

## Chapter 6

# IT Architecture and Information Quality in Data Warehouse and Business Intelligence Environments

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### ABSTRACT

*Organizations are currently investing more in information technology to store and process a vast amount of information. Generally, this information does not comply with any standard, which hinders the decision-making process. The cause of the difficulties can be attributed to Information Quality (IQ), which has technical characteristics related to the architecture used in Data Warehouse (DW) and Business Intelligence (BI) environments. On the basis of the relevant literature in IQ, DW, and BI, a research model was created to identify the relations between components of DW/BI architecture and IQ dimensions. This research model was applied in a real case study (Big Financial Company in Brazil). This case study involved semi-structured interviews with managers and analysts. This chapter attempts to provide a better understanding of the relations between IT architecture and IQ in DW and BI environments. The authors hope to motivate the discussion around the development of IQ-oriented architectures for BI and the relationship between these concepts.*

DOI: 10.4018/978-1-4666-4892-0.ch006

## INTRODUCTION

Organizations are increasing their investment in information technology (IT) so that they can collect, store and process a vast amount of information. The purpose of this investment is to employ information in making improvements, better decision-making and providing companies with a competitive advantage. However, there is a problem faced by many organizations which is how to handle such a large volume of information. Generally this information does not comply with any standard or repeat data, which hinders the decision making process, especially at a strategic level. One of the causes of this difficulty is Information Quality (IQ) which has both technical features, such as information integration and data warehouse, and non-technical features, such as the lack of strategic cohesion across the organization, to allow stakeholders to have the right information in the right format at the right time (Madnick *et al.*, 2009). The technical characteristics of IQ are essentially based on the architecture used in the Data Warehouse (DW) and Business Intelligence (BI) environments (Jarke & Vassiliou, 1997). The environment of DW/BI is characterized by its analytical objective, i.e. it is aimed at providing IQ for decision makers (senior management, analysts and experts).

There are several studies in the academic literature about the concept of DW and BI, but few of them address the question of the choice of the DW/BI architecture. Some of the first and best-known studies on these topics were conducted by Inmon (1996) and Kimball (1996) in the 1990s, when a number of companies began building DW/BI environments (Wixom & Watson, 2001). Both authors helped formulate the concept of the analytic environment and to differentiate between this type of environment and the Transaction System (TS) environment.

In the opinion of Inmon (2005), DW is a more efficient model to store corporate information. This is because, a centralized database makes it

possible to share all the information needed for different business areas, and allows the DW to be integrated with historical information - usually within a time span of five years or more, and with non-volatile information. Kimball and Ross (2002) present a different architecture with a proposal to quickly meet users' needs through a distributed database, known as Data Marts (DM), and the use of specific information for each business area.

These two authors opened up a discussion about the importance of IT architecture in providing information for businesses, and enabling a proper infrastructure, database, model and IT team to be obtained in an analytical environment. In this context, it is worth highlighting the importance of IQ for an analytical environment. Wixom and Watson (2001) argue that the IQ can provide several benefits to users: a better understanding of the context of the decision, improved decision making and changes in the way people work. From a DW/BI perspective, by employing appropriate tools of access and searching for information, users are able to make faster and more wide-ranging decisions. In general, DW/BI can make data accessible to the final users and reduce the required time and effort needed to provide access to the information (Graham, Coburn & Oleson, 1996).

According to Ariyachandra and Watson (2010), the choice of the architecture is an important decision. A project, called DWQ – Foundations of Data Warehouse Quality (Jarke & Vassiliou, 1997; Jarke *et al.*, 1999), carried out by a research group from some European universities at the end of the 1990s, tried to establish a framework, with the intention of analyzing the DW/BI architecture and IQ factors involved in this approach. Despite these efforts, there is still a gap in the literature about the ways to detect the relationships between the components of DW/BI architecture and their links with IQ dimensions.

The overall goal of this chapter is to analyze the components of IT architecture and IQ dimensions in a DW/BI environment. Three specific aims have been defined to achieve this: (1) To describe

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