A Comparative Analysis between Maturity Models for ITIL

Humberto Rocha de Almeida Neto[1, 2, 3], Alexandre J. H. de O. Luna[1], Edviges Mariza Campos de Magalhães[4],Hermano Perrelli de Moura[1], Pedro A. D. A. Teixeira[2], Victor Monteiro Silva[2]
{hran,ajhol,hermano}@cin.ufpe.br; edviges.magalhaes@dataprev.gov.br;
{pedroaristides1,vic.monteirosilva}@gmail.com

[1] Centro de Informática - Universidade Federal de Pernambuco – CIn - UFPE
Avenida Professor Luís Freire, s/n - Cidade Universitária - CEP 50740-540
Recife - PE - Brasil
[2] Centro Universitário de João Pessoa – UNIPÊTECH - UNIPÊ
Rodovia BR 230, Km 22 - Água Fria - CEP 58053-000
João Pessoa - PB - Brasil
[3] Serviço Federal de Processamento de Dados - SERPRO
Avenida Parnamirim, 295 - Parnamirim - CEP 52060-901
Recife - PE – Brasil
[4] Empresa de Tecnologia e Informações da Previdência Social - DATAPREV
Av. Getúlio Vargas, 47 - 8º Andar - Centro - CEP 58013-240
João Pessoa – PB - Brasil

Resumo: *ITIL (Information Technology Infrastructure Library) é um dos frameworks utilizados pelas organizações como referência de "boas práticas" para gerenciamento de serviços de Tecnologia da Informação (TI). Devido à sua complexidade, implementar o ITIL não tem se apresentado como uma tarefa trivial. Implementar processos baseados no ITIL tem normalmente trazido elevado risco as organizações. Desta forma, tem sido primordial constantemente realizar uma avaliação quanto à maturidade dos processos organizacionais antes, durante e após a implementação de boas práticas em Gerenciamento de Serviços de TI. Neste artigo são apresentados os resultados de uma análise comparativa realizada entre três modelos de maturidade de apoio à governança em TI para avaliação de processos baseados no ITIL. Acreditamos que os resultados apresentados sirvam de incentivo para o uso efetivo destes modelos visando otimizar o gerenciamento de serviços de TI no mercado contemporâneo.*

Abstract: *ITIL (Information Technology Infrastructure Library) is one of the frameworks used by organizations as a benchmark of "good practices" for service management of Information Technology (IT). Due to its complexity, implementing ITIL has been considered as a trivial task. Implement processes based on ITIL has usually brought elevated risk to organizations. Thus, it has been paramount constantly perform an evaluation of the maturity of organizational processes before, during and after the implementation of best practices in IT Service Management. This article presents the results of a comparative analysis between three maturity models to support IT governance for evaluation processes based on ITIL. We believe that these results serve as an incentive for the effective use of these models to optimize the management of IT services in the contemporary market.*

Palavras-chave: Modelos de Maturidade. Modelos de Apoio à Governança em TI. Gerenciamento de Serviços. *ITIL.* Engenharia de Software.

1. Introduction

As market competition becomes increasingly fierce, organizations feel the need to control and monitor your workplace. In this context, organizations operating in dynamic environments must increase their performance and maintain competitive advantage in the market. The adoption of best practices, as, for example, suggests the ITIL, increases the probability of organizations to achieve efficiency in the provision of IT services (OGC, 2009).

ITIL is the most widely used frameworks with regard to support for IT governance (Computerworld, 2006). Nevertheless, implementing ITIL has proven to be a rather complicated task, with high probability of failure and that traditionally have been doomed to failure (Luna, 2011). According Sharifi et al. (2008), some of the most common mistakes made by organizations in implementing ITIL are being too ambitious, not create work instructions, do not assign the charge of the process, lack of management commitment, among others.

As ITIL has a lot of processes, most organizations usually can not identify which actually implement first. Faced with scenarios like this, maturity models have assumed a role of paramount importance in providing information with respect to organizational guidelines for defining your plan to improve quality and productivity.

This article presents the results of a comparative analysis of three maturity models to support IT governance, which are in accordance with ITIL.

