

# Creating Knowledge for Business Decision Making

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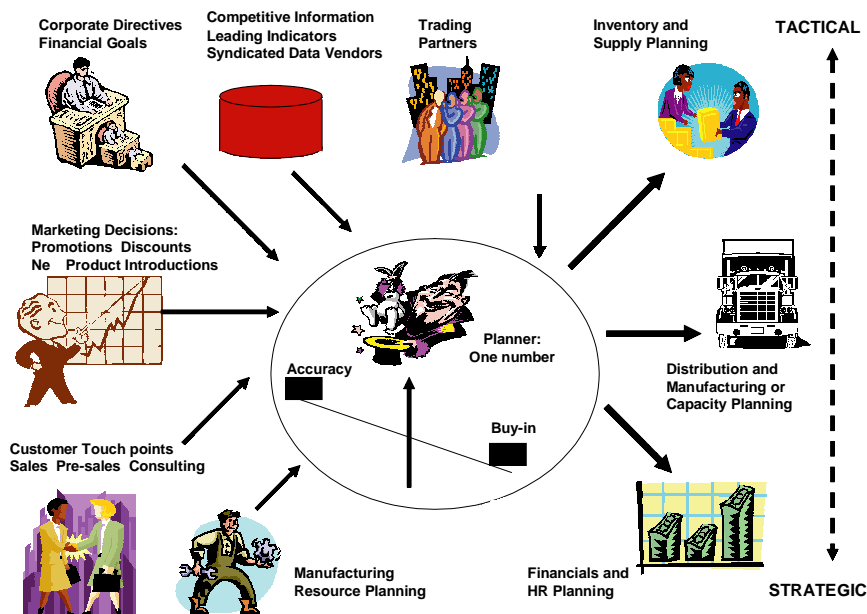
## INTRODUCTION

Business forecasts and predictive models are rarely perfect. A paraphrase of the Nobel winning physicist Neils Bohr is apt in this context: *Prediction is difficult, especially if it is of the future.* However, executives and managers in enterprises ranging from retail and consumer packaged goods to high tech and semiconductors have to resort to forecasting and planning about the future. Phenomenal growth and spectacular failures are associated with organizations depending on their ability to understand market directions and respond quickly to change. Relatively minor improvements in forecast accuracy and predictive modeling at detailed levels can translate to significant gains for the enterprise through better strategic decisions, continuous performance management, and rapid translation to tactical decisions. The key to these

processes is the knowledge-based enterprise, which can effectively utilize information from multiple sources as well as the expertise of skilled human resources, to develop strategies and processes for creating, preserving, and utilizing knowledge. These efforts, spanning revenue-generation endeavors like promotion management or new product launch, to cost-cutting operations like inventory planning or demand management, have significant impacts on the top and bottom lines of an enterprise.

Advances in scalable mathematical model-building, ranging from advanced statistical approaches and data mining (DM) to operations research (OR) and data assimilation, can extract meaningful insights and predictions from large volumes of data. Information technologies and e-business applications can enable a degree of process automation and collaboration within and among enterprises. Enterprises of the new millennium can truly take

Figure 1. "One-number forecasting" for an enterprise



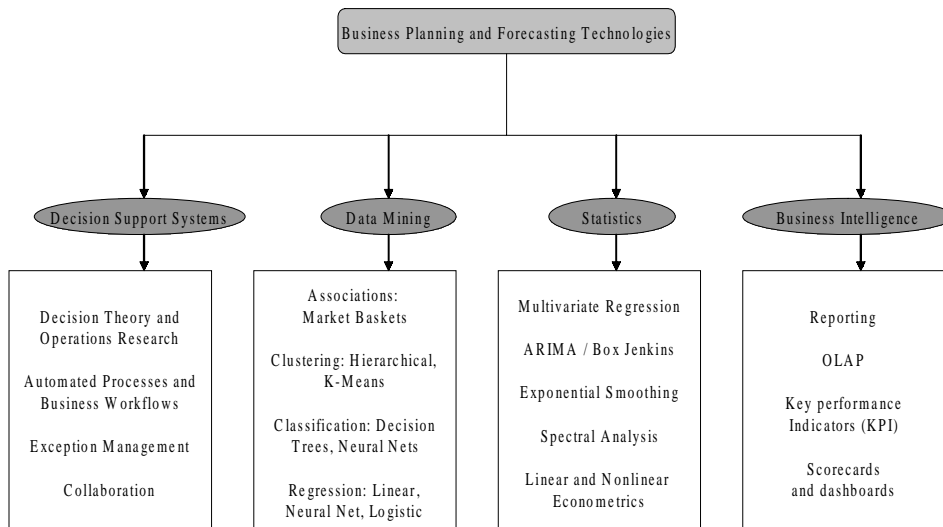
advantage of scalable but cutting-edge data-dictated approaches to understand the past and predict the future, and then focus valuable planner resources on key value drivers or exceptional situations through human-computer interaction, which in turn utilizes tools like online analytical processing (OLAP) and automated or planner-driven decision support systems (DSSs).

Analytic information technologies enable managers of the knowledge-based enterprise to choose the path to new revenues, new markets, good customer service, and competitive advantage over their rivals. The ability to produce “one-number forecasts” that reconcile information from multiple sources and blend disparate points of view is a critical first step for enterprise-scale strategic, operational, and tactical planning (see Figure 1). However, this is a challenging process, especially in recent years owing to short product lifecycles, mass customizations, and dynamic markets, combined with the ever-increasing service expectations of consumers and trading partners on the one hand, versus the need to reduce operating and inventory costs on the other. The need to manage product lifecycles and promotions or pricing decisions, factor in market signals or competitive intelligence, analyze consumer behavior, and achieve buy-in from multiple participants within and across enterprises has fundamentally changed the way the forecast generation process is perceived. Corporate data repositories, collaborative information technologies and processes, syndicated data vendors, and the Internet provide large volumes of historical and real-time information. The challenge is to acquire, manage, analyze, and reconcile the information for knowledge extraction and predictive purposes in an optimal fashion.

## BACKGROUND

Data-derived knowledge adds value to a business through products, processes, and better decision making. Davis and Botkin (1994) describe six features of knowledge-based businesses. Manual analysis, evaluation, and interpretation are the most common approaches of creating knowledge from digital data. Volumes of information can grow rapidly, as every communication, interaction, and transaction produces new data. Thus, manual data analysis quickly becomes slow and expensive, and is becoming obsolete in applications like retail, telecommunication, health care, marketing, the natural sciences, and engineering. With the advent of analytical information technologies, researchers and engineers have been exploring the possibility of constructing data-dictated models by mining large-scale corporate or scientific data repositories. These approaches combine data management technologies and innovative computational or visualization methods with analytical techniques drawn from the diverse fields of statistics, machine learning, and artificial intelligence (Fayyad & Uthurusamy, 2002; Hand, Mannila, & Smyth, 2001). Many organizations have invested in automated analysis techniques (Ganguly, Gupta & Khan, 2005) to unearth meaningful patterns and structures from millions of records with hundreds of attributes. Automated analytical approaches like data mining (DM) and statistics are combined with planner-driven analytic systems like decision support systems (DSSs) and business intelligence (BI) (see Figure 2). These are being integrated with transactions systems, producing insights into how effectively a company does business, responds to or forecasts trends, understands and reacts to market

Figure 2. Examples of technologies used for business planning and forecasting



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