level of audit criteria that have been set (policies, procedures and other requirements considered references for the audit).

Quality audit is a management instrument used to confirm the existence of a quality management system, measures how it has been implemented and eventually its effectiveness. Therefore, domains which need adjustments and improvements are identified using this instrument (Roncea, 1998). This should be the finality of any audit.

Quality supervising or quality inspection must not be considered an audit. They have the purpose of keeping a process under control or validating a product while the audit should mean the evaluation of activities of „keeping under control" or the process of validating something not the validation itself.

Concluding, the audit of a quality management system could have the following purposes (Roncea, 2000):

- The conformity check of the quality management system with the requirements specified in the reference documentation;
- Effectiveness evaluation of the quality management system in accordance with the established objectives;
- Quality management system improvement of the audited organization;
- Compliance with legal

requirements;

- Quality certification of the existing management system for the audited organization.

An audit has the following main stages: audit initiation, documents analysis, on-site audit preparation, on-site auditing, audit report, audit ending, post implementing audit, as seen in the following figure:

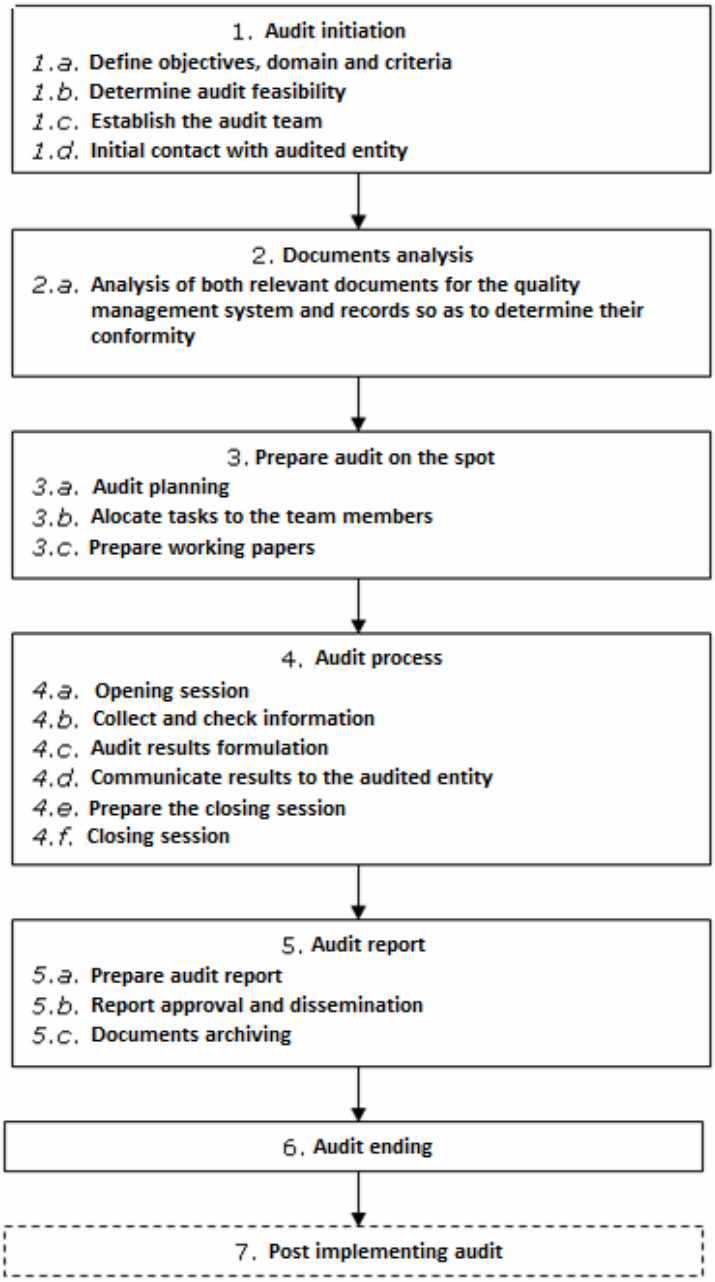


**Figure 1. Stages of audit process**

*(Adaptation from ISO/FDIS 19011standard:2002 Guidelines on quality and/or environmental management systems auditing)*

## Particularities of audit in software companies

**1) Checking the availability of needed competencies**

In order to confirm the existence of required competences for the quality management system and their effectiveness assessment, during the audit process would be better to check the following aspects:

a) Base knowledge of the employees: work experience and qualification of current tasks are relevant;

b) Responsibilities: if they are clearly defined and understood;

c) Conformity of carried out activities with the directions included in the documents of quality management system.

**2) Clarification of in-use terminology**

Auditors who audit a software organization for the first time face a „special" situation. They have to clarify first the specific terminology used by the audited entity. There are cases when even common terms like „plans", „roles", „phases" and „responsibilities" might have particular connotations. Here there are some examples:

- „testing plan" could be both a general description of testing methodology in an organization and a step by step description of a specific test in another organization. A similar term often used as a synonym of testing plan is "test scenario", accepted as being a much more analytic approach of the necessary steps to be followed for checking one or several functionalities of the same software application.
- „project plan" could have just a general approach while tasks, terms and deadlines are defined in another document;
- „team leader" in such an organization could be a senior programmer or designer while in other companies such a person is responsible for financial and human resource supervising of the team members.

