

Business Intelligence Tools & Techniques for Enterprises

* CM Maran

Abstract:

Business Intelligence (BI) consists of tools and technologies to access and analyze enterprise information in a useful way to make better business decisions. BI technologies include query, reporting and analysis tools, On-Line Analytical Processing (OLAP), decision support systems, analytics, dashboards, data mining, enterprise performance management, balanced scorecards, predictive analytics. This paper describes BI, the benefits of BI, its applications in various industry verticals, and popular BI tools in the market and their capabilities. Some of the areas where BI finds application are customer segment analysis, compliance reporting and trend analysis

1. Introduction:

Intelligence is the aptitude to learn, comprehend, and counter new or trying situations. It is the skillful use of reason and the capacity to apply knowledge to influence one's environment or to think conceptually. Business Intelligence is a set of notions, methods and practices which improve business decisions. It uses information from multiple sources and applies experiences and assumptions that help in understanding accurately the intricacies of business dynamics.

Business Intelligence enables firms to make calculated business decisions. It involves assembling, accumulating, analyzing and accessing corporate data. For this purpose it uses a variety of tools and techniques. By using BI, any potential loss of knowledge within an enterprise, which results due to enormous information accumulation, can be prevented successfully. A BI solution should help deliver information to any user in the format they need, which makes it immediately usable and actionable.

Business Intelligence (BI) systems provide deep insights into the business processes, financial information, customers and products, and render tremendous value to users. This sort of information, while being a priceless asset to the enterprise, could also pose a significant security risk. Making BI systems secure is a crucial step in protecting the valuable information that these systems seek to analyze. Enterprises need to incorporate the security aspect in their BI tools in the design stage itself and also lay down a well-framed security policy

2. Understanding Business Intelligence

As discussed, BI consists of many activities and technologies to make informed decisions. Some of the more commonly used ones among them are described below. It should be noted that each of the mentioned technologies/terms are not strictly different, and that there is a lot of overlap between them.

* Faculty – Information Systems, VIT Business School, VIT University, Vellore, Tamil Nadu, India

- ❖ A **spreadsheet** is a computer application that simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. A spreadsheet cell may alternatively contain a formula that defines how the contents of that cell is to be calculated from the contents of any other cell (or combination of cells) each time any cell is updated. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made.
- ❖ **Online Analytical Processing or OLAP** is an approach to quickly provide answers to analytical queries that are multi-dimensional in nature.[1] OLAP is part of the broader category business intelligence, which also encompasses relational reporting and data mining. [2] The typical applications of OLAP are in business reporting for sales, marketing, management reporting, business process management (BPM), budgeting and forecasting, financial reporting and similar areas. The term OLAP was created as a slight modification of the traditional database term OLTP (Online Transaction Processing).[3]
- ❖ **Dashboard** is an executive information system user interface that (similar to an automobile's dashboard) is designed to be easy to read. For example, a product might obtain information from the local operating system in a computer, from one or more applications that may be running, and from one or more remote sites on the Web and present it as though it all came from the same source.

Digital dashboards may be laid out to track the flows inherent in the business processes that they monitor. Graphically, users may see the high-level processes and then drill down into low level data. This level of detail is often buried deep within the corporate enterprise and otherwise unavailable to the senior executives.

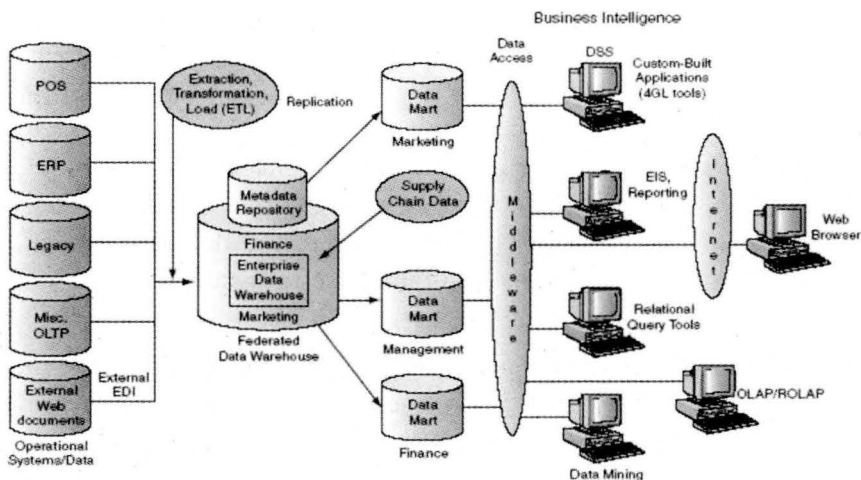
Three main types of digital dashboard dominate the market today: stand alone software applications, web-browser based applications, and desktop applications also known as desktop widgets. These latter would be driven by a engine. Specialized dashboards may track all corporate functions. Examples include human resources, recruiting, sales, operations, security, information technology, project management, customer relationship management and many more departmental dashboards. Digital dashboard projects involve business units as the driver and the information technology department as the enabler. The success of digital dashboard projects often relies on the correct selection of metrics to monitor. Key performance indicators, balanced scorecards, sales performance figures — these are just some of the content appropriate on business dashboards.
- ❖ **Data mining** is the process of sorting through large amounts of data and picking out relevant information. It is usually used by business intelligence organizations, and financial analysts, but is increasingly being used in the sciences to extract information from the

