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## ITQMM: A New Model for IT Processes

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### Abstract

*Information Technology (IT) Governance and IT Service and Processes Management (ITSM) are one of the priorities in organizations. Although many organizations are aware of the importance of using well-defined quality IT processes, they face the problem of how to use and improve them in practice. One of the final objectives of any ITSM policy must be to guarantee an adequate IT quality. In this sense, the use of action frameworks as Information Technology Infrastructure Library (ITIL) is essential. However, several quality models and maturity models have been developed, but they are not focused on how to measure the IT quality. As they do not include the appropriate mechanisms, it is necessary to complement them with other quality frameworks, e.g. European Foundation for Quality Management (EFQM). This paper proposes a maturity model for IT quality improvement based mainly on ITIL and EFQM.*

### Keywords

EFQM, ITIL, ITSM, Maturity Model.

### INTRODUCTION

The evolution of IT organizations from technology providers into service providers requires taking a different perspective on IT management. One objective of good management of IT services must be for providing an adequate quality management. Currently the application of appropriate models or action frameworks for government and IT Management are one of the priorities in the area of IT in organizations but they do not measure IT quality directly. So when organizations use one of these frameworks, in its implementation is necessary to consider, among other things, that for improving the quality of the IT processes, it is necessary to measure it and this measurement cannot be done only with tools or methodologies own of IT, but other tools or standards can be used in the organization to measure quality in general (e.g. EFQM, ISO 9000, etc).

The important thing about ITSM and therefore ITIL is to improve the quality of IT services. Many organizations decide to implement IT quality management and they fail completely. Many others only implement ITIL because they are thinking that it is enough to have quality in their processes. The problem is that implementing ITIL is not easy (Nicewicz-Modrzewska and Stolarski, 2008).

Current authors consider that to see if quality is achieved, it should be measured. But neither ITSM nor ITIL measure the quality, so it is necessary to use other standards, frameworks or methodologies. EFQ\_TIL is a model proposed by (Sánchez and Fernández, 2011) which is used to measure the quality of processes in the implementation of ITIL (<http://www.itil-officialsite.com/>) in an organization using for this purpose the EFQM model (<http://www.efqm.org/>). This model proposes a proper correlation of ITIL processes and criteria EFQM.

In this paper is presented an IT quality maturity model (ITQMM) which organizations can use it as “IT quality measurement tool”. This model grades the IT quality maturity into:

- Level 1 – Initial. The organization's IT quality is characterized as ad hoc, and occasionally even chaotic. Little information is defined, and success depends on individual effort and heroics.
- Level 2 – Repeatable. Basic information about IT quality is established to track cost, schedule and functionality. The necessary quality process is in place to repeat earlier success on projects with similar application.
- Level 3 – Advanced. The IT quality processes are documented, standardized and integrated into a standard quality process for the organization.
- Level 4 – Mature. Detailed measures of the IT and quality processes are collected. Quality processes are quantitatively understood and controlled.
- Level 5 – Optimized. Continuous IT quality process improvement is enabled by quantitative feedback.

This model is to be used as a quality tool for IT quality management. ITQMM can be applied to help an organization step-by-step by assessing the maturity of the existing IT quality processes and suggesting what to improve or implement next to acquire better IT quality that will make organizations more competitive. ITQMM adopts a multidimensional approach encompassing people, process and methodology to improve IT quality management. The proposed maturity model can facilitate communication and improve understanding between researchers and practitioners. For organizations engaging in IT quality, ITQMM can be used to track the on-going development of IT quality processes or benchmark and compare the progress of different IT units.

This paper clearly defines the components of ITQMM and recommends using an assessment instrument, which allows the model to be empirically and independently assessed by researchers and applied by practitioners. By highlighting the important issues in IT quality measurement, ITQMM can also assist managers in their planning of IT quality processes. In section 2 is done a literature review of some papers where quality is defined and other maturity models. The ITQMM itself is presented in section 3, where its maturity levels and its key process areas are described. Section 4 describes the assessment that has been developed for this purpose. Section 5 summarizes the approach and gives an outlook on future work.

