

Business Intelligence: A View on Requirements, Process and Tools

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Abstract

Business Intelligence is the computer based technique, methodology and process that is used to transform raw data to meaningful information for business. It is the architecture that discovers, analyzes and processes business data and presents business statistics to managers and analysts. As the organization tends to take decisions at different levels, Business Intelligence helps in this phase promptly by providing specific tools. The paper discusses these tools along with decision making capabilities. Paper also discusses life cycle of BI and its advanced methods of processing. Further few applications are also discussed for the organization perspective.

Keywords: Business Intelligence, Decision Making Process, data warehouse, data mart, OLAP

1. INTRODUCTION

The term Business Intelligence is seen as a tool and system for systematic strategic planning process of the corporation. Business intelligence, or BI, is an umbrella term that refers to a variety of software applications used to analyze an organization's raw data. BI as a discipline is made up of several related activities, which include data mining, online analytical processing, querying and reporting [1].

Business Intelligence supports market research, market segmentation, customer profiling, product profitability, statistical analysis, and inventory and distribution analysis etc. It allows a company to gather, store, access and analyze corporate data to aid in decision-making at each level so that, managers, executives and knowledge workers may take proper actions at time.

Most of the companies collect a large amount of data from their business operations. Software programs, such as Excel, Access and different database applications are used to keep track of this vast information, for various departments throughout the organization. But the use of multiple software programs results in difficulty to retrieve information in time and to perform analysis of the data.

Although BI holds great promise, implementations can be dogged by technical and cultural challenges. Executives have to ensure that the data feeding BI applications is clean and consistent so that users trust it. When you submit your paper print it in one-column format, including figures and tables. In addition, designate one author as the "corresponding author". This is the author to whom proofs of the paper will be sent. Proofs are sent to the corresponding author only.

2. BUSINESS INTELLIGENCE TOOLS

Business Intelligence (BI) is especially suitable for midsize companies. These companies need targeted, timely and accurate information that can successfully drive strategic business decisions. But these mid-size companies have limited IT staff and budget, they need a practical solution that enables them to deploy components tactically and incrementally [2]. These companies should start with reports or dashboards for information on how the business is performing and incorporate planning functionality to link the insights gained from analysis. They should not try to solve all their challenges at once, as it may lead them to failure.

Business Intelligence tools provide management and employees, reliable information and insights so that decision making can be enhanced, social collaboration can be done and a better performance can be achieved. These tools provide means for efficient reporting, thorough analysis of data, statistics & analytics and dashboards displaying the relevant indicators.

3. PROCESS OF DECISION MAKING-

In any organization, there exist three levels of decision making-

- (i) Operational Decisions- These are related to daily activities in an organization, and thus, possess short term effect usually these decisions are taken by lower level management and are completely structured.
- (ii) Tactical Decisions- These semi structured decisions are taken by middle level management and are focused to few months ahead.
- (iii) Strategic Decisions- These are unstructured decisions taken by top level management, and have long term effect on organization.

On the basis of these three levels of decision making, business intelligence processing is also classified into three types.

4. TYPES OF BUSINESS INTELLIGENCE PROCESSING-

Business Intelligence Processing is of three types [3]:

- (i) Strategic Business Intelligence- It is used for managing long-term business plans and goals. Mostly executives and business analysts use strategic Business Intelligence with a time frame of few months to years. It produces high level business performance metrics that is used to track how well the business is doing against long-term business goals such as growing market shares, reducing costs, increasing revenues etc.
- (ii) Tactical Business Intelligence- It is used to manage tactical initiatives to achieve strategic goals by senior managers, business analysts etc. it analyzes business operations over a period of days, weeks or months.
- (iii) Operational Business Intelligence- It is concerned with managing and optimizing daily business operations. It delivers the right information at the right time to the right business users to enable them to react rapidly to solve business problems and satisfy new business requirements. It deals with daily business optimization and thus has an intra day time frame.

5. REQUIREMENTS FOR THE BUSINESS INTELLIGENCE-

Business Intelligence results in many benefits, such as- reduced labor and cost, making data actionable, capabilities of better and faster decision making, aligning the organization towards its business objectives etc. To achieve these goals, BI also has few requirements [4], such as-

- (i) BI should be subject oriented- all data in BI should be in line of organization's business reality. For example, user should be able to access data by natural terms instead of table and column names in the database.
- (ii) Subject Definitions and targets should be unified and centrally managed- All definitions and key process items should be stored only at one place, so as to avoid redundancy and outdated definitions or reports. There should be a semantic layer that separates application of data and definition of data.
- (iii) Data interaction and exploration should be guided by system- The system must have an understanding of data to truly guide the user. This understanding can be implemented using data model. Relational data models are used for modeling operational system databases, whereas multidimensional data models have become a standard for analytical reporting systems.
- (iv) Data Collection and distribution should be automated- All data collection should be automated so that benefits of reduced labor costs and faster and better decisions may be achieved. Data collection includes any processing for the purpose of reporting. Automatic data distribution is the generation of reports and other outputs that are based on schedules and events and then these are propagated directly to relevant recipients.
- (v) Data documentation and validation should be system supported- To enforce the requirement of unified and centrally managed subject definition, it is required that users trust or understand the data they see in the reports. The BI system must support documentation and validation in following manners-
 - a. By encouraging system designers to write good and readable descriptions on all system objects.
 - b. By giving users an easy access to object description.
 - c. By allowing users to get an access to source transactions.

