

# INFORMATION SYSTEMS AND E-BUSINESS

## *Risc and Value of Applications to Organizations*

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Abstract: We aim to analyze the current problems and the main difficulties encountered by information systems and information technologies managers, featuring different actors and how they relate. This work introduces a design pattern, a fact table, for management and decision support, named CRUDI Table. The CRUDI Table is an abstraction idealized from the CRUD Matrix concept extended by an extra dimension: the importance dimension.

## 1 INTRODUCTION

Today, the information systems (IS) and information technologies (IT) managers have major challenges in characterizing the risk and the relative importance of each information system and each application to support the business processes of enterprises.

The global economic difficulties have led companies and their managers to scenarios of major challenges, in need of constant change and evolution that require the continued investment, but with less budget and less time to implement them.

Quite often, business managers in organizations have an opinion contrary to their information systems manager, regarding the importance of an information system and the priority of necessary investments in information systems to better support the business. It is also difficult to estimate the risk assigned to each information system and to define its need for complete replacement on certain types of disasters (natural or others) with larger impact. Henderson & Venkatraman (1993) defined two main characteristics in this process:

- A direct relation between financial results and the ability of managers to create a strategic adjustment of the management team and support services;
- A dynamic strategic adjustment, aligning business objectives with information systems objectives.

We consider extremely important the creation of new methods and new tools to aid in the demanding

job of information systems managers because technological development has introduced electronic components and software in the normal day-to-day of people and companies, even in those that traditionally haven't had the need for it before. The rapid evolution of Internet and the emergence of Web 2.0 have also created new problems, new opportunities and new business models that imply new management models.

The traditional models for information systems analysis and management already consider, for example, the use of CRUD tables for modeling business processes and their respective information entities. However, these same tables do not indicate which processes and which entities are most important to the company's business. They also don't indicate what system or subsystem must be implemented first in order to have the greatest impact on business and in the organization's future.

We intend to create new tools and analysis models to better support the decision (making it faster), helping the information systems managers in their daily activity and in their strategic planning.

This paper also presents an approach and a new method to better define business processes importance and their related support applications, based in a conventional CRUD matrix. We introduce a design pattern and a fact table for management and decision support, named CRUDI Table. The CRUDI Table is an abstraction idealized from the CRUD Matrix concept extended by an extra dimension: the importance dimension.

## 2 PROBLEM DEFINITION

In the last two decades of the twentieth century, Information and Communication Technologies – ICT – have contributed in a significant way to a profound change in economic and social activities. These changes include increases in quality of life, as well as in the competitiveness and productivity of enterprises (Sócrates, J., 2007).

It is important to align the business needs with the business processes of an enterprise, even if they are in continuous improvement. There should be a good fit between the tasks of business processes and information systems (Trkman, P., 2010).

According to other studies (Ramirez, R., *et al.*, 2010), in the past years information technology has been promoted as a central tenet of process redesign that scopes the evolution of processes. This fact is enhancing the continuous call for IT investment in business process management.

According to Lunsford (Lunsford, D., Collins, M., 2008), organizations need to ensure that each employee has the appropriate access to information, but does not have excessively powerful access rights. This author also describes the challenges faced by auditors and organizations when a company hires, fires, loses, or moves employees. At the same time, new laws such as Sarbanes-Oxley (SOX) Act place greater importance on this.

Business management involves monitoring and controlling all forms of commercial transactions over the Internet and extranets, related technologies and communications services (Ray, P., Lewis, L., 2009). Some of the good business practices are based in a good definition of processes, both for management and for business delivery (products or services), so they can be enforced and monitored by Key Process Indicators (KPIs). Those indicators are collected automatically and presented to management in a graphical way called Score Cards (Business or others like IT). They allow a permanent follow up of evolution (good or bad), allowing management to take updated decisions to change what is bad and enforce what is good. Usually the KPIs are presented together as Business Score Cards (BSC), to allow a permanent follow-up. This management process is also called business intelligence (BI), because it's based in real business information.

According to Barroero (Barroero, T., *et al.*, 2010), business managers specify the business processes for delivering the business services and the related business performance relevant to each business services stakeholder. Additionally, they

argue that in order to partnering IT service management and business service management, it is necessary that IT management decisions and actions consider business customer's priorities and impacts. Thus, they foster the need of models and methods able to correlate business customer performances with IT services performances and management. Business processes should be aligned with delivery and management processes in order to optimize business performance. The key achievement of the analysis model is the link between business and IT performances, and a systematic approach that enables to step from business value down to IT resources and IT management processes. This alignment could actually enable the continuous improvement cycle that is in the final stage of Capability Maturity Model Integration (CMMI). With this, management can take good decisions that have direct impact in processes improvement and in business results.

According to Ramirez (Ramirez, R., *et al.*, 2010), process redesign is one of many activities that can produce positive organizational change. Other programs utilized by firms include employee involvement, total quality management (TQM), lean manufacturing, six sigma, and business process management.

An important consideration in investment decisions is on the potential value of using a global Information Technology (IT) in order to solve a business need (Scheepers, H., Scheepers, R., 2008).

There are several difficulties to define and to decide which the priority investments are. Usually business managers have a different opinion from CIO's in what concerns information systems investments and value. Some business managers claim that technologies should be seen as a cost and that its usage should be as insignificant as possible. Others say that technologies are strategic to business development, to optimize delivery costs and creating new opportunities.

Nevertheless, there's a large consensus in the importance of technologies and information systems to present business models (Ramirez, R., *et al.*, 2010). Additionally, managers should consider investment in IT and process redesign as a means for improving firm performance.

