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## ISO 9000-3 OR CMM: WHICH IS MORE EXTENSIVE FOR THE QUALITY SYSTEMS IN A SOFTWARE INDUSTRY?

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**Abstract:** *In order to survive in this era customer oriented business every industry is trying to satisfy the existing customers and also attract new customers. One of the policy used is to maintain a quality standard of the products exceeding the customers' expectation. The software industry is no exception to the same. The main objective of this paper is to evaluate the effectiveness of ISO 9000-3 or CMM on software industry in terms of their clause. In this two well known quality standards ISO 9000-3 and CMM are compared which is concluded that both standards are useful but there is growing need for situation specific standard. The purpose of this paper is to contrast the CMM and ISO 9000-3, showing both their differences and their similarities with their importance in a software industry. In the end we concluded that a software organization will be better positioned to accommodate technology evolution by embracing the CMM.*

**Key words:** *CMM, ISO 9000, ISO 9000-3, Software Industry, Juxtaposition.*

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## **I. INTRODUCTION**

In a competitive world everybody is striving for customer satisfaction, and in software industry where the developer can't afford the worst outcome of any work done. The software development organizations are paying great deal of attention to quality management [1-2]. In different countries of Europe, Asia, North and South America etc. the ISO 9000 set of quality standards [3] are widely used as standards for quality management in software development. ISO 9000-3 was specifically designed for system development. These standards are usually used to serve two purposes namely they can be used to provide guidance to organization installing quality system to produce goods and services of the desired quality or there are basis of their certification of quality system. It means quality certification give a positive impact to the buyer with the reference of supplier. Even CMM resolves some of the problem of the ISO model but it also has some shortcomings.

## **II. THE ISO 9000 STANDARD**

The ISO 9000 series of standards, developed by the International Standards Organization, share a common concern with quality and process management. The international standards ISO 9000-9004 standards describes how company can implement quality system. Once the organization has put in the various clauses of the standard it may go for certification by an independent certifying institution. The certificate can then be used by the organization to show the customers that the company adheres to externally verified quality standards. The philosophy of quality standard is consistent with the development in the theory of quality management [5], the focus is shifting from controlling the quality of the final product to the quality of its production process. The main essence of ISO is that company should visibly control all the aspect of the business in order to guarantee a minimum level of quality standard for its product. The standards does not define that what is most effective and efficient way of controlling business process, it just requires to maintain sets of quality procedures and guidelines without specifying them. This is both the strength and the weakness of the standard.

## **III. THE ISO 9000-3 STANDARD**

ISO-9000-3 [4] is typically considered as an international standard for quality. It is the defining standard accepted by almost all European and North American countries. Software development companies are often required to conform to ISO standards in order to be

considered for contract awards. ISO-9000-3 provides special guidelines for implementing ISO-9000, and was created specifically for the software development industry. It is used for system development which is contributed in “guidelines for the development, supply and maintenance of software. In this life cycle of model is taken as the process to be controlled. The software development guidance document for ISO 9001 remains as a very general description of the procedures and guidelines for quality management. The main criticisms of the use of ISO 9000-3 for system development are:

- The generic nature of standard ,
- The fact that is specified for quality system development organization and that title attention is given to quality measures on the level of specific development projects.
- The ISO 9000 recognize only one certifiable level of quality, while in practice different quality level may be advisable for different situation.
- The emphasis’ on strict procedure and their documentation in manual leads to bureaucratic type of behavior instead growing awareness of the importance of quality for the organization searching for new insight methodologies in system development may be hampered. Boehm’s spiral [6] is the good example of it which copes with uncertainty in system development but clashes with the rules of ISO 9000-3
- Though through-put time may be important in some cases than superb quality and a somewhat quick and dirty approach might then be advisable, quality standards leave very little room for the idea of end-user and rapid application development.

The above resulted in the development of standards which can take care of the shortcoming of ISO system, especially for a software industry.

#### **IV. CAPABILITY MATURITY MODEL**

The Capability Maturity Model for Software (CMM), developed by the Software Engineering Institute, the SEI CMM has been the standard set of quality guidelines for companies developing software for the U.S. Government i.e. usually the Department of Defense. The SEI Capability Maturity Model (CMM) was initially developed as an assessment model for software engineering management capabilities of software providers [7-10]. Companies wishing to develop software under these standards are evaluated according to five capability levels, ranging from uncontrolled development processes to consistently effective

organization-wide implementation. This maturity model presents a growth theory according to which the quality level of a systems development organization can grow along a given growth path. The gist of the model is that several quality levels for the systems development process can be recognized. As a result of this deeper understanding, new practices in process-based software engineering have been emerging in the last decade. An Organization can go from one stage to another and thus grow from a situation with no quality management to a mature situation with a very high level of quality control in table 1

**Table 1 depicts the CMM Level with their description**

<b>Level CMM</b>	<b>Description</b>
<b>1.Initial</b> processes	- ad hoc, sometimes chaotic processes - project success not guaranteed
<b>2.Repeatable</b> processes	-process are characterized -organization is reactive
<b>3. Defined</b> processes	- process documented - process standardized - tailored standards used for each project
<b>4.Managed</b> processes	- process understood - process measured - process controlled
<b>5.Optimizing</b> Processes	- focus on process improvement - focus on rapid technology updating

## **V. JUXTAPOSITION OF ISO 9000-3 AND CMM**

In software industry the ISO 9000 and CMM are widely accepted standards. The CMM using companies are growing rapidly mainly in Europe and Japan where as ISO is being extensively used in major Asian countries. ISO 9000-3 and CMM can be considered stable in the sense that they have widely been used for a number of years and "teething troubles" have been cured. Both of these can be compared as summarized in table 2.