6. LIFE CYCLE OF BUSINESS INTELLIGENCE-

There are four steps in Business Intelligence, which are connected in a cyclic fashion [5].

- a. Acquisition of correct data- Correct and accurate data is collected from huge data warehouses, data marts, databases and other data sources.
- b. Analysis of data that is obtained through different BI operations- Many small segments of information are extracted from single large and complex element. These smaller elements help in better understanding and creating a knowledge base. In this step, different annual reports, dashboards, charts etc are created for the purpose of analysis.
- c. Identification of trends, changes and incorrectness- By using predictive analysis, complex mathematical methods and algorithms one can find the threats and opportunities within the business.

- d. Obtaining new knowledge and simulation- After analysis and identification of changes and trends, new business opportunities and problems are traced out.

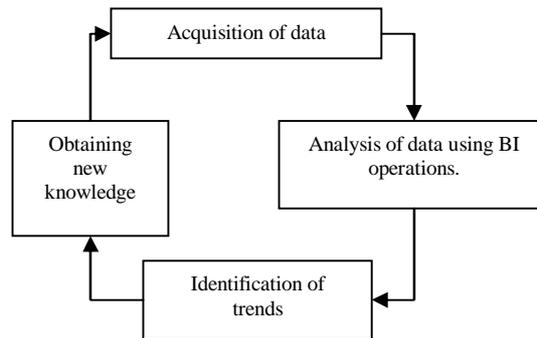


Figure 1: 4 steps of BI life cycle

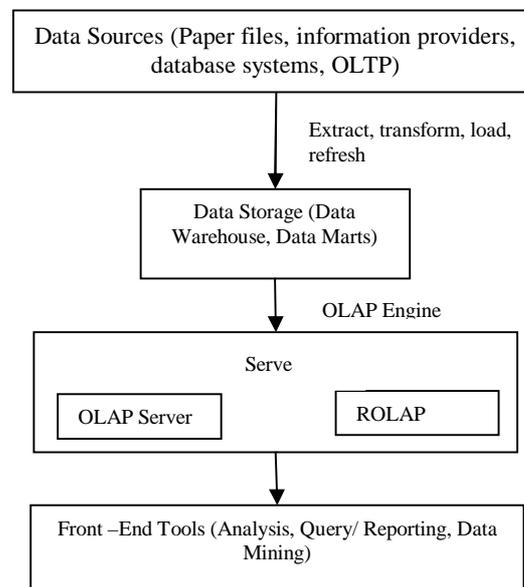


Figure 2: Business Intelligence Process

7. ADVANCED METHODS OF BUSINESS INTELLIGENCE-

In order to create complex reports and analysis, there are few advanced methods of BI [6], such as-

- a. Complex Analysis using OLAP- Online Analytical Processing provides the ability to manipulate and analyze data from different perspectives. User friendly queries can be built for OLAP, and multidimensional data model can also be used for data warehouses that are reconfigured for OLAP. It provides the facility to traverse through database, data warehouses or data marts for searching of particular data, analytical calculations etc. OLAP performs following functions-
 - Drill Down/Up- Specific techniques where analyst either moves to less detailed information (Drill Up) or to more detailed information (drill down).
 - Slice and Dice- Slice refers to combine and recombine the dimensions to view different aspects of information. Dice refers to slice a data cube on more than two dimensions. These features help in formulating business behavior and rules.
 - Pivot- It helps in changing dimensional orientation of report, i.e. from row orientation to column orientation or vice versa.
 - Nesting- Displaying one data dimension into another.
- b. Predictive Analysis-Regression techniques, discrete choice models, time series models etc are few techniques that can be used for predictive trend analysis. This method analyzes historical events and data with goal to find patterns of subtle data in relation to surround which uses data on dependent and independent way. This model

usually performs real time transaction and calculations for the purpose of introduction data driven decisions which lead to efficient and effective business [7].

- c. Data Mining- It is a process of obtaining and detecting patterns in data by using tools and statistical and mathematical techniques. Data mining can be used for classification of new, unknown samples to one of the many groups, clustering of groups with common characteristics, finding association and sequence between events etc.

8. APPLICATIONS OF BUSINESS INTELLIGENCE IN AN ENTERPRISE-

To achieve business values, Business intelligence can be applied to the following business purposes-

- (a) Measurement – program that creates a hierarchy of performance metrics and benchmarking that informs business leaders about progress towards business goals.
- (b) Analytics – program that builds quantitative processes for a business to arrive at optimal decisions and to perform business knowledge discovery.
- (c) Reporting/enterprise reporting – program that builds infrastructure for strategic reporting to serve the strategic management of a business, not operational, distribute, and enable adoption of insights reporting.
- (d) Collaboration/collaboration platform – program that gets different areas (both inside and outside the business) to work together through data sharing and electronic data interchange.
- (e) Knowledge Management – program to make the company data driven through strategies and practices to identify, create, represent and experiences that are true business knowledge.

9. CONCLUSION

Business Intelligence can be thought of a set of theories and technologies that converts raw data into useful information for the business use. It uses vast data from data warehouses and facilitates decision making in business organization. It's success for any organization depends on the amount and quality of business data available, level of business needs and commitments of project from senior management.

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