

# **BUSINESS INTELLIGENCE: AN INNOVATIVE TOOL FOR COMPETITIVE ADVANTAGE**

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## **ABSTRACT**

In today's information society, an explosive growth of electronic information is being witnessed. Many industrial sectors like banking, power, bio-informatics, operate huge data warehouses for collecting many different types of relevant information. This necessarily involves handling voluminous data. An essential element to achieving success involves the continuous enhancements of knowledge and understanding of the business environment by employees at all level. This can be accomplished by implementing processes which augment the accessibility and communication of value added information throughout the organization.

The time has come when organizations have to become more intelligent to sustain in cut throat competitive business world, by using intelligent business decisions. The term Business Intelligence (BI) was first used by Gartner and popularized by analyst Howard Dresner. It refers to the ability to collect and analyze high volumes of data pertaining to customers, vendors, markets, internal processes and the business environment. BI tools are software that facilitates analysis and decision-making.

**Key Words: Business Intelligence, Data Mining, Data Warehousing, OLAP, Implications**

## **INTRODUCTION**

Business Intelligence is an invention and emerged necessity now for the corporations across the globe. It will help the organizations to simplify data integration process and access

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problems that corporations in this fast changing global business scenario. . In the fast moving business world decision-makers must be equipped with best of the available techniques and tools to take right kind of decision on right time. Business Intelligence also known as synonym for competitive intelligence, helps decision makers to take intelligent decision by providing them sophisticated and trusted data at their fingertips. Business Intelligence reduces the decision-making cycle by eliminating the time it takes to accumulate dissimilar data.

BI includes a range of functions such as query and reporting, business graphics, online analytical processing (OLAP), statistical analysis, forecasting and data mining. Data mