Data Warehousing for Business Intelligence
Course 4: Business Intelligence Concepts, Tools, and Applications

Module 2 Bonus Materials

Lesson 1: Defining and learning about business intelligence

We've arranged for students in this MOOC to purchase at a very low cost digital versions of chapters 1, 2, and 4 of the authoritative textbook *Business Intelligence and Analytics: Systems for Decision Support*, 10th edition, 2015 by Sharda, R., Delen, D., and Turban, E. See the optional text book link under course overview to purchase (US$4 for one chapter, US$10 for all three; the regular price for students is $15 per digital chapter).

- The term *BI* was coined by the Gartner Group in the mid-1990s. However, the concept is much older; it has its roots in the MIS reporting systems of the 1970s. During that period, reporting systems were static, two dimensional, and had no analytical capabilities. This definition is broad. BI encompasses not only applications, but also technologies and processes. It includes not only "getting data out" (through tools and applications), but also getting "data in" (to a data mart or warehouse).

- Another definition: *"Business Intelligence is the science of analyzing business data wherever it exists within your organization or elsewhere in order to understand what has happened in the past, why it happened in the first place and what can be expected to happen in the future and why that might happen differently given different behavior."*

- "BI is neither a product nor a system. It is a generic concept that blends infrastructure databases and applications. It lets business users access, analyze and manipulate data, whether it's financial, sales, marketing, operational/ production, HR-related" (Hart 2005). Its major objective is to enable interactive access (sometimes in real time) to data, enable manipulation of these data, and to provide business managers and analysts the ability to conduct appropriate analysis.

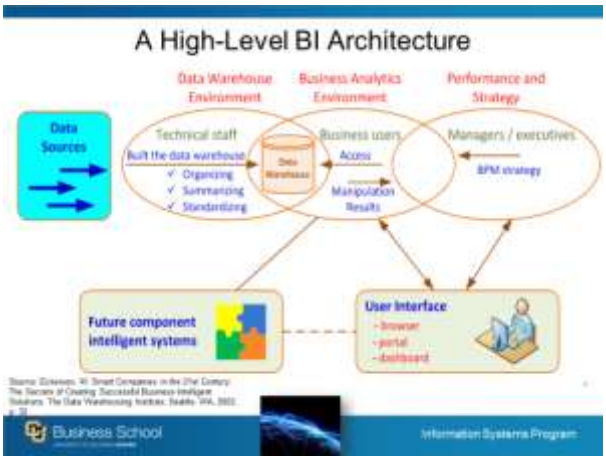
To understand how business intelligence capabilities have evolved in a very short period of time, dive into this schematic in the textbook.

Also featured in the textbook is this conceptualization of a high-level BI architecture [link to purchase, list page]. A BI systems has four major components: a data warehouse with source data, business analytics, a collection of tools for manipulating, mining, and analyzing the data; business performance management (BPM) for

monitoring and analyzing performance, and a user interface.

A High-Level Architecture of BI. *Source*: Based on W. Eckerson, *Smart Companies in the 21st Century: The Secrets of Creating Successful Business Intelligent Solutions.* The Data Warehousing Institute, Seattle, WA, 2003, p. 32, Illustration 5.

- A BI system has four major components: a *data warehouse*, with its source data; *business analytics*, a collection of tools for manipulating, mining, and analyzing the data in the data warehouse; *business performance management (BPM)* for monitoring and analyzing performance; and a *user interface* (e.g., a dashboard). The relationship among these components is illustrated in Figure below
- It is an integrated set of tools used to support the transformation of data into information to support decision-making.
- BI analyses the performance of an organization and increases its revenue and competitiveness



To get a sense of a detailed BI architecture, you can reference this 2009 report by Deloitte Consulting, and especially the full version of this schematic (found on p. 12).

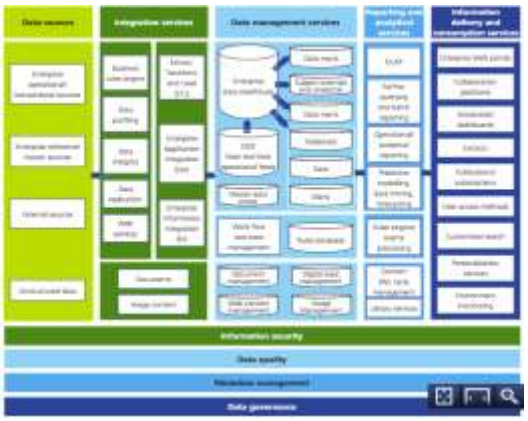


Figure shows a generic BI environment. At the left are the source systems that provide data to the decision support data repository (i.e., data warehouse and marts). Data integration technology and processes are needed to prepare the data for decision support use. The mart or warehouse can employ a variety of architectures, technologies, and data models. On the top, a variety of users can access the data using different tools and applications. To ensure that BI meets its intended purposes, metadata, data quality, and governance processes must be in place.