2. Methodology

This work was based on a exploratory review of scientific literature with indirect documentation. The direct documentation is based on interviews or questionnaires which was not our case. In this study we used the comparative method (Marconi and Lakatos, 2004). This method was used to perform a comparative analysis between three models of maturity models to support IT governance, namely: the PMF ITIL - Process Maturity Framework (OGC, 2007), ITSCMM - Information

Technology Service Capability Maturity Model (Niessink et al, 2005) and CMMI-SVC - CMMI for Services (CMMI-SEI, 2010). Moreover, this work can be classified as an applied research, since the application is based on the theory already developed, in other words not intend to discover new theories.

3. Maturity Models to Support IT Governance

Maturity models have been increasingly used by IT managers in organizations for self assessment, providing an approach for IT professionals to control , understand and agree on priorities and areas that require greater attention. Since the maturity models describe how processes are managed, an organization can discover best practices for internal controls system of IT. This paper will present three maturity models based on ITIL in order to compare them. These models are presented in the following sections of this article.

ITIL PMF

The ITIL PMF (Process Maturity Framework) was developed to provide a common approach to best practices for measuring the maturity of the organization's processes. It is the only maturity model specifically designed to ITIL, and is described in the ITIL library, on the book Service Design. It can be used to assess the maturity of a given process and to measure the maturity of the processes of the organization as a whole. The PMF is aligned with ITIL CMMI and several other models with a focus on service delivery.

According to ITIL PMF, the maturity of the organization not only depends on the maturity of their processes because each level requires a set of changes that is fully efficient. Thus, the five sets PMF ITIL areas surrounding each specific level, these being (OCG, 2007):

- **Vision and direction:** The general direction regarding the role and position of IT within the organization;
- **Processes:** The procedures necessary to achieve the goals and objectives;
- **People:** The skills and abilities required to perform the procedures;
- **Technology:** The supporting infrastructure to ensure that processes are executed;
- **Culture:** Behaviors and attitudes required in relation to the role of IT within the company.

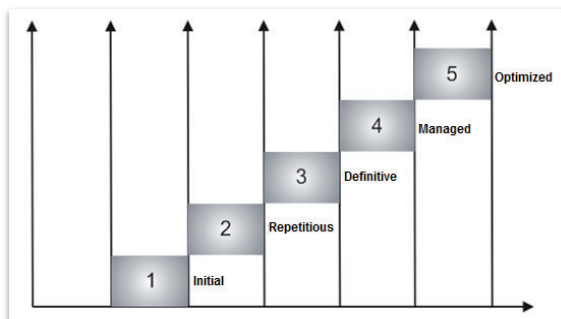Figure 1. Maturity Levels of ITIL FMP - Source: Adapted from OCG (2007).

Figure 1 illustrates the pattern of growth according to maturity levels of the ITIL PMF. Thus, according OCG (2007), the five levels are:

- **Level 1 (Initial):** There is little or no activity on the management process. This level can also be described as *ad hoc* or chaotic.

- **Level 2 (Repetitious):** The process was recognized but with little clarity. Generally process activities are disorganized and without direction and are targeted to be efficient.

- **Level 3 (Definitive):** The process was recognized and documented. Reports and results are stored for future use.

- **Level 4 (Managed):** The process is fully defined, managed, well documented and has become proactive.

- **Level 5 (Optimized):** The process was considered "institutionalized" as part of daily activity among all involved in the process.

ITSCMM

The maturity model known as ITSCMM (Information Technology Service Capability Maturity Model) is based on the CMM for Software Version 1.1. Originated from two research projects, with partial support from the Dutch Ministry of Economic Affairs. The overall goal of the project which led to ITSCMM was to devise a method for specifying and controlling IT services (Niessink et al. 2005).

To this end, the ITSCMM was structured in different maturity levels for organizations that provide IT services. Its main focus is on measuring and improving process maturity of IT services provided by organizations. This model does not measure the maturity of individual services, projects or organizational units but the whole process of service delivery.

