Development of a Model for Quality Process Stage Development Software Applied Unit Systems UTMACH

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Abstract— In the present investigation discloses some models or standards focused on system development process. Pretending to give a solution to the user dissatisfaction that causes no profiling to develop quality system. And with reference to the systems unit of the Technical University of Machala and under the investigative process that took place it was detected that there is no order of development in the Unit, the various schedules that are performed many times outside the scope of work team. Due to this circumstance and aims these preliminary detected based on a comparative analysis of the various models or standards applied quality system to create a working environment that allows Systems Unit improve the system development process. Forming itself the quality model system that will engage the Systems Unit.
Keywords— Quality models, quality standards, software development process, ISO, IEEE.

I. INTRODUCTION

Quality besides being a term of approval or satisfaction for the customer today has become a point of competition to stay in business.

Therefore many companies and organizations chose to create quality models enabling work environment coupled to each organization's software development and not before highlighting best placed to propose models or standards that are involved in the different stages of such software as models to evaluate planning, product, process and quality management software such as ISO / IEC or IEEE.

Stressing the purpose of the rules is to coordinate planning and better use for realizing processes in various areas of development.

This article aims to show the results of the development and application of a quality model for software development process in Unit Systems at the Technical University of Machala for this study has taken into account the various problems encountered in the context the rules focus on the software development process after having selected standards comparative analysis of the advantages and disadvantages of each of these standards was conducted containing benchmarks are used to determine the appropriate standard to be coupled is selected the study of research and already developed a phase model was implemented in the project SIUTMACH systems Unit Head where systems and developers who applied the model proposed concluding that this quality model proposed allow systems Unit optimize processes involved software development and achieve satisfaction in the use of the computer system by users UTMACH and thus improve the performance and usability of the system.

II. METHODOLOGY

In preparing the proposal quality model search about the different models and quality standards of software directly related to the development process if it is true in the world meets a number of standards but not all are dedicated to be developed area of software development process, and the study was conducted is important to focus on the standards applied to the subject. [7]

A. Study of standards and quality standards for software development process.

To research the rules and standards of the development process including CMMI pattern, SCE, IDEAL model, model PSP, TSP model, model CBA-IPI, ISO 15504, ISO 90003, and ISO / IEC 12207 is considered: 2008.[9]

Starting with the CMMI quality model was created in 1987, the DoD commissioned the University of Carnegie-Mellon to develop a model that would assess the level of quality that could be expected from their software contractors. It sponsored the creation of the Software Engineering Institute (SEI), who created the SW-CMM (Capability Model for Software Matrurity) model was an officer since 1991 with version 1.1. it is a model consisting of best practices that address development activities applied to products and services also addresses practices that cover the product lifecycle from conception through delivery and maintenance of software.

Under the study it determined that the model provides a common epithet for an evaluation equal software processes,

although the assessment does not characterize the certification if not rather to the results obtained demonstrate that the selected standard is adequate to implement CMMI in an organization by applying a series of levels which processes must pass to result end maturity. The levels are: Level 0 Incomplete, informally Made Level 1, Level 2 - Planned, Level 3 - Well defined, Level 4 - controlled quantitatively, and Level 5 - Continuous improvement. [6]

You have even knowing that to implement any of these levels is very costly to the organization and this could be seen as a disadvantage.

Study also took as the PSP Model (Personal System Process) is aligned and designed for use in organizations with process models CMMI or ISO 15504. It was proposed by Watts Humphrey in 1995 and was aimed at students. Beginning in 1997 with the launch of the book "An introduction to the Personal Software Process" is now directed to juniors engineers this model is a smaller version of CMMI which cares only for a set of process areas the structure of this model based on the measurement of staff where it relates to the estimated time that will develop the software, staff planning, adds to PSP0 planning steps. The first step adds size and resource estimates and a test report. Another area is the quality of personal quality, is related to the amount of defects that contains the software product. At this level the inspections are introduced in the phases of design and coding, as a mechanism to increase the quality of products, as you can see is a model we need a different model or standard in order to function and can also be considered a disadvantage.

Other models taken for research is the ISO 15504 standard provides a framework for methods also known as Software Process Improvement Capability Determination, abbreviated SPICE, in Spanish, 'Determination of Capacity Software Process Improvement "is a model for improvement, evaluation of development processes, maintaining information systems and software products.