- Source system: ERP systems: (CRM, HRM, Production Management (PLM), Supply chain Management (SCM), Accounting (SRM), Procurement (SRM), Ticket management system, change management system) , point of sale, unstructured data, legacy system, spreadsheets, OLTP Data bases
- Integration Services (ETL, Operational Data Feeds, Enterprise Application Integration, Enterprise Information Integration)
- Data Management Services (data warehouse, data marts, federated data marts, OLAP cubes, etc.)
- Information Delivery and Consumption Services (Web portals, subscription, direct user access, internal portals
- Reporting and Analytical Services (Analytical Reporting, ad-hoc query and batch reporting, dashboards/scorecards, predictive and prescriptive modeling, data & text mining/forecasting). A collection of tools for manipulating, mining, analyzing the data in the data warehouse, and unstructured text data, business performance management dashboards/scorecards

These three snapshots should give you a sense of how complex BI solutions can be. Business intelligence relies on many possible source systems (such as ERP, POS, etc.) on many technical platforms (IBM, Oracle, etc.) with many formats (relational, hierarchical, unstructured, etc.). This allows, however, a wide range of services, including integration, data management, reporting and analysis, as well as information delivery and consumption services to many types of end users (IT developers, analysts, managers, executives, front line workers, suppliers, customers, and regulators, to name a few).

According to White, Critical Agility: Operational BI Generates Faster and Smarter Decisions TeraData Magazine Volume 9, No. 1, March 2009,

- BI used for decision making can be broken into three main types of applications: BI initiative can help enterprise achieve strategic, tactical, and operational goals. BI vision should be to help drive better business performance by enabling all decision makers essentially empowering all employees, customers, and external parties to be able to play their roles effectively as a result of the BI adoption.
- Strategic and tactical BI approaches employ query, reporting and analysis applications to process operational data that has been consolidated into a data warehouse. There is an expectation from BI to enable better execution of the tactical and operational decisions that enterprise makes numerous times every day through more effective use of information. An example of such a decision would be a product manager deciding about the discount schedule or making a pricing decision for a product. Tactical and operational decisions are the drivers for day-to-day management of the business at different levels. These decisions have smaller business impact when measured in silos as compared to strategic decisions. However, when put together, multiple tactical and operational decisions add up to account for a lot of value and can help significantly in driving better business. BI strategy should embody the approach to enable better decision making at all levels of the enterprise.
- BI strategy should aim to support the complete breadth of decision making ability in the enterprise. Strategic decisions deal with the long-term planning, performed by top management, focus mostly on demographic, and industry trends. These address broad issues to achieve general objectives. Strategic decisions are where BI traditionally has been implemented. Businesses today want more than just strategic insight from their BI implementations.

A pertinent article about the value of business intelligence, "Assessing BI Readiness: A Key to BI ROI," by Steve Williams, points out how business intelligence has benefits for both the private and public sectors. It can be found here: http://www.decisionpath.com/wp-content/uploads/2010/12/Assessing-BI-Readiness.pdf).

According to Ziama and Kasher "*Data Mining Primer for the Data Warehousing Professional*. Teradata, Dayton, OH, 2004", analytic application can add business value in the following areas:

- Customer segmentation: What market segments do my customers fall into, and what are their characteristics?
- Personalize customer relationships for higher satisfaction and retention.
- Propensity to buy: Which customers are most likely to respond to my promotion? Target customers based on their need to increase their loyalty to your product line. Also, increase campaign profitability by focusing on the most likely to buy.
- Customer profitability: What is the lifetime profitability of my customer? Make individual business interaction decisions based on the overall profitability of customers.
- Fraud detection: How can I tell which transactions are likely to be fraudulent? Quickly determine fraud and take immediate action to minimize cost.
- Customer attrition: Which customer is at risk of leaving? Prevent loss of high-value customers and let go of lower-value customers.
- Channel optimization: What is the best channel to reach my customer in each segment? Interact with customers based on their preference and your need to manage cost.

See more information in the web resources below:

Top 5 Business Intelligence Myths Revealed
Business Intelligence Tools
Business Intelligence Overview
2015 Business Intelligence Software Pricing Guide