According Niessink, et al. (2005), the two still ITSCMM has two specific objectives:

- Allow IT services providers to evaluate their capabilities regarding the delivery of IT services.

- Provide IT service providers the steps and guidelines for the continuous improvement of its capacity of service.

The ITSCMM meets these two objectives by measuring the ability of the processes of IT service organizations on an ordinal scale of five levels of maturity. Each level prescribes certain processes, and organizations can enhance their service capacity by implementing these processes. The five maturity levels are (Niessink et al, 2005):

- **Level 1 (Initial):** The processes of service delivery are often ad hoc or even chaotic. Few processes are defined.

- **Level 2 (Repeatable):** basic management processes are established.

- **Level 3 (Defined):** The IT services processes are documented, standardized and integrated into standard service processes. All services are delivered using adapted versions of standard service processes of the organization.

- **Level 4 (Managed):** There are collected detailed measurements of the process of service delivery (Service Delivery) and IT service quality. Both the service processes and the services provided are quantitatively understood and controlled.

- **Level 5 (Optimized):** A continuous improvement of the process is done by quantitative experience of the processes and the monitoring of new technologies and ideas.

According to ITSCMM, for an organization to go to the next level of maturity, it first needs to implement all the processes of the level you are on.

CMMI-SVC

The CMMI for Services (CMMI-SVC) provides guidance to CMMI best practices across service organizations. The best practice model focuses on activities to provide quality services to customers. It is designed to improve practices in mature services and to contribute to performance, customer satisfaction and profitability of the economic community (CMMI-SEI, 2010).

The CMMI-SVC offers two evaluation forms: per stage (with a focus on assessing the organization as a whole) or continuous (with a focus on evaluation of individual processes). Table 1 shows how these levels are structured.

Table 2: Levels of continuous representation and Stage representation - Source: CMMI-SEI (2010).

Levels	Continuous Representation Capacity Levels	Stage Representation Maturity Levels
Level 0	Incomplete	
Level 1	Executed	Initial
Level 2	Managed	Managed
Level 3	Defined	Defined
Level 4		Quantitatively Managed
Level 5		Optimizing

The levels of continuous representation have the following descriptions SEI CMMI-(2010):

- **Level 0 (Incomplete):** A process partially executed or not executed.

- **Level 1 (Executed):** It is a process which meets the specific goals of the process area. The resulting improvements of this level can be lost over time. And to avoid this is done through the institutionalization of generic practices at levels 2 and 3.

- **Level 2 (Managed):** It is a planned process and its implementation is monitored through the initial planning.

- **Level 3 (Defined):** It is a process adapted from a set of processes, standards of the organization, according

to trace route defined by the organization.

Levels of representation in stages have the following descriptions CMMI- SEI (2010):

- **Level 1 (Initial):** The processes that level are usually *ad hoc* and chaotic. Some of the characteristics of organizations that are at this level commit itself beyond its capacity, leaving a process at a time of crisis for being unable to repeat their successes.

- **Level 2 (Managed):** The process discipline reflected by that level, contributes to that existing practices are retained during times of stress. When those practices are in place, projects are executed according to their documented plans. The process descriptions, standards and procedures may be different for each process instance.

- **Level 3 (Defined):** The processes are well understood and characterized. Uses standard processes to establish equality within the organization. The process descriptions, standards and procedures are adapted from the standard set of processes of the organization to adjust to an organizational unit or a specific project. At this level the processes are typically only qualitatively predictable.

- **Level 4 (Quantitatively Managed):** The process performance is predictable and is quantitatively controlling techniques using statistical and other quantitative techniques. Used as criteria in managing processes quantitative objectives for process performance and quality, which are established by the organization and projects. The quality and process performance are understood in statistical terms and managed over the life of the processes.

- **Level 5 (Optimizing):** Focuses on continuous improvement of process performance using incremental and innovative processes and technology. The organization takes care to address common causes of process variation and generate process changes in order to improve process performance and meet quantitative targets established process improvement.

4. Comparative Analysis

The comparative analysis between maturity models related to this work was structured in this macroscopic view, which sought to present general data of these models. These data are presented in the table below.