According to Moura & Bartolini (Moura, A., Sauv e, J., Bartolini, C., 2007), the contribution of IT to business value creation is currently a hotly debated topic. IT is expected to bring value to the business, as is attested to by the introduction of Control Objectives for Information and Related Technologies (COBIT, 2007) and SOX Act

compliance requirements. To meet such expectation, IT management methodologies, tools and processes have had to evolve in maturity. Evolution has been made possible with the IT Service Management (ITSM) practices recommended by the process-oriented Information Technology Infrastructure Library (ITIL) framework (ITIL, 2007). Other IT management frameworks have been developed on the basis of ITIL by HP, IBM and Microsoft, among others, traditionally related to innovation.

### 2.1 Information Systems Risk and Value

To measure the importance of a particular application or information system for the different business units of the company is, normally a very difficult task. It obligates to answer some others questions as:

- What is the relative importance of each system or application for company business?
- Which system or application should have the biggest budget?
- Which projects should be executed given the available budget?

These are the frequent questions that CIO's have to answer and which promote big and frequent discussions with the business managers. The chain value that is perceived by each department is different and is based in different indicators. Nowadays, the aimed alignment between business and information systems is not a reality. It's frequent to assist a business manager that refuses to talk to an information systems manager.

The ITIL and COBIT management are good practices and methods but they don't solve these typical problems. According to the ITIL, COBIT and ISO 27002 alignment for business benefit (ITIL alignment, 2008) and Malta & Sousa (Malta, P., Sousa, R., 2009), the development of architectures has been a major issue for IS managers, both from a technological point of view and from an organizational way. It's even more complex when it comes to Enterprise architecture (EA) that includes business strategies and processes, besides IS models that support them.

This way, the CRUD matrix (Lunsford, D., Collins, M., 2008) is an excellent technique to model processes and data and how they interact with respect to creation, reading, updating, and deleting of data. In this paper, we extend the CRUD matrix to a CRUDI matrix, where we propose to incorporate a third dimension on the matrix, in order to include the relative importance of each node (pair process/data).

## 3 CRUDI APPROACH

The need for new tools and methods implies the search for new approaches. This way, we intend to define a new method supported in new tools like the CRUDI matrix, to help information systems managers to better decide the investments and their related priorities, aligned with the business needs.

The first difficulty will be to define the CRUDI matrix to the first level of abstraction, with a CEO of a company, thus adding the relative importance of each business process with each information entity.

The second problem, certainly more complex than its predecessor, will repeat the previous procedure, iteratively, obtaining the same information but now with a greater level of detail going into each sub-process.

Achieved the previous two objectives, then we can obtain the clusters of entities-processes, necessary for the characterization of information systems and enterprise applications.

At this point, it will be possible to assess the indicators achieved and we can correlate the relative importance of each information system and each sub-system. With this new information, and the creation of new indicators for decision support, managers of information systems and business managers now have a consistent and coherent view on the relative importance of each investment in information systems to achieve the business objectives.

Definition and specification for a process change:

- a) Definition of the CRUD matrix for the processes and systems that support the business;
- b) Add the relative importance of each node in the CRUD Matrix (New Dimension), of each feature and each process, in a relative scale, creating a CRUDI matrix; you can get an array with nodes with information about the alignment and the importance for business, for each node of the array, for Level 1 – Business Process and Entities.
- c) Add the relative importance of each link between nodes in the CRUDI matrix, reflecting a relative scale and thus the value of integration between IS for business;
- d) Determine the relative importance of each application subsystem based on information gathered in the CRUDI matrix, with a simple scoring calculation, defining their distinct position rank;
- e) Implementation of a New Information System and Technology (IST) Management Process

for determining and simulating the relative importance of each system and application to business, in a simple and intuitive way;

- i. Introduce procedures to specify and update the CRUDI matrix, for processes and features associated with its importance;
- ii. Determination and simulation of the relative importance of each system and application based on CRUDI Matrix;
- iii. Create Indicators (KPI's) based on the new CRUDI matrix for measuring progress;
- iv. Analysis and Strategic Decision-making based on the CRUDI matrix and new KPIs; it also allows an assessment on the business impact (financial and strategic).

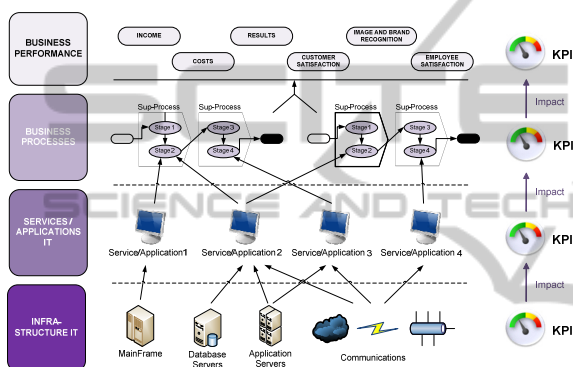


Figure 1: Relation between business processes and support applications.

### 3.1 Challenges and Conclusions

With the presented example we aim to demonstrate that the use of a CRUDI matrix can be a viable approach and that CIO's and business managers can have new information to better decide new investments. This new approach has, in our opinion, a big potential to define investment priorities in information systems, which are perfectly aligned to business needs. This way we can reduce the abysm between business and technology, steel present in several business sectors. This method also allows a better alignment between business and information systems.

The present work is a starting point to a more detailed evaluation of possible scenarios, to assure the complete assessment of a company need, starting with an insurance company or a bank. We will continue this task, trying to work closely with real entities in the future year, to define and describe the new method and to create real CRUDI matrix samples, which describe the real problems and business needs. We will present those CRUDI

matrix samples to CIO's and to business managers in the way they can evaluate the information and comment if it's useful or not and if there is any gap we must still solve. Then we intend to provide new articles with a more detailed work and the achieved results (case studies).

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