enormous data sets generated by modern experimental and observational methods. It has been described as “the nontrivial extraction of implicit, previously unknown, and potentially useful information from data” [1] and “the science of extracting useful information from large data sets or databases.” Data mining in relation to enterprise resource planning is the statistical and logical analysis of large sets of transaction data, looking for patterns that can aid decision making.

- ❖ **Process mining** techniques allow for the analysis of business processes based on event logs. They are often used when no formal description of the process can be obtained by other means, or when the quality of an existing documentation is questionable. For example, the audit trails of a workflow management system, the transaction logs of an enterprise resource planning system, and the electronic patient records in a hospital can be used to discover models describing processes, organizations, and products. Moreover, such event logs can also be used to compare event logs with some a-priori model to see whether the observed reality conforms to some prescriptive or descriptive model.
- ❖ **Business performance management (BPM)** (or corporate performance management, Enterprise performance management, Operational performance management, Business performance optimization) is a set of processes that help organizations optimize their business performance. It is a framework for organizing, automating and analyzing business methodologies, metrics, processes and systems that drive business performance. BPM is seen as the next generation of business intelligence (BI). BPM helps businesses make efficient use of their financial, human, material and other resources.

3. Enterprise Business Intelligence Framework

Figure – 1



The general framework for BI deployment is illustrated in Figure 1. It is just a simplistic and a common view of BI deployment. There may be many different types of architectures in actual practice.

Clearly, the process of developing successful data warehouses to provide business intelligence services required specific solutions to address these challenges, and a number of methods and technologies have supported the maturation of the practice. Dedicated applications for data extraction and transformation simplify the process of mapping source data into the target warehouse model. Techniques have been introduced to help architects organize views of the source and target data models at the structure level as well as at the data element level. And data quality and data cleansing tools have been introduced to help in standardizing the views taken from different sources to facilitate consolidation and integration. The general acceptance of these tools and techniques has led to a common framework for data warehouse development, including these standardized service components:

- **Metadata Management**, in which information about all data elements is collected, including name, size, type, definition, which data entities or tables use which data elements, as well as reference information such as valid data value domains, and code mappings.
- **Extraction, Transformation, Loading (ETL) tools**, which are specifically configured using the metadata repository and transformation rules to extract data directly from the original source, and transform the data elements, values, and record structures into a format that is suitable for subsequent integration and consolidation within the target data warehouse model.
- **Data parsing, standardization, and cleansing** for the cases where slight variance in representation of data values introduces confusion or ambiguity. Values (such as person names, telephone numbers, addresses, or product codes) can be parsed into their component segments and then transformed into a standard format, and business rules can be introduced for those values that are recognized as not conforming to expected formats or structures so that they can be corrected.
- **Identity Resolution and Record Linkage**, which measure the degree of similarity between any two records as a means for determining whether the two records are a match and likely to represent the same entity. Identity resolution is employed in recognizing variance between records that represent the same objects, enabling cleansing and consolidation.
- **Query and Reporting**, which provide users with direct access to the data warehouse for direct queries and to configure reports.

- **Report Delivery**, which executes the queries to generate standardized reports and provides the channel for delivering those reports to the specified audience.
- **Information Analysis frameworks**, such as OLAP (Online Analytical Processing), which configure and aggregate data to allow for dimensional analysis and review.

4. Business Intelligence Market and Major Players/Vendors:

There are a number of software vendors involved in the development of BI tools and performance management products. Some of the top vendors in this segment, their products and their capabilities are as follows:

1. Business Objects

Business Objects ended 2005 again as the leading BI software vendor, with \$795 million in BI tools revenue and a 14% market share. Business Objects is the dominant query, reporting, and analysis vendor, with a broad user base spanning all major geographic regions, company size segments, and industries. Building on this base, the company has ambitious goals for growth. This growth can either be organic or involve further acquisitions. Both paths will likely contribute to Business Objects' top line over the foreseeable future, with most of the organic growth coming from query, reporting, and analysis tools from both expanding the company's user base within enterprise accounts and deeper penetration of midsize organizations.