It includes evaluating the processes, process improvement, capacity determination.

- It is aligned with the ISO / IEC 12207 standard that defines the lifecycle processes for development, maintenance and operation of systems software.
- Placement and support CMMI. ISO panel is part of the processor model and SEI CMMI maintaining compatibility and equivalence of the latter with 15504.

The ISO / IEC 12207: 2008 standard established by the International Organization for Standardization (ISO) created on 1 August 1995 was the first international standard that provides task-focused life cycle process of software that are grouped into key processes, support process, and general processes of the organization, as well as a process to adapt the life cycle of each particular case. [10]

The purpose of the ISO / IEC 12207: 2008 is to provide a defined set of processes to facilitate communication between purchasers, providers and others involved in the software lifecycle. [11]

This International Standard is aimed at purchasers of software products and services from suppliers, developers, operators, maintainers, managers, quality assurance managers and users of the software product.

As shown in this section is the historical evolution of different quality standards focused on the software development process as a basis for this investigation.

B. Problems found

To properly justified problem encountered in this research a survey to staff working in the software development department of the Technical University of Machala was performed.
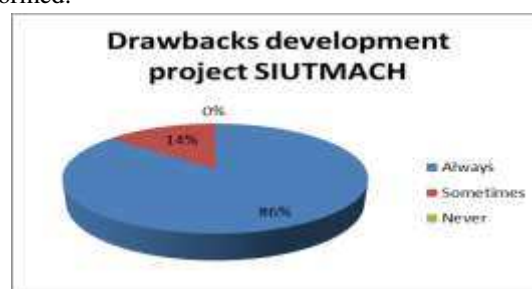

Fig.1: Drawbacks in the project

The questioning was developed based on

1. Lack of documentation
2. Delays in project delivery
3. Lack of specification requirements.
4. Disagreement by the requesting authorities.
5. Failure to deliver

Of applied survey may show that 86% say that there are always problems in the project 14% say they sometimes and 0% say there are never problems as shown in the above chart.

Likewise I questioned the staff if they would agree to implement a quality model that will help them solve the problems encountered in the 1005 System Unit respondents who agree fully.

C. Selection of models and quality standards for software development process in the UTMACH

The investigation has selected the models and standards that are focused on the software development process, albeit globally are different assessment models focused on software product and process quality; for the present study focuses on the software development process; consequently, will be the ones to allow comparative analysis of its features and adjust the proposed model for Systems Unit of the Technical University of Machala.

2.1. General Software Development Process in UTMACH.

A software development process generally focuses on the different activities relations with the process, and is embedded lifecycle of software that allows you to check the procedure as shown in the chart below.
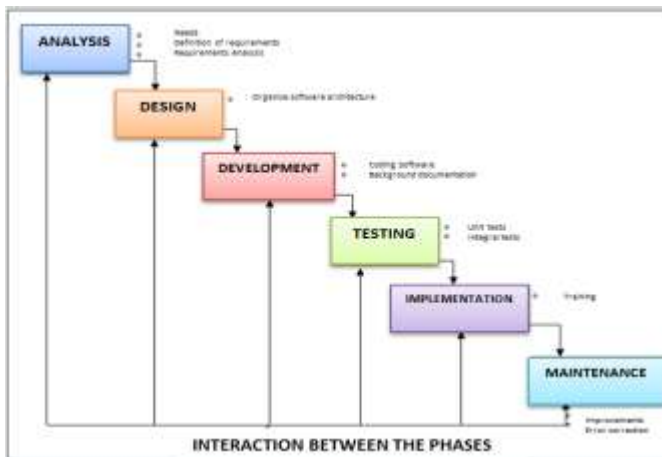

Fig.2: Lifecycle software

Likewise there are rules that analyze the life cycle of software and listed below have been pillars to raise the quality model for Unit Systems UTMACH.

• STANDARD ISO 12207: 2008

This standard was created specifically for the software development process and consists of the following processes:

Main processes and management support within them are detailed threads as follows:

In the main processes perform the following activities:

Acquisition, supply, development, operation and maintenance

In the process of supporting the following activities:

Documentation, configuration management, quality assurance, verification, validation, joint review, audit, troubleshooting.