## LITERATURE REVIEW

ITSM puts the delivered services by IT at the centre of IT management and is commonly defined (Young, 2004) as "a set of processes that co-operate to ensure the quality of live IT services, according to the levels of service agreed to by the customer. It is superimposed on management domains such as systems management, network management, systems development, and on many process domains like change management, asset management and problem management."

IT services usually represent a key to the processes of the organization (Duffy, 2002), thus it is necessary to measure, evaluate and improve the quality of IT services and processes. In this context, principles and quality management practices can be useful to meet these needs (Peterson, 2003). Therefore, the purpose of the quality is to provide to the customer a suitable offer with controlled processes while ensuring that this improvement does not result in additional costs.

In the other hand, quality has been defined by Juran (Juran et al., 1974) as "fitness for use". It implies that quality is defined by the customer, so that quality and customer satisfaction are considered as being analogous. Thus, it can also be defined as meeting or exceeding customer expectations, given that a perfectly produced product has little value if it is not what the customer wants. The quality of a service or product is evaluated once it is provided. The quality can be defined as the ability to achieve the desired operational objectives.

Maturity models in IT management have been proposed since at least 1973 (Rocha and Vasconcelos, 2004). More than one hundred different maturity models have been proposed (Bruin et al., 2005) but most are too general, as a result, not well defined and documented. The principle idea of a maturity model is to briefly describe the typical behaviour (activities) exhibited by an organization at a number of levels of maturity (Fraser et al., 2002). For each activity, it provides a description of the activity as it might be performed at each defined maturity level (Fraser et al., 2002). In general, maturity models are designed to assess the maturity of a selected domain (Bruin et al., 2005). Besides assessment criteria, a maturity model provides guidelines how to reach the next higher maturity level, as the descriptions of higher maturity levels can be seen as best practice guidance (Fraser et al., 2002). In general, maturity assessment is conducted by assessors (EFQM, 2003; SEI, 2006). However, maturity assessment can also be made by an external auditor or by self-assessment (Fraser et al., 2002).

## PROPOSED ITQMM

### The ITQMM model

In the previous sections authors described that IT quality management should be improved because there is not an only framework or standard that can be applied to this function. This section introduces a maturity model that can help to get this objective.

The purpose of the presented model in this paper is the evaluation and measurement of an organization's IT quality. The proposed maturity model has the following value propositions:

- As a diagnostic tool, it allows the identification of current strengths and shortcomings in IT quality management in the organization and it quantifies as-is maturity.
- The model and the findings derived from its application can be used to identify and direct IT quality activities. It enables organizations to focus on less mature processes and to develop a structured improvement plan for progressing to the determined to-be situation.
- The model can be applied over time and supports the measurement of progress in IT quality.
- The model facilitates informed decisions about prioritizing process for IT quality management. It provides a framework for understanding the benefits of investing in proposed changes and the impacts of those changes on realization of the organization's strategic objectives.
- Finally, the application of the model in a number of organizations allows benchmarking studies.

The proposed ITQMM follows a staged-structure and has two main components: maturity level and Key Process Areas (KPAs) and each KPA is described by a set of characteristics.

To be classified at a given level, an IT team has to follow all the practices assigned to that level and all the practices of the lower levels.

### ITQMM maturity levels

The structure of the proposed model consists of five levels as shown in Figure 1.

