

# Chapter 5

## A Proactive Approach for BI

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### ABSTRACT

*A framework to develop proactive BI is presented and discussed in this chapter. In a proactive process, analysis develops as a scientific investigation or research, where analysts must discover an initial set of hypotheses and then test or evaluate the hypotheses. The steps of the framework are presented and ways to perform each step are discussed. Data mining techniques are associated to this proactive paradigm, exploring how they can be applied in each step of the framework. Although there are not yet experiments that validate the correctness of this framework, the objective of the chapter is to focus attention on the differences in the paradigms, discuss ways to perform BI in a proactive way, and alert analysts and executives for practical experiences with the proactive paradigm.*

### INTRODUCTION

Nowadays, most companies are using Business Intelligence (BI) processes and tools to monitor key performance indicators (KPI). Usually, these indicators are quantitative attributes, such as sell levels, costs, profitability (by country, city, store, vendor, product and time periods). The goal is to find out these indicators and to present them in a visual way (like dashboards and other kinds of graphics). There are different kinds of techniques for information visualization, including ways to compare information among subgroups or along the time.

In these cases, BI is confused with Management Information Systems (MIS), which generate reports synthesizing or presenting information in

a visual format. They generate new information from those stored in databases. This new information was not explicit in databases, as for example reports about the bestsellers products or the most profitable, the vendors or stores with the best performance, seasons where products sell better or worse, etc.

MIS are very important to companies. However, BI should go deeper than MIS applications. The role of BI is noblest: the goal is to find the causes for events. Thus, if MIS point out the bestseller product, BI should be able to explain why this product sells better than others and why other products do not sell so well. If MIS present a graphic with the level of sells during a time period, BI should investigate why peaks and abyss happen.

Monitoring KPI is a reactive process. There is a well defined entry and BI analysts know

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exactly what to search for and what to present to executives. Traditional OLAP or multidimensional techniques play well this role. On the other hand, companies have other kinds of needs that are difficult to monitor or even to understand. Many times, executives know the goals they have to achieve but they do not know how information systems or information technology can help. For example, how to obtain productivity gains in a factory, how to conquer new customers, how to raise sells, how to reduce production downtime, how to reduce machine maintenance, and so on.

This kind of situation may be classified as a proactive process. Executives can't explain their information needs, because they do not know the causes for objectives or problems. The process develops as a scientific investigation or research. Analysts do not know what to monitor without initial hypothesis. Therefore, the first step is to discover an initial set of hypotheses and then to test or evaluate the hypotheses. After that, analyst can observe results and then set a new knowledge or even reinstate the process, revising the hypotheses.

This chapter will compare the two paradigms (reactive vs. proactive) for knowledge discovery, in the context of BI. Since proactive BI is not usual, it deserves more attention and studies. In general, scientific literature about BI utilizes methodologies based on a reactive paradigm. The novelty of this chapter is to present a proactive framework for the BI process, although there are not yet experiments that validate the correctness of this framework. The objective of the chapter is to focus attention on the differences in the paradigms, to discuss ways to perform BI in a proactive way and to alert analysts and executives for practical experiences with the proactive paradigm. Besides that, Data Mining techniques are discussed in the context of the proactive paradigm, exploring how they can be applied in each step of the framework.

The chapter is structured as following. Firstly, BI is presented as a discovery process, similarly to the perspective of the process for Knowledge Discovery in Databases. Secondly, the two paradigms

for knowledge discovery (reactive vs. proactive) are discussed and compared. Thirdly, a framework to perform a proactive BI process is presented, including where data mining techniques may be applied. Finally, future research directions and concluding remarks are presented.

## **BUSINESS INTELLIGENCE AS A DISCOVERY PROCESS**

The process of BI is, in a certain way, similar to a musician looking for one note that connects two parts of a music, or a criminal investigator searching for suspects, or a mechanic analyzing the cause of a defect in a machine, or an artist searching for a way to express his/her ideas and mental emotions. The search for causes of problems or for best practices depends on mental processes, most of times not well understood by humans.

Koestler (1964) and Johnson (2010) states that there is no Eureka moment. Creation and discovery does not happen as a blink from an insight in our brains. As cited by these authors, Pasteur said: "the chance favors the prepared mind". According to them, Archimedes only saw the solution for his problem because he was studying hard the problem and because he had other kinds of knowledge. The discovery was to put all knowledge together to solve a unique problem. Solutions come from ripeness and from the collision of ideas.

For this reason, the process of cause analysis and discovery must be developed in a systematic way, through established steps as those proposed by Goebel & Gruenwald (1999) for Knowledge Discovery:

1. Developing an understanding of the application domain and the goals of the discovery process;
2. Acquiring or selecting a target data set;
3. Integrating and checking the data set;
4. Data cleaning, preprocessing, and transformation;

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