In the process of managing this standard it consists of the following activities:

Home and scoping, planning, implementation and monitoring, review and evaluation, termination.
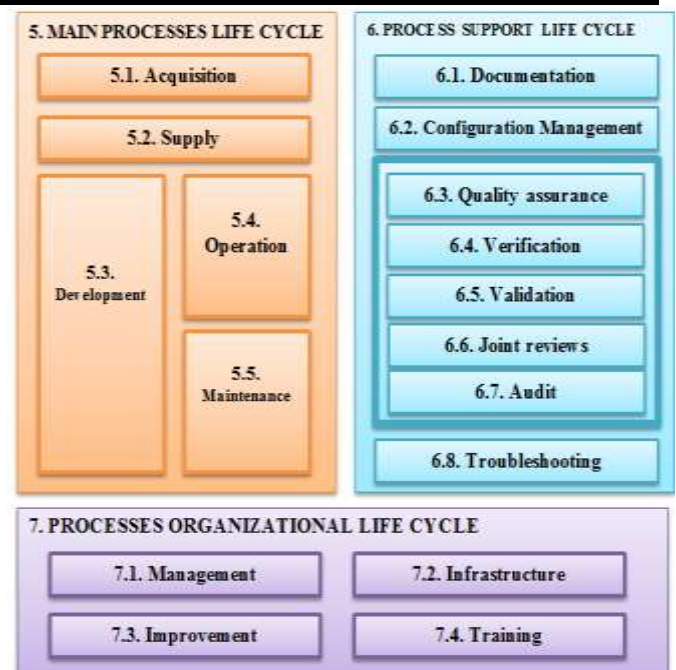

Fig.3: Process of ISO 12207: 2008 standard

• ISO Standard 15504

The ISO 15504 standard creates a framework for assessment methods, it is not a method or model itself. [9]

This involved the evaluation of processes, process improvement, determination of process capability.

It is distributed with the ISO / IEC 12207 is the standard that defines the lifecycle processes of software development.
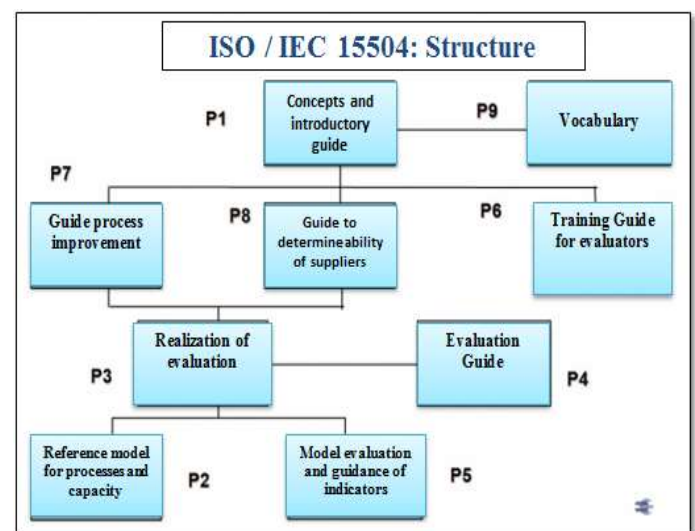

Fig.4: Process of ISO 15504

2.2 Comparative analysis of quality standards for the software development process.

To prepare a comparative analysis of models and quality standards to focus software development process has been taken other related software quality in phase of software development process concepts.

Regarding the software development process as in the engineering process is based on four core activities [5]:

• Software Specification

- Software Development
- Software Validation
- Software evolution

And these are the activities to be considered and that further quality model to be applied within the Systems Unit of the Technical University of Machala approaching.

In addition to considering these parameters is referenced a study by the National Technological University of Buenos Aires in a Master's thesis in engineering quality which consists of the following: [12]

Criteria to evaluate quality models for software process.

Criterion 1: Availability: the degree to which you can access existing information [12].

1. The information is not available to the general public
2. There is availability of some documents but is limited access.
3. Enough information available to be used is located.

Criterion 2: Clarity: has explanatory mechanisms on the use has factors such as structure, language and presentation of the model.

1. The model does not have support mechanisms for applying the model.
2. The model is clear but has no mechanisms to implement it.
3. The model has mechanisms on its usage.

Criterion 3: Adaptability: it has the ability to adapt to different situations that present the project.

1. The model presented is not adaptable rigidly to use.
2. The model is adaptable but requires certain rules to follow
3. The model can be adapted.

