APPLICATION OF LEAN SIX SIGMA METHODOLOGY TO OPTIMIZATION PROCESSES OF DATA MANAGEMENT IN AN EDUCATIONAL CONTEXT

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Abstract: This paper aims to contribute with some thoughts about database and information management in Portuguese educational context, at the level of schools and supervisors schools, as well as about transmission of information among them. We also emphasize the importance of definition and development of standardized technology platforms in order to build and develop structures that ensure the interoperability of information exchange and management among the various entities of an information system. In this paper we suggest a methodology (Lean / Six Sigma) that combines the reduction of complexity of the process with the improvement of reliability and efficiency.

1 INTRODUCTION

This paper aims to contribute with some thoughts about database and information management in Portuguese educational context, at the level of schools and supervisors schools, as well as about transmission of information among them.

Presently, information technologies are considered as an essential part of the modern educational system. In educational institutions, professionals of Information and Communication Technologies (ICT) face many difficulties in computer networks management because, generally speaking, their use very limited resources (Pereira, 1998).

There are several issues that must be preserved and treated with some care, including how to keep systems running efficiently, how to guarantee network security in accordance with security policies, the implementation of easier processes and how to ensure database functionality, which usually is a difficult goal to achieve.

Is also emphasize the importance of definition and development of standardized technology platforms in order to build and develop structures that ensure the interoperability of information exchange and management among the various entities of an information system.

The marching trend of the new economic order has generated a new capsule of SIX SIGMA as a unified approach to process excellence. The tests reveal that it has transformed some of the most successful companies in the world like Motorola, GE etc. It is activated as an approach to aiming at the target by changing the culture of a company, involving everyone in the company, not just the Black Belts and Green Belts (Guarraia, 2009).

2 PROJECT

Thus, the development of the project focused on identifying ways and mechanisms to increase efficiency and / or efficacy in database and educational information management in order to:

- Increase the speed of treatment processes and educational information management;

- Standardize the model of the information report between schools and education authorities;

- Reduce errors, avoid duplication of records and minimize the area of data warehouse;

- Seek ways to integrate different platforms and / or information systems;

- Matching the skills that are required to improve the process of managing data and information in school (Harry & Schroeder, 1999).

3 METHODOLOGY

Taking into account the objectives of this project, it was designed a methodology that combines the reduction of complexity of the process with the improvement of reliability and efficiency. Lean Six Sigma is a methodology that combines tools for efficient processes with the improvement of the quality of services and is being applied successfully in all manufacturing sectors and, more recently, in services industries, because it combines the focus of Lean - flow and speed - with the focus of Six Sigma - variability and quality (George, 2002).

This project cover the importance of definition and development of standardized technology platforms in order to build and develop structures that ensure the interoperability of information exchange and management among the various educational entities information systems.

For those that use the Six Sigma system there are two major methodologies. They include DMADV - used to create new processes or designs - and DMAIC – used for existing business processes - both inspired by Bill Smith and subsequent by Edwards Deming who are considered the pioneers of modern quality control.

DMAIC is useful in improving an existing business process to reduce and eliminate defects and it is normally defined as a set of practices that improve efficiency. The DMAIC methodology includes five steps including; Define, Measure, Analyze, Improve and Control. Here is some information regarding each step (Chau, 2009):

Define - The definition of the project/ assignment, using process map, application area, desired improvement, likely benefits etc. The importance lies of having the chance of a high successful delivery of better quality and saving costs in totality. Here in the academic strata, the failures include the definition of the problem in as an identity. The others may include projects like real life problems pertaining to "Distractions in the Class Room" for example.

Measure - This involves the analyses of the process to determine its present state and the future, as obtained. The data collection is a well suited frame for this.

Analyze - This involves the data analysis for identification of parts of process which affect the quality of the problem.

Improve - This adds to the process to find a permanent solution to the problem. This may involve better forecasting, better scheduling, better procedures or better equipment, specifying, teaching techniques, work environment for the teachers and school campus quality life.

Control - Involves the process of closing the problem by putting in the right procedures and management statistics.
DMAIC

4 APPLICATION

The application of this methodology was designed in two phases. In the first phase the characterization of reference and definition of the metric are made and the second phase consider the optimization of data management and information entities (Pyzdek, 2003).