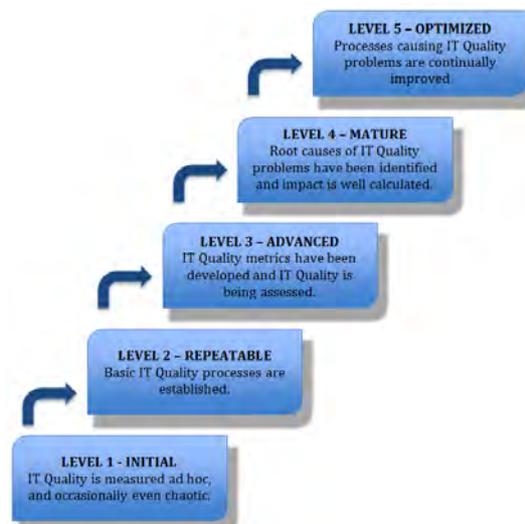


Figure 1: ITQMM maturity levels

#### ITQMM Level 1 – Initial

Organizations in stage one are taking the baby steps. Their IT quality management processes are not standardized or documented (they are ad-hoc). IT quality is sporadic within the organizational IT departments with no overall knowledge sharing enterprise-wide. They do not have any standard or uniformity as to what toolsets and process to use: it is run on a “best effort” basis. As such success and failures have little impact on future undertakings.

Results therefore become unpredictable, processes are poorly controlled and the ultimate success depends on the dedicated effort of a few people instead of the entire organization as a whole.

Organizations move to stage two from stage one especially when there is some interest about implementing IT quality. The duration of stay at stage two depends on the culture of the organization about IT quality.

#### ITQMM Level 2 – Repeatable

At this second level, organizations depend mainly on policies for managing IT quality and measures to apply those policies are established. These measures help the organizations to repeat successfully the previously mastered tasks and avoid the repetition of failures. The major chunk of an organization's processes at this level stays institutionalized, through staff experience instead of detailed documentation procedures.

#### ITQMM Level 3 – Advanced

Stage three means one framework, standard or model is being used and there is an idea to increase their use or add more mechanisms to improve IT quality management.

Organizations in stage three can implement any ISO (9000, 20000, 27000 or 38500), ITIL or EFQM. The main focus is not quality management and process control. These organizations should be enjoying a significant amount of benefits listed in the literature because of using ISO, ITIL or EFQM. Therefore, they are encouraged to increase the IT quality and process control. Theoretically, organization in this state should move to stage four but it could stay in this stage or move down to stage two if there are no intentions to follow, implement and evaluate one well-known of these frameworks within the organization. This is possible because to implement a framework, it is necessary to collect a lot of documentation, analysis and evaluate continuously, and organizations have good intentions at the beginning, but finally, they abandon these frameworks and they only used an internal documented methods.

#### ITQMM Level 4 – Mature

Stage four of IT quality maturity model is the highest maturity level in this model. At stage four, quality management and process control are part of the organization and its policies.

About company's processes, ITIL should be used. Although there are many other frameworks, ITIL has become the most popular for implementing ITSM (Brenner, 2006; Hochstein et al., 2005) and, as a result, the framework of choice in the majority of organizations (Ayat et al., 2009). With ITIL, organizations aspire to deliver services more efficiently and effectively, with more quality and less cost (Hochstein et al., 2005; Ayat et al., 2009; Kaschanchi and Toland, 2006). Furthermore, preliminary results have shown that ITIL works in practice (Kaschanchi and Toland, 2006).

ITIL provides a framework for best practice processes in ITSM that help IT management resources from a business perspective. With ITIL, IT can meet business objectives and reap the resulting rewards, including the delivery of higher quality business services at lower costs to the organization.

As a complement of ITIL, it would be good to use EFQM because it can evaluate the reference quality levels or measurement of quality improvement. EFQM is the model Excellence Assessment currently most widely used by European organizations (Dudek-Burlikowska, 2006; Urbaniak, 2004) and one of the most popular today (Michalska, 2008).

But the best recommended framework is EFQ\_TIL (Sánchez and Fernández, 2011) as it was described before: this new framework combines ITIL and EFQM in only one model to guarantee quality in IT management.