Table 2. General data of the investigated models - Source Author's Own.

Evaluation Criteria	ITIL PMF	ITSCMM	CMMI-SVC
Representations	Stage only	Stage only	Stage and Continuous
Number of Levels	5 maturity levels	5 maturity levels	5 maturity levels and 4 capacity levels

Number of Processes	26	22	24
Focus	*ITIL*	Services	Services
Publication year	2007	2005	2010
Author	*OGC - Office of Government Commerce* (OGC, 2007)	Frank Niessink, Viktor Clerc, Ton Tijdink, e Hans van Vliet (Niessink et al, 2005)	*SEI -Software Engineering Institute* (CMMI-SEI, 2010)
Country	England	Netherlands	USA

Given that there are commonalities among the three maturity models analyzed, it becomes possible a comparative analysis between them. Given the macroscopic view presented in Table 2, we can highlight some points of the models investigated in this work.

On the issue of coverage, the ITIL PMF was created specifically with a focus on best practices of ITIL. The other models discussed in this study, despite compliance with ITIL also take into consideration other good practices of IT services.

The model ITSCMM, in turn, does not cover individual services and is focused on optimizing services of an organization as a whole. Thus, we can say that ITSCMM has a more comprehensive with regard to IT services, where the processes are ordered in maturity levels very well organized.

The CMMI-SVC would also not have been designed with specific focus on ITIL, this model has the option maturity assessment continuously.

5. Conclusion and Future Work

In this paper we present the results of a comparative analysis between three maturity models for evaluating processes based on ITIL. We seek through a comparative analysis presenting relevant points about each model presented merely to models PMF ITIL, CMMI-SVC and ITSCMM.

We believe that these results serve as an incentive for the effective use of these models to optimize the management of IT services in organizations.

As future work, other maturity models to support IT governance as well as comparison criteria already being investigated and applied to the context of this research. Another idea is to create a new model based on the positive and negative points of each model investigated for future experiments.

References

[COMPUTERWORLD, 2006]. O porta voz do mercado de TI e comunicação. Gestão: ITIL é o framework de governança mais procurado.
http://computerworld.uol.com.br/gestao/2006/10/10/id gnoticia.2006-10-10.4331781665/

[CMMI-SEI, 2010]. SEI, Software Engineering Institute. CMMI for Services (CMMI-SEI, 2010b), Version 1.3, Technical Report CMU/SEI-2010-TR-034. Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, 2010.
http://www.sei.cmu.edu/reports/10tr034.pdf.

[LUNA, Alexandre J. H. de O, 2011]. MAnGve: Implantando Governança Ágil. 1ª. Edição. Rio de Janeiro – RJ. Editora BRASPORT, publicado em: 09 de novembro de 2011, 384 páginas. ISBN: 9788574524900.
http://www.brasport.com.br/gerencia-de-projetos-br/tecnologia-da-informacao-ti-br/implantando-governanca-agil-mangve.html.

[MARCONI e LAKATOS, 2004]. MARCONI, M. A.; LAKATOS, E. M. Metodologia Científica. 3ª ed. Atlas, 2004. ISBN: 8522437998.

[Niessink, F., Clerk, V., Ton, T., Van Vliet, H, 2005]. IT Service CMM Version 1.0, Release Candidate 1. Faculty of Sciences, Departament of Computer Science. The Vrije Universiteit. Amsterdam. http://sites.google.com/site/itservicecmmwebsite/itscm m-1.0rc1.pdf.

[OGC, 2007]. Office of Government Commerce. Service Design. London - England: The Stationary Office (TSO).

[OGC, 2009]. Office of Government Commerce. ITIL V3 Foundation Handbook. . London – England: The Stationary Office (TSO). 2009.

[SHARIFI, Mohammad; AYAT, Masarat; RAHMAN, Azizah Abd; SAHIBUDIN, Shamsul, 2008]. Lessons learned in ITIL implementation failure. In: Proceedings - International Symposium on Information Technology, ITSim. Institute of Electrical and Electronics Engineers, New York, 2008.