**Table.2: Comparison between the ISO 9000-3 and CMM.**

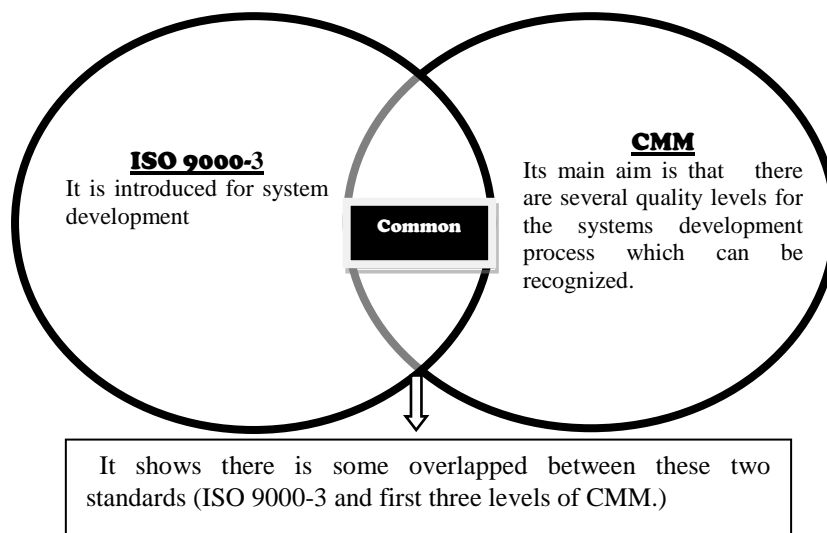
<b>S. No</b>	<b>ISO 9000-3</b>	<b>CMM</b>
1.	Outwardly focused	Inwardly focused
2.	ISO 9000-3 is recognized all over the world	CMM is a de facto standard in the USA.
3.	ISO 9000-3 is not specially aimed at software development	CMM is specially aimed at software development
4.	ISO 9000-3 Guidelines is not much easier to implement or building quality system in software development	CMM Guidelines is much easier for building quality systems in software development.
5.	It models the development process not in a detailed way than like CMM	It models the development process in a much more detailed way than ISO 9000
6.	The ISO standards prescribe one fixed level of quality management	CMM points out that different level are possible but do not prescribe which level a systems developer has to choose.
7.	Quality characteristics of the clauses in ISO 9000-3 are not described in detail than the quality characteristics of CMM.	Quality characteristics of the levels in CMM are described in much more detail than the quality characteristics of ISO 9000-3.
8.	The structuring of the quality characteristics in ISO 9000-3 is not makes it easier to discuss quality matters.	The structuring of the quality characteristics in CMM makes it easier to discuss quality matters.

## **VI. FOR A SOFTWARE INDUSTRY WHICH IS MORE EXTENSIVE? ISO 9000-3 OR CMM**

As it can be observed from the above discussion that some issues in ISO 9001 are not covered in CMM, and vice versa. The levels of detail also differs significantly e.g. Chapter 4 in

ISO 9001 is 5 pages long, sections 5, 6, and 7 in ISO 9000-3 comprise 11 pages where as the CMM standard is over 500 pages length. The ISO 9001 clauses on control of customer-supplied products and handling, packaging, preservation and delivery do not have strong relationship to CMM. The clause in ISO 9001 that addresses in CMM in a completely distributed fashion is servicing. There is significant debate about the exact relationships to CMM for corrective and preventive action and statistical techniques. The biggest difference is the emphasis in CMM on continuous process improvement where as ISO only addresses minimum criteria for an acceptable quality system.

So in connection to a software industry it is observed that for certain things both play a genuine role but if any standard is to be completely adhered to in respect of a software industry, CMM is the better approach as compared to ISO 9000-3. Figure 1 shows the difference as well as the overlapped portions (similarities).



**Fig1. The relationship between ISO 9000-3 and CMM.**

## VII. CONCLUSION

In this present scenario there is a conflict between the desire for better quality systems resulting in measurable improvements of the systems development process and the way in which this is implemented by means of standards. Therefore Quality certificates can create a wrong impression of the real capabilities of an organization. This should not lead, to an abolition of standards. The majority of organizations can improve themselves by logical use of the existing standards. But there is also a need for improving the present standards. In

the short span the quality of systems development can be improved by an approach that is specially constructed for assessing systems development environments, which supports measurable improvement of the development process and which also advocates for the choice and implementation of actions. Although not absolutely perfect, but CMM still offers more possibilities in this respect than does ISO 9000-3. In the longer term standards and certificates will have to take into account the diversity that exists in the real world. Standards and certificates will have to be attuned to this diversity. It is felt that this transformation process will take some time and that therefore the organisations have to carefully assess the value of the quality certificates in different situations. Finally it can be stated that the CMM methodology provides for more possibilities for the construction of an appropriate software quality system than does ISO 9000-3.

Moreover it can be summarized that a software company can use ISO 9000-3 for the certification and streamlining of the processes involved or responsible for the betterment of the quality systems and then can directly switch over to CMM and work towards continuous improvement by achieving the various levels.

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