The first phase, which includes the first three steps of the DMAIC methodology – Define, Measure and analyze - makes a diagnostic analysis which aims to characterize and measure the current state of the main areas of data management and information of each entity, namely:

- Exchange of information between the school (directory board, teachers) and education agencies that supervise schools;

- Structure of data and existing technologies in the school;

- Internal processes for data and information management in the school;

- Processes that support information exchange.

Subsequently, based on the relational schema of the entities involved, flow maps and the results obtained in measuring the processes of data management and exchange of information, solutions to major problems were identified at the level of information technology, qualification of human resources, processes, and information model.

In a second phase, which adds the two final steps of DMAIC - Implement and Control - the solutions

previously identified are implemented, and the monitoring of improvements arising from them is made. The solutions of this approach include (Chakravorty 2009):

- Improvement of data structures existing in schools;

- Development of methodologies for fast convergence for the exchange of information between schools and regulating authority;

- Implementation of processes that should enable to operationalize a framework for rapid exchange of information between education entities and authority boards;

- Establishment of procedures that support the implementation of data management processes;

- Minimizing errors;

- Performance improvement;

- Continuous improvement of the system.

Proposed Framework

The proposed frame work includes the objectives definition, an Information Model and the Dimensions of analysis.

Objectives

A Implement the most expeditious and greater efficiency in line with best practices from other institutions.

B Ensure more appropriate skills for information management in the Entity-School.

C Ensure the operational models of data management for the School organization.

D Standardize the format for reporting of information between schools and Entities-Clients.

Model Information
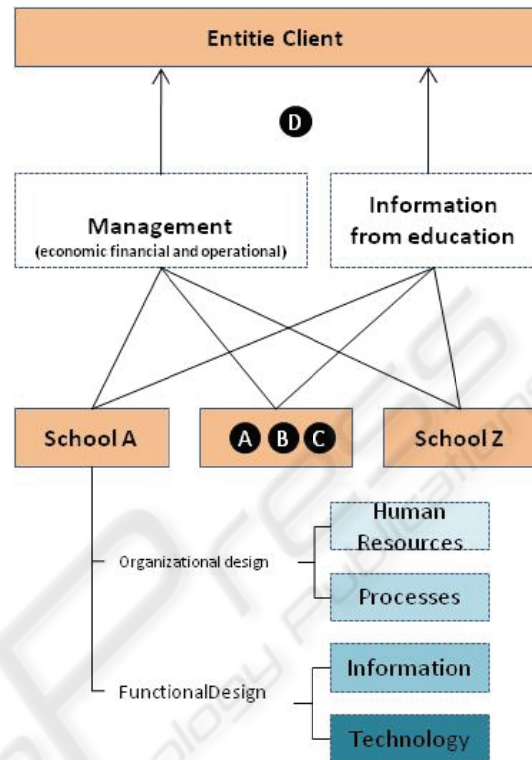
Dimensions of Analysis

Human Resources:

- Identification of roles and responsibilities in the Information management;
- Qualifications and experience in IT and information of the entity;
- Identification of entities responsible for contact with extra-and intra-school;

Processes:

- Identification of developed activities and their responsibility in support processes and in the processes of the educational system
- Design processes to develop over the life cycle of assets, identifying those responsible, information systems support and information flow.

Information:

- Identify the data kind and / or information;
- Characteristics of information (financial or operational);
- Identification of requirements for storage of information (history).

Technology:

- Define objectives for the Information Systems Model in order to support the Asset Management;
- Identification of applications that support management (architecture application);
- Define workflow information for applications;
- Impact of storage requirements and workflow information in technology infrastructure.

5   CONCLUSIONS

Summarizing, this methodology allows assessing the weaknesses that exist within the information systems in an educational environment, particularly identifying and quantifying the main problems at the level of data management and information organization in school.

On the other hand, it allows overcoming the more frequent difficulties in implementing this methodology in the educational context, opening ways for the creation of proposals to improve results in this type of projects, ensuring their implementation in similar contexts.

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