

# Proposal of a Model for IT Service Continuity Management

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**Abstract:** Micro and small companies in the software area now represent more than 90% of organizations in the country and grow 6% annually on average. However, the lack of planning in these companies in business continuity management contributes to their mortality when problems occur, such as disasters and disruption of system services. The implementation of IT Service Continuity Management as a tool for planning would be the solution. This research presents the current level of maturity of these companies in a Micro scenario and Small IT Companies in Paraná, at Londrina and Cascavel region.

**Keywords:** Planning, Management, Maturity, Companies.

## 1. INTRODUCTION

Currently, the service continuity planning is an essential element of the organization's risk management program. The purpose of this plan is to keep the organization in business in the event of a disaster, through the maintenance of their most critical processes while providing products and services to its internal and external customers.

The process of service continuity management incorporates both a technology element - Service Continuity Management in Information Technology (IT) - and a business element - Business Continuity Management (BCM). Effective management of IT Service Continuity requires a balanced risk reduction, measured according to the business continuity planning. IT continuity management services are concerned with the organization's ability to continue providing a predetermined and agreed level of IT services to support the minimum business requirements in case of a business interruption.

Historically, business continuity was focused on protection against unlikely events, but large ones, such as fire, flood, natural disaster. However, even with interruptions, such as minutes or hours of interruption of a critical business system, an interruption in service of a critical supplier or an external service provider, or the potential business impact caused by the economy and its effects on customers may have serious business consequences.

To this end, the article is organized as follows: section II presents a literature review on the two main concepts of this project: continuity management of IT services and maturity models and also a discussion of the related work. Section III presents the research methodologies used as well as the research methodology that was applied in the development of this work. Section IV exhibits a presentation of the questionnaire and the results obtained from the research use. Eventually, section V presents conclusions and future work.

## 2. LITERATURE AND RELATED WORK REVIEW

In this section, it is presented a literature review, based on the development, mounted on three main databases: Science Direct, IEEE xplora, ACM Digital Library. However, not limited only to these databases, the work intends to conduct a study on the actual state of the art about Continuity Management of IT Service and Maturity Models. Studies in the literature will be presented as well.

### 2.1. IT Service Continuity Management

Every organization's business is, somehow, IT-dependent; thus making IT services critical for the continuity of the organization's business.

Besides the emphasis on IT, it is important to realize that there are people who operate and make decisions, as well as processes designed to fulfill the operational procedures and the organization of actions and tasks. These elements must always be synchronized for optimum operation of the process; they are technology, people and processes.

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Initially, the continuity management of IT services must have a Business Continuity Plan (BCP), in order to determine which are the critical processes of IT areas that support the organization's business, and procedures to prevent the unavailability of services.

To have proper management, it is necessary the company to have certain maturity in the process; through indicators capable of measuring and managing this process.

This maturity allows management of the continuity of IT services and, consequently, the business. The higher the maturity of the organization, the faster the process of continuity management of services IT will be implemented. All the proposed survey intends to find how much the organization loses as a result of a disaster or another kind of interruption in IT services.

## 2.2. Maturity Models

Maturity models seek to establish levels of development processes, called maturity levels, featuring stages in the implementation of organization's improvement [8]. On every step of this journey, the model recognizes and signals the progressive recognition of the organization. Many maturity models have been studied, among which we highlight:

### **Gartner Group**

The study of Gartner Group, Inc. shows a view of organizations with respect to business continuity [1].

### **Process Estimates by Maturity and Service Levels**

Maturity model to manage the processes estimations based on services and supported by diagnostic assessment questionnaire [5].

### **KM Competences Maturity Model (KMCMM)**

It is a model based on Knowledge Management (KM), in processes and competence of KM; which propose to evaluate the impact both of the KM in organizational change and of the learning in the performance of business management [9].

### **Capability Maturity Model Integration (CMMI)**

It is a maturity model created and maintained by SEI (Software Engineering Institute); whose emphasis is the area of processes of information technology [10].

### **Reference Model for Improving the Software Process (MR-MPS)**

This model is developed and managed by the

Association for Brazilian Software Excellence Promotion in conjunction with numerous companies in the sector [7].

### **Control Objectives for Information and Related Technology (COBIT)**

Created by ITGI (IT Governance Institute), it is a widely used model in the governance area of information and communication technology [11].

## 2.3. Related Work

To further emphasize the theoretical review, a search of the literature on related work was made. Demonstrating that in the area of construction of a framework for a maturity model, using management continuity of IT services, this work proved to be the pioneer. However, some non-specific studies to the topic discuss the use of management continuity of IT services aiming knowledge storage.