As EFQ\_TIL uses EFQM and it is based on EFQM, one important advantage of the EFQM self-assessment is the quantitative character that it is, in other words, it can be compared against other organizations, it can be compared to previous assessments of the same organization or between different business units within the same organization.

#### ITQMM Level 5 – Optimized

At level 5, focus is on the continuous quality process improvement. The organization proactively identifies strengths and weaknesses in the process, with the aim of preventing the occurrence of bad quality. Processes causing IT quality problems are continually being improved. Here continuous improvement becomes institutionalized into the process management. Instead of merely correcting defects as they are found, the main aim at this highest level is to stall future defects and address the key to those defects by planning in advance.

ITQMM proposes that organizations should progress from one maturity level to the next without skipping any level. In practice, organizations may beneficially employ key practices described at higher maturity levels than

they are. However, being able to implement practices from a higher maturity levels does not imply that levels can be skipped since they are unlikely to reach their full potential until a proper base is laid.

### Key Process Area (KPA)

Each maturity level is characterized by several KPAs that include the areas an organization should focus on improving its IT quality process to the next level. The main focus of each level and the corresponding key process areas are shown in the next subsections (they do not describe each KPA at each level in detail).

Based on authors' review of existing international standards and frameworks to guarantee an adequate quality of IT (ITIL, EFQM) and proposed model (EFQ\_TIL), important KPAs in IT quality management are people (EFQM has a criterion about organization culture, strategy and policy), processes (ITIL is composed by processes) and methodology (see Table 1).

Table 1. ITQMM Key Process Areas.

ITQMM Level	Focus	People	Processes	Methodology
1. Initial	IT quality is measured ad hoc, and occasionally even chaotic. Little or no intention to formally manage IT quality.	Organization and its people are not aware of the need to formally manage IT quality.	No formal processes to measure; share and reuse IT quality.	No specific IT quality methodology is used.
2. Repeatable	Basic IT quality processes are established and managed. A certain degree of process discipline exists; successful execution of the measurement IT quality processes can be repeated.	Management is aware of the need for IT quality in their processes.	Knowledge indispensable for performing routine task is documented.	Some IT quality methodologies are initiated (not necessarily by management).
3. Advanced	IT Quality metrics have been developed and IT quality is being assessed.	Management is aware of its role in IT quality processes. Basic training on IT quality standards is provided (e.g. EFQM, ITIL, ISO, etc.).	Process for IT quality is formalized. Some metrics are used to measure the increase in productivity due to IT quality processes.	Only one standard or framework is used.
4. Mature	Root causes of IT quality problems have been identified and impact is well calculated. The measurement IT quality processes are documented and standardized. The execution of the processes is compliant to the description.	Common strategy and standardized approaches toward IT quality. IT quality is incorporated into the overall organizational strategy. More advanced IT quality standards training.	Quantitative measurement of IT quality processes (i.e. use of metrics).	Use of quality standards is fully in place and they are at a reasonable level.
5. Optimized	Processes causing IT quality problems are continually improved.	Culture of IT quality is institutionalized.	IT quality processes are constantly reviewed and improved upon.	Existing organization IT quality methodologies are continually improved upon.

In ITQMM, people KPA includes aspects related to organization culture, strategies, and policies; the process KPA refers to aspects concerning IT quality processes; and the methodology KPA relates to aspects about IT quality methodology. Understanding IT quality maturity from these different perspectives is expected to provide a comprehensive overview.

### ITQMM Assessment

To facilitate independent validation and practical application of ITQMM, an accompanying assessment instrument has been developed. The IT quality maturity of an organization is indicated by the extent to which an organization is successfully accomplished all the key practices characterizing a maturity level.