**3) Checking out the client's requirements**

At the general level of the project but also at the department level of the organization, the auditor has to verify the implemented processes and their effectiveness for:

- Identification of clients' requirements;
- Communication with the client and feedback collecting;
- Getting the client's approval, wherever it is requested;
- Monitoring the client's satisfaction.

Auditors have to verify if the organization takes measures toward:

- Clarification of the existing communication system with the client;
- Checking if the communicated data has been well understood by the client;
- Assuring that the client's approval is based on clear acknowledgement of the facts.

**4) Control of documents and records related to the quality management system**

This is another component of the quality management system of any organization, which is an interest point of the auditing process, and it is related to the activity of keeping under control documents and records. There are industries where documents are located and controlled in a centralized manner while the IT domain shows the tendency of defining, stocking and controlling data locally. This is a consequence of their specific organizational structure by project, division etc.

Furthermore, the auditors have to consider the fact that the controlled document types are typically much numerous and more specific in the case of software products comparing to other industries. Many auditors simply check the status of the current edition for each of the examined document.

This approach is also applicable in the case of recordings. The records

about the stage of a software product accomplishment and about other related activities carried out in IT industry are often spread out inside the whole organization and they are controlled by several organizational entities.

**5) Software products multiplication**

Delivering modes of software products have various ways, taking the form of CDs, DVDs or electronic transmission. From quality system point of view it is necessary to exist a method of checking the multiplication process, which provides trust on using accepted copies of the software product delivered to the client. For the first 2 delivering modes, at least, integrity internal check of recorded data is required. Besides the probable physical errors, due to physical degradation of the transport support, errors which cannot be removed without replacing the bad support with a good one, there is very important to take care and properly record the history of software versions installed at each client, their granted licenses of use. There are quite often cases when the same software has different versions running in the market. Therefore, it's really possible to have different clients with different versions of the same software application. Considering all of these, it's a very good idea to have a precise administration of each client individually about characteristics like current version, existing hardware, licenses so as to have an optimum service and customer care anytime is necessary. This information is vital for a good organizing of Customer Service department.

**6) Assuring a highly qualified personnel available for the clients**

Many organizations from software industry guarantees qualified personnel dedicated to a single client or no more than a few. In such cases, the auditors have to verify the way this personnel is selected in relation to clients' needs, to check the processes of performance evaluation and coordination of this category of employees.

**7) Checking the way the internal audits are carried out**

Organizations from software domain have to develop and implement a good system of planning and documenting the internal audits. Internal audits have the purpose of assessing, internally, the activities related to quality assurance, if these activities are in accordance with the planned objectives and also the aim to determine the effectiveness of the existing quality management system.

Internal audits have to be planned taking into consideration the importance of each activity. The audits and the consequently actions applied after, have to be carried out in accordance with some documented procedures.

Results of audits have to be also documented and made available for the managers of the audited areas. They have to take corrective actions in the shortest possible time in order to correct the discovered deficiencies during the audit process.

It is essential these audits to take place in a systematic manner, not occasionally and nor superficially. Problems discovered during the audit have to be analyzed in order to identify the best way of solving them and keeping the effectiveness of the system.

Additionally, it's important the auditors to be independent from the audited area. Sometime, delegation to a specialized organization could a proper solution.

Internal auditors have to be trained on the necessary techniques to organize and manage the audits. During the audit process, they have to identify the ways to improve the situation and to accordingly suggest corrective actions in order to eliminate the causes of the identified deficiencies. All of these have to be included, mentioned into the audit report as recommendations. This is the best alternative comparing to the situation when they just report

deficiencies and highlight unconformities coming from the audited areas.

## Conclusions

Considering all information included in this article, there are some conclusions which could be drawn in order to mark out main ideas:

- Quality management is an orientation that has to be followed by all companies from software industry because of the fact the software applications play a critical role for the success of the companies which use them;
- Quality management is materialized into a quality management system which has to guarantee the established level of quality for the output;
- There are at least few methods to improve and evaluate the quality level easily applicable in software companies;
- Once the quality management system exists in a company, it has to be periodically assessed and even improved by applying one convenient evaluation method;
- Quality compliance evaluation has to be frequently carried out, and this can be done using the audit process. We provided a short description of the steps to be following during audit;
- One of the most important points of this work consists on a presentation of particularities of the audit in software companies as they appeared after a series of practical observations.

Utility of this paper emanates from the effort to synthesize the main ideas to be kept in mind by the managers from software industry interested on quality management. The value added is provided especially by the last chapter which presents the particularities of the audit in software companies revealed from their specific activities and processes. This information might be useful whenever an auditor is preparing to run an audit in a software company and it consequently might ease up the necessary work.

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