These studies converge with each other for the main application functionality of this framework, which deals with the management and storage of information within knowledge management companies. A work that addresses this practice is presented by [5], the generation of knowledge from practice in specific situations. Which makes the development process less risky, in order to achieve the established goals.

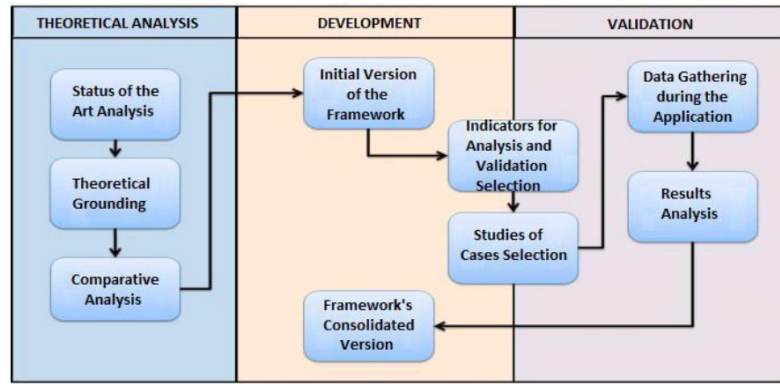
Finally, it is relevant to highlight the work of [2], [3], [5] and [6] to develop maturity models for different areas present during the process of software development. These studies always aim to achieve a higher level of maturity. This fact is also addressed by this project, seeking to make the continuity management of IT services at the highest maturity level.

## 3. RESEARCH METHODOLOGY

To emphasize the importance of implementation and monitoring of a research methodology while conducting scientific work, this paper will bring a description of a model ready and in use.

### 3.1. Research Methodology Used

The research methodology used has as a basis the GAIA software factory, belonging to the Department of Computing of Londrina State University. The model presented by GAIA can be seen in Figure 1.



**Figure 1:** Research methodology of scientific articles development with emphasis in a framework construction. Resource: adapted from [3].

According to Figure 1, there are three main stages: (1) Theoretical Analysis, (2) Development and (3) Validation. In the first stage (1), three macro activities effectuate, being the first one Status of the Art Analysis, in which a database search is performed. This Search aims to provide fundamental subsidies for the construction of the second and third macro, Theoretical Grounding and Comparative Analysis, concluding the first stage of the methodology.

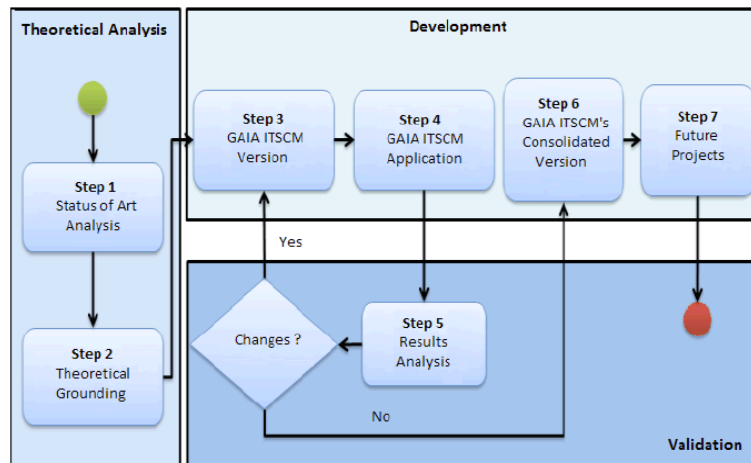
In the second stage, Development, there are two exclusive macros, belonging only to their grade, and other two that are shared with Stage 3, Validation, which in its turn has another two exclusive macros. In the beginning of the second stage, an Initial Version of the Framework is already developed; it's the first step of this second division. Furthermore, the two shared macro activities, Indicators for Analysis and Validation Selection and Studies of Cases Selection, are performed.

Before settling Stage 2, the model introduces the last development stage, effectuating Data Gathering

during the Application and Results Analysis. Lastly, to finish the process, the course goes back to Stage 2, in which executes the Framework's Consolidated Version. The usage of this methodology has shown to be, in fact, efficient, mainly in projects about framework based maturity models creation.

**3.2. Research Methodology Developed to the Management of IT Services Continuity (ITSCM)**

Based on the procedures described above and used for the accomplishment of this project, a specific methodology for the creation of a framework was formulated, for a maturity model through the Management of IT Services Continuity (ITSCM). This model, adapted from [3], is also split in three main stages: (1) Initial Analysis, (2) Development and (3) Validation, with seven total steps for its framework development. Among them, two belong to Initial Analysis, four to Development and two to Validation, as seen on Figure 2.