Criterion 4: Completeness: Has description of attributes, metrics and support mechanisms to reach measurement.

1. The model is incomplete
2. The model fairly describe its components
3. The model describes all parts

Criterion 5: Application area: the model can be applied to different areas of system quality.

1. Process model, methodology or standard.
2. It can be process model and product at the same time
3. Model System Product

Criterion 6: Types of projects: What types of projects can be applied.

1. For the most part can be applied to large projects robust and weather
2. It can be applied to various projects that vary in time and size
3. It is applicable to all types of projects and which can be applied through interactions.

More than considering the score for each criterion applied from the value 1-3 there are models that do not apply the criteria and is considered the state N / A which means that it has no score.

In the present investigation is taken as reference the results in Table 1 where it was determined that the ISO 12207 standard has the highest rating although it has taken all models or standard that are part of the software development was chosen complementing implement ISO 12207 to ISO 15504 standard for being the standard that assesses process maturity and thus adapt what can correspond to the Unit Systems at the Technical University of Machala.

TABLE I. SCORING CRITERIA EVALUATED TO SELECT THE MODEL OR STANDARD

Standar / Model	Evaluation criteria						Total
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	
CMMI	2	2	1	2	1	1	9
PSP	2	2	2	2	1	2	11
ISO 15504	2	2	2	2	3	1	12
ISO 12207	2	2	2	2	2	3	13

2.3 Quality Model for software development process.

The proposed model consists of the union of process quality model ISO 12207: 2008 standard where a framework that will allow Systems Unit at the University mentioning that in this section the study of the standards will be created that integrates conform better to the investigation and resulted in the ISO 12207 standard to evaluate the software development process, and the ISO 15504 standard that will measure the maturity of the software development process, the traditional methodology and model traditional life cycle is where software development from the initial phase to the implementation of the developed software, that uniting all these activities that each said element ensure software quality is defined.
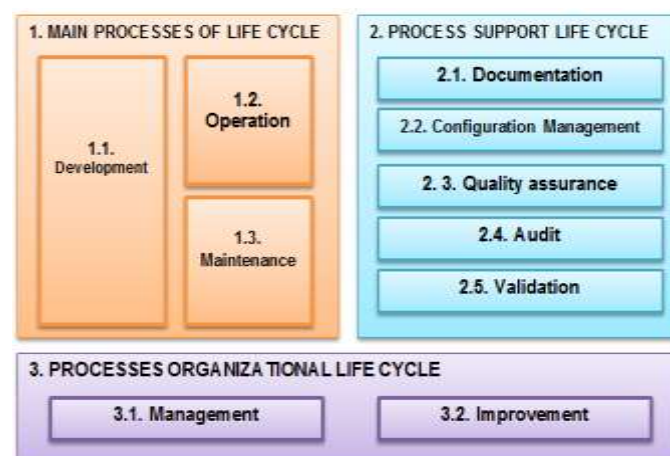

Fig.5: Quality model for software development process

III. RESULTS PRESENTATION

The interpretation refers to the instrument applied to developers and the head of the Systems Unit of the Technical University of Machala.

TABLE II. RESULTS OF APPROVAL OF THE CHIEF DEVELOPERS AND QUALITY SYSTEMS MODEL

ASESSMENT		Frequency	Porcentage	Valid Porcentage
Valid	Always	4	57,1	57,1
	Almost always	3	42,9	42,9
	Rarely	0	0.00	
	Never	0	0.00	
	Total	7	100,0	100,0

Fig.6: Acceptance criteria quality model

According to Figure 6. It can be seen that the degree of acceptance by the staff development unit systems achieving a 97% acceptance considering as acceptable to the assessment of long and often.

IV. CONCLUSIONS

Evolutionary advancement of standards and quality standards for the software development process has contributed in some way to improve the development process.

Good practices in the software development process have allowed coupling at different stages involved in the development.

The proposed quality model for software development process in Unit Systems at the Technical University of Machala was based on the study of different models and quality standards specifically the International Standard IEC / 12207 which allowed coupling cycle system life considering that the activities proposed in the model is easily adapted to the current situation of the Systems Unit.

The quality model proposed according to the results of the application to a part of the software development process is applicable as it is based on standards of quality and the development process is optimized by ensuring quality.

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