2. SAS Institute

SAS was the second-largest vendor in 2005, with \$582 million in BI tools revenue and a 10.2% market share. Fifty-nine percent of SAS' BI tools revenue comes from advanced analytics software. However, in 2005 the company saw strong performance from its Enterprise BI Server product suite, which resulted in a 26% growth in its query, reporting, and analysis revenue. SAS is also continuing to find success in specialty analytic applications that take advantage of its advanced analytics tools. Examples include applications for various types of forecasting, optimization, and descriptive and predictive analytics. Although this revenue is not accounted for in the current BI tools study, it influences the company's overall product mix and in aggregate has a tempering effect on BI tools revenue.

3. Cognos

Cognos finished 2005 as the third-largest BI vendor, with \$567 million in BI software revenue and a 9.9% market share. Like its longtime rival Business Objects, Cognos experienced competitive market pressures, which kept its query, reporting, and analysis revenue growth rate below that of the market. IDC speculates that the company's ReportNet product, which had tremendous growth when it was first introduced at the end of 2003, encountered tough competition from the many reporting products in the market from specialty BI and database vendors.

4. Microsoft

It Estimates the value of Microsoft's BI tools at \$353 million, which puts the company into fourth place with a 6.2% market share. Among its closest competitors, Microsoft is a relative newcomer to the BI tools market; the company introduced its OLAP server at the end of 1997. Nevertheless, Microsoft has seen strong growth over the past several years as it has expanded and enhanced its database-embedded BI features and combined them with related tools such as data integration. Specifically, the high growth rate in 2004 is attributed to the release of SQL Server Reporting Services.

5. Hyperion Solutions

Hyperion recorded a strong year of BI tools sales with revenue of \$287 million and a 5% market share. The growth was driven by the new Hyperion System 9, which in essence was the first major release of a combined BI suite incorporating the best of Hyperion and former Brio technologies. It's also interesting to note that Hyperion had weaker-than-expected results in its financial and business performance management (BPM) applications business lines. These two major revenue streams for Hyperion seem to oscillate in performance as sales and marketing efforts shift from year to year. Hyperion remains the largest financial and BPM analytic applications vendor, and over the long term.

6. Oracle

Oracle's BI tools revenue in 2005 came in at \$247.7 million, which increased its market share to 4.3%. The company derives BI revenue from both database embedded BI servers and end-user query, reporting, and analysis tools. There was a clear increase in marketing emphasis on BI in 2005, and IDC expects Oracle to continue above-market growth rates in BI tools as the current market cycle plays itself out over the next 15 years. At Oracle, its BI tools must compete not only with other vendors' products but also with its own analytic applications and Daily Business Intelligence, a component of the company's e-Business Suite.

And other players include Micro strategy, SPSS, SAP, IBM, Humming Bird, Information Builder, Lawson, Teradata (NCR) and others etc.

5. Applications of Business Intelligence

Sales & Marketing

- Determine real-time product sales to make vital pricing and distribution decisions.
- Analyze historical product sales to determine success or failure attributes.
- Evaluate successful products and determine key success factors.
- Quickly isolate past preferred customers who no longer buy.
- Identify daily what product is in the manufacturing and distribution pipeline.
- Instantly determine which salespeople are performing, on both a revenue and margin basis, and which are behind.

Finance

- Compare actual to budgets on an annual, monthly and month-to-date basis.
- Review past cash flow trends and forecast future needs.
- Instantly generate a current set of key financial ratios and indicators.
- Receive near-real-time, interactive financial statements.

Human Resource

- Evaluate trends in benefit program use.
- Identify the wage and benefits costs to determine company-wide variation.

Other Areas

- Warehouses have also been applied to areas such as: logistics, inventory, purchasing, detailed transaction analysis and load balancing.

6. Conclusion

Just as security technology is something without which organizations can't survive, so is BI technology something without which organizations can't succeed. However, BI as a set of tools and concepts for managing organizational and individual performance still has a long way to go in reaching all of the necessary people and processes in companies, government agencies, hospitals, and universities.

In this era of globalization, BI is necessary for any organization which wants to churn intelligence out of its enterprise data, to make better decisions and compete with its competitors and thus stay in business.

7. References:

1. *Creating a foundation for Enterprise Decision Management*, White Paper. Allen, Bonde Group Inc, 2003
2. *ARoadmap to Data Migration Success*, White Paper, Business Objects, 2008
3. *A Competitive Analysis of Worldwide Business Intelligence Tools 2005 Vendor Shares* by Dan Vesset Brian & McDonough, IDC Report 2007
4. *Building the Data Warehouse*, Bill Inmon, John Wiley Publications, 2ed
5. *Data warehousing, Data Mining and OLAP*, Berson A and Smith, McGraw Hill
6. *Data Warehousing, Next Generation Business Intelligence and the evolution of Data Quality*, white Paper, David Loshin, Integrity Systems, 2008
7. *Worst Practices in Business Intelligence*, White Paper, Kevin R Quinn, Web Focus, 2008
8. www.datawarehousingonline.com
9. www.learn-datamodelling.com
10. www.bloor-research.com