This model, which recognizes many approaches to achieving sustainable IT quality, is based on the premise that excellent results about IT quality are achieved through People, Processes and Methodologies. Each KPA has some variables to be measured (i.e. number of certified processes with ISO 9000, percentage of IT projects and processes with active quality assurance participation from stakeholders, percentage of stakeholders satisfied with IT quality, number of people who work in IT quality, etc.) and all these variables have a different weight in the final result. The weight of each variable is based on an assigned metric. To get a value for these variables, authors propose a questionnaire.

Questions used in the assessment instrument were adapted from related literature and existing instruments when available and appropriate. New items were developed based on the proposed model to assess aspects where suitable items could not be found in existing literature.

This questionnaire is composed totally by 43 questions that will help to know, based on our maturity model, in which level the organization is in the maturity model and they are grouped to each KPA. These questions are grouped to each KPA and they are divided in two parts: on the one hand 40 questions whose answers will be from 1 (the worst) – 4 (the best) points defining the degree of fulfillment through the organization of the quality (Tables 2, 3 and 4); on the other hand, 3 questions about what IT quality standards/frameworks are applied in the organization if any.

- People (15 questions). How the organization manages, develops, and releases the IT quality knowledge and full potential of its people at an individual, team-based and organization-wide level. How leaders develop and facilitate the achievement of the mission and vision, develop values required for long-term success and implement these via appropriate actions and behaviours, and are personally involved in ensuring that the organization's IT quality management system is developed and implemented (see Table 2).

Table 2. People Questions.

N	Description
PE1	Is organizational knowledge recognized as essential for the long-term success of the organization?
PE2	Are employees ready and willing to give advice or help on request from anyone else within the company?
PE3	IT management, does it identify the necessary changes in the organization and it leads their development to improve the quality management?
PE4	IT management, does it promote actions to improve IT quality based on own experiences with other people or organizations?
PE5	Are the IT quality processes coordinated by the management?
PE6	Are there individual IT quality roles that are defined and given appropriate degree of authority?
PE7	Is there a formal IT quality strategy in place?
PE8	Is there a clear vision for IT quality?
PE9	Are there any IT quality training programs or awareness campaigns? e.g. introductory/specific workshops for contributors, users, facilitators, etc.
PE10	Is there a defined flow chart where people who are responsible to take decisions about planning, implementation and IT quality management are well defined?

PE11	Are there regular knowledge sharing sessions?
PE12	Is IT quality incorporated into the overall organizational strategy?
PE13	Is there a budget specially set aside for IT quality?
PE14	Is there any form of benchmarking, measure, or assessment of the state of IT quality in the organization?
PE15	Has the IT quality initiatives resulted in a knowledge sharing culture?

- Processes (15 questions). How the organization designs, manages and improves its IT quality processes in order to support its policy and strategy and fully satisfy and generate increasing value for its customers and other stakeholders (see Table 3).

Table 3. Processes Questions.

N	Description
PR1	Is the knowledge that quality is indispensable for IT service management?
PR2	Are there defined processes related to IT quality management (i.e. self-assessment, certifications, and audits)?
PR3	Are there policies and processes to detect and fix cases of non-compliance IT quality?
PR4	Do the quality processes improve the quality and efficiency of work?
PR5	Is the process for collecting and sharing information formalized?
PR6	Are precisely defined which are the functions to be performed by managers and technicians responsible for planning, implementation and management of IT quality?
PR7	Does it guarantee that standardized methods and procedures are used in efficient way in all changes to minimize their possible bad impact on the IT quality?
PR8	Are defined levels of service to maintain and gradually improve the IT quality?
PR9	Are the existing standards or frameworks actively and effectively applied?
PR10	Are the quality processes measured quantitatively?
PR11	Are there a plan and quality management system well defined and agreed?
PR12	Is there a quality system management focused on the customer?
PR13	Can the existing quality processes be easily adapted to meet new business requirements?
PR14	Are the processes monitored to see if they carry out the quality system management?
PR15	Does the organization continuously design, manage, measure and improve its key processes in order to ensure high quality, cost optimization and efficient use of resources?

