

# Business Intelligence through Analytics and Foresight

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## INTRODUCTION

Business Intelligence (BI) and Business Analytics (BA) are very fast moving fields which have evolved greatly from fields such as Data Mining and Knowledge Discovery in Databases (KDD). Today the focus of much research in BI centers on the notion of the BI software platform and its analytic capabilities. The implications of the term business intelligence are much broader, however, and indicate a process through which an organization builds intelligence and awareness of its operations and context which ultimately facilitates decision making that makes the organization more competitive (Jourdan, Rainer, & Marshall, 2008). With this definition in mind, therefore, it is clear that BI could not and should not be limited to only software analytics, but rather should be expanded to include complimentary strategies that achieve the same aims of building organizational 'intelligence'. This perspective is supported by the finding that, among critical success factors for BI implementations, organizational issues such as the presence of a business vision were rated as more important than data and infrastructure issues according to experts (Yeoh & Koronios, 2010).

Through utilizing strategies from other areas along with Software Analytics (SA) we can engineer stronger BI processes. Parallels in complimentary areas become more apparent if we conceptualize BI as a process that rests on three elements, similar to the widely used three-phase analytics continuum (Davenport & Harris, 2007): description (understanding the past), prediction

(anticipating the future) and prescription (decision making informed by the previous two that maximizes organizational competitiveness). One such complimentary area with similar goals is Strategic Foresight (SF), which focuses on the, "identification, assessment and usage of weak signals to recognize and give warning about threats and opportunities at an early stage" (Rohrbeck, Arnold, & Heuer, 2007). Strategic Foresight also, "defines the methods, the actors, the process and the system needed to enhance the competitive position of a company" (Rohrbeck, Arnold, & Heuer, 2007). Strategic Foresight thus presents many techniques that are complimentary to software analytics.

In what follows, we propose a convergence framework for BI based on software analytics and strategic foresight which uses the well-established KDD process outline as a foundation. The motivation is to capitalize on the relative strengths of each area and thereby build a more robust BI process that ensures more critical success factors are met and that more impactful analytics takes place.

## BACKGROUND

In order to illustrate the parallels between Software Analytics (SA) and Strategic Foresight (SF) and the way in which they both can play a role in developing Business Intelligence, we give an overview of the BI process, the focuses of SA and the elements of SF.

## The Business Intelligence Process

Beyond the current focus on SA platforms, the initial connotation of the term Business Intelligence was that of a process or a set of methods through which an organization could develop useful knowledge or information to enhance its competitiveness. A survey of BI research done by Jourdan, Rainer, and Marshall (2008), notes that BI is both a process consisting of “methods that organizations use to develop useful information, or intelligence, [to help them] survive and thrive in the global economy” as well as a product of information that can help a business predict various aspects of their operating environment. A related term to BI that is seen frequently is that of Competitive Intelligence (CI). Competitive Intelligence focuses on, “[gathering] information about competitor activities from public and private sources,” with the stated goal of obtaining information, “about the present and future behavior of competitors, suppliers, customers, technologies, acquisitions, markets and the general business environment” (Vedder & Guynes, 2002).

Research on the end-to-end features of the BI process referred to in the foregoing definitions is somewhat scant, however. Olszak and Ziemba (2007) describe the BI process in two main phases: creation and consumption, with creation encompassing task definition, data preparation, tool selection, design & implementation and exploring information needs. The consumption stage encompasses the following tasks: logistic analyses of the supply chain, fact analysis, development of alternative decisions, division and co-operation and finally change in company performance (Olszak & Ziemba, 2007).

One of the early fields that explored the science of moving from data to usable knowledge was ‘Knowledge Discovery in Databases’ (KDD), which has been defined as, “the nontrivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data” (Fayyad, Piatetsky-Shapiro, & Smyth, 1996). This process encompasses everything from developing an understanding of the application domain to

acting on the discovered knowledge. Brachman and Anand (1996) propose nine steps for the KDD process:

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1. Developing an understanding of the application domain,
2. Creating a target dataset,
3. Data cleaning and pre-processing,
4. Data reduction and projection,
5. Matching KDD goals to a data mining method,
6. Exploratory analysis, model and hypothesis selection,
7. Data mining,
8. Interpreting data mining results, and finally
9. Acting on those results.

The KDD process has two primary goals or two types of analytic models: prediction, or “using some variables or fields in the database to predict unknown or future values of other variables of interest” and description, or “finding human-interpretable patterns describing the data” (Fayyad, Piatetsky-Shapiro, & Smyth, 1996). Due to the thoroughness of the KDD process abstraction it will form the basis for our framework that integrates software-based analytics and strategic foresight.

## Software Analytics

Much of the recent research on business intelligence however has begun to focus primarily on the technological aspects of the BI process. For example, Chen, Chiang, and Storey (2012) define Business Intelligence as, “a data-centric approach [with] its roots in the long-standing database management field” and then go on to discuss the Gartner criteria for a BI software platform and the foundational technologies behind those functions. Chaudhuri, Dayal, and Narasayya (2011) define Business Intelligence software as, “a collection of decision support technologies for the enterprise aimed at enabling knowledge workers...to make better and faster decisions”.

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