**Figure 2:** Research Methodology for the creation of a framework for a maturity model using Management of IT Services Continuity (ITSCM). Resource: adapted from [3].

According to Figure 2, in the first stage there is Theoretical Analysis, with two steps: Step 1: Status of Art Analysis and Step 2: Theoretical Grounding. The whole basis of the model is created in this stage. For the creation, the following resources were used as support: Science Direct, IEEE Explore, Scopus and ACM Library. Therefore, in Literature, similar and/or complementary works to the actual project are searched.

Following Figure 2, the second stage, Development, has four steps, being Step 3: GAIA ITSCM Version, which is about the creation of its maturity levels and a diagnostic evaluation survey. Step 4: GAIA ITSCM Application, according to [3], using (1), planning of the case study, (2) data gathering preparation, (3) data gathering, (4) data analysis and (5) reports.

Before settling the second stage the model introduces the third one: Validation. There is Step 5: Results Analysis, which compares the achieved results to the model creation, so that it will become capable of performing all necessary procedures to its application. Going back to the second stage, there is Step 6: GAIA ITSCM's Consolidated Version, in which the final version of the model is developed. Lastly, Step 7: Future Projects, finishes the framework with the description of possible projects to be done in the same area.

**4. SURVEY AND RESULTS APPLICATION**

In a Parana's 11 software business research, a survey was applied and it was noticed that none of the companies had security policy for disasters caused by terrorism, by chance, fortuitous event or system failures. The percentage of application about the related topics by the organizations doesn't reach 20%. This survey has as resource the GartnerGroup Inc. study that shows the vision of companies when it comes to management of business continuity.

**4.1. Research Survey Results**

Topics	Percentage
Governance	29%
Scope	15%
Investment	20%
Organizational Program	15%
Disaster Recovery	21%
Process and Control	14%
Training	11%
Average	18%

Figure 3: Table of the results separated by subject.



Figure 4: Graphic of the results separated by subject.

**Governance**

Shows 29% in the research with the companies It describes the frequency that administration is updated about its business continuity management program and all objectives of recovery that support new ambitions. It also describes the density that intern balance is performed on implementation and maintenance of the program.

**Scope**

Appears with only 15% in the research, although the organizations should have indicators of quality of the business continuity management program, reported to the management.

The Scope also defines levels of recovery time service to critical objective applications.

Furthermore, it defines risk and business continuity management metrics that should be reported to the management.

**Investment**

shows 20%; the administration's concept about business continuity management contribution and disasters recovery should be connected to strategic long term objectives and individual business cases. The business continuity management projects should also be reviewed to ensure accordance to budget requirement.

**Organizational Program**

Shows only 15%; the business constancy and disaster recovery management should be adjusted as an all-company program. The objectives from business continuity management program should be regulated to the business strategy of the organization.

### **Disaster Recovery**

With 21% in the research, should keep levels of disaster recovery management aligned by key-business requirement. Combination of business continuity management and disaster recovery, besides continuous validation of risk evaluation and impact in business analysis.

### **Process and Control**

Appear with 14% in the research; the recovery time and place objectives should be connected to real recovery time. It should have maximum acceptable interruption and minimum business continuity defined to the product and service, a software/system to control and administrate status and maturity of the business continuity management program, a crisis/incident control tool to manage answers to the catastrophes.

### **Training**

With 11%, should act, consistently, through planned exercises or real recovery, performing the improvement of service level and availability goals for critical objective applications.

## **4.2. Maturity Levels**

Levels of maturity were established according to the process, following GartnerGroup Inc. [1] study.

### **Level 0 – Inexistent**

Little or no archives about the need of Business Continuity Plan. Inexistent corporate approach or appointment. Need is seen as a problem from IT area.

### **Level 1 – Initial**

Few executives recognize that Business Continuity Plan is a problem that demands study. Inexistent organized approach. Different groups use different approaches, with no methodology. There is investment, but no reports or control.

### **Level 2 – Repetitive**

There is acknowledgement from the executives of the need of Business Continuity Plan. Formal rules for the Plan, but no metrics. Systematization for development and maintenance of the Plan. The Plan is seen as a project, not as a process. Focus is IT disasters.

### **Level 3 – Defined**

Processes and procedures are regulated and filed, but there is no actual administration of its performing.

Formal structure of the Business Continuity Plan – responsible.Regular application of tests and exercises. Focus on IT and critical functions of business. There is Business Continuity Plan budget.

### **Level 4 – Managed**

Business Continuity Plan is seen as a part of risk management. There is control. The Plan is seen as a process, not as a project. Processes are reviewed periodically for improvement.