- Methodology (10 questions). How the organization implements or uses IT quality standards and frameworks to reach quality in its IT processes (see Table 4).

Table 4. Methodology Questions.

N	Description
ME1	Does it perform IT quality benchmarking with other companies?
ME2	Is there a policy to recommend the use of standards ensuring IT quality?
ME3	Are there policies and methods to detect and fix cases of non-compliance IT quality?
ME4	The planning, implementation and IT quality management, are they managed by a methodology and has a well-defined procedure to implement it?
ME5	Does the IT quality management support the entire organization?
ME6	Is the IT quality tightly integrated with the business processes?
ME7	Are the existing quality systems continually improved upon (e.g. continual investments)?
ME8	Is there any quality methodology implemented in the organization?
ME9	Does the organization use an IT quality methodology to improve its IT quality to their customers?

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ME10 Is the IT quality methodology important for the organization?

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Apart from these 10 questions for Methodology, there are three questions more to be evaluated in the organization (see Table 5):

Table 5. Special Methodology Questions.

N	Description
	Number of certified processes with any ISO (max. 20 points)
MEA1	numProcesses < 100 (0 points)
	100 <= numProcesses < 200 (4 points)
	200 <= numProcesses < 300 (8 points)
	300 <= numProcesses < 400 (12 points)
	400 <= numProcesses < 500 (16 points)
	numProcesses >= 500 (20 points)
	Indicate which ISO standards are applied in the organization (max. 40 points)
MEA2	ISO 9000 (10 points)
	ISO 20000 (10 points)
	ISO 27500 (10 points)
	ISO 38500 (10 points)
	Indicate which standards are applied in the organization (max. 250 points)
MEA3	ITIL (50 points)
	COBIT (50 points)
	EFQM (50 points)
	EFQ TIL/EFQBIT (100 points)

Finally, once one organization answers these questions, it will be got a number of points (see Table 6). The final result is based on the weighted variables once the metric is applied and it will be known if the organization is doing a good work at IT quality management or not.

Table 6. Results of the Questionnaire (Points) of each KPA in the ITQMM.

ITQMM KPAs	Maximum Points in the ITQMM
1. People	60
2. Processes	60
3. Methodology	350
TOTAL	470

Once this assessment is applied to one organization, it will be in one level of ITQMM and it will also know which the next steps are to get a higher level.

Table 7. Necessary points for each ITQMM level.

ITQMM Level	Points
1. Initial	0-100
2. Repeatable	101-200
3. Advanced	201-300
4. Mature	301-400
5. Optimized	401-500

## CONCLUSION

In the paper authors have proposed a simple maturity model for IT quality and they have tried to make it simple and light to allow to any organization use it without any problem. It consists of 5 levels. It is also important to note that although ITQMM defined the fifth maturity level to be the most advanced level, it does not suggest that organizations at this level will cease managing their IT quality. Rather, as IT quality management standards and frameworks evolve, the conditions for attaining maturity are likely to change and serve more like moving targets to encourage continuous learning and improvement rather than a definite end by themselves. This maturity model is not closed to future updates. For future research will be to investigate the relative importance of practices in each KPA at different stages of maturity. Identifying and understanding these dynamics may help organizations in charting their IT quality management better.

The underlying objective of the proposed model is to improve IT quality management in organizations and eventually enhance organization performance. The proposed ITQMM recognizes that IT quality is unlikely to be

achieved in one giant leap. Its staged structure provides a general understanding of the gradual and holistic management of IT quality. It is hoped that ITQMM can serve as both an effective diagnostic tool for assuring IT quality and a coherent roadmap that guides academic and practical IT quality efforts.

Next step will be to use this proposed maturity model in different IT organizations. They will be asked to organize their IT quality management according to ITQMM and apply as many quality practices as possible to achieve highest possible quality in IT management. Authors hope that the proposed model will open a discussion on maturity assessment for IT quality.

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