### **Level 5 – Optimized**

Business Continuity Plan is discussed at the high levels of the organization. Risk management is part of the organization's culture. The Plan is focused on business processes and supply chain. The Plan is also included in the beginning of IT projects.

## **4.3. Qualitative Survey and Results Application**

To conclude this process of presented proposal and results evaluation, the methodology of [4] and [12] was used. Firstly, an introduction of the developed model is done for two categories of participants: specialists and non-specialists. Specialists refers to users that have specific learning about the subject or work with IT service continuity management for at least three years. Non-specialists refer to the remaining workers from both organizations used as object of study.

In order to this process to be elaborated, nine participants from each organization were chosen; four were specialists and five, non-specialists, varying from project manager to conventional users of the system. In favor of this result, the application and utilization of the model was kept for a period of 30 days. It was necessary so that the participants could adapt to the framework and its processes, also to be part of the execution and implementation of it in the organization.

During the evaluation stage, five topics were shown to the participants, and they should consider these when judging the framework. The topics were based on the works of [4] and [12]. These are: (1) The definitions of IT service constancy management instruments are illustrated in the model, (2) The guidelines are about an IT service continuity management model, (3) It is possible to perform the usage of IT service continuity management inside the company, (4) The model helps daily processes of IT service continuity management and (5) This model can be applied to any institution and won't be restricted to software developer organizations only.

With such items in evidence, after the application time of the model, a survey from each participant was performed. This process should follow these procedures: (1) Each participant, specialist and non-specialist, should assign a rating according to the applied research, based on the five topics described above and (2) The ratings scale will vary from 1 to 5; 1 represents “entirely disagree” and 5, “entirely agree”. Table 3 shows results of this application.

**Table 3: Survey Application**

Organization A						
Participants	Ratings					Average
Specialists	5	4	5	5		4,75
Non-Specialists	4	5	5	4	5	4,60
Total Average						4,68

Organization B						
Participants	Ratings					Average
Specialists	4	4	5	5		4,50
Non-Specialists	4	5	4	5	5	4,60
Total Average						4,55

Therefore, according to Table 3, Organization A had, averagely, a bigger indication (4,68) of the users of the model, and Organization B had an indication of 4,55. This can be associated to the fact that Organization A is in a bigger maturity level than B's. Although the difference is below 3%, this shows the real need of the utilization of the maturity model in companies.

It is important to highlight that ratings provided by non-specialists reached the same result from both organizations (4,6), having 92% of approval and efficiency of the application. This demonstrates the dualism of the appropriateness of the tool, useful to public or private branch. If the ratings are compared, independently of average or participant, it can be noticed that in any case the model had a less than 4 grade, showing again the acceptance and approval of the obtained results.

Considering data from Table 3 as percentage, in which each point equals 20%, no rating had a range bigger than 20% of its maximum value. The average of the organizations and specialists range had a 50% decrease, so that, relative to the rating's maximum value, this average didn't have a variation bigger than 10%, reassuring the efficiency of the model.

Formerly, an organization should identify its critical business processes, that is, the analysis of business impact, based on its main trade objectives, values and activities. After evaluating the reflection of interrupting each critical business process, the company can

determine its constancy demand. For example, maximum process interruption time and minimum level of process substitute.

It is necessary to develop and program a contingency and plan to ensure the constancy of its critical business and processes in an acceptable level. The plans should be tested or executed to reassure its efficiency. Once introduced, an organization still needs to be sure that the business constancy management and its processes will be kept as part of the business.

**5. CONCLUSION AND FUTURE PROJECTS**

The IT service continuity management is a gradual cause of extreme importance to the administration of every and each company. Managing its assets is no longer a factor of control, but an essential process in all branches of the companies, contributing directly to the business' success or failure.

Based on that, the proposal given in this project, aimed for presenting a model of maturity that could help processes, so that the IT service continuity management can happen in a correct, constructive and positive manner in a company. This research consists, primarily, of the application of a survey that classifies the respondent in a level of maturity in the model. Furthermore, the implantation process of the model and the services, composed by the best execution techniques of widely used norms in each level.

Therefore, after the survey application, it is conclusive that it shows the maturity level the organization is in a relative subject. Because of the collected data presented as case study, the conclusion was that the model showed to be efficient and contributed positively to increasing the maturity level of the company. With this research, the IT service continuity management's usage leaves the status of improvement proposal in institutions and starts to be a viable and opportune way of executing and granting management in organizations.

Finally, as future projects, the intent is to apply this model in more case study objects, pursuing, thus, continuous improvement in the processes of the model. Advance, as well, the development of a tool already existent for the scope of the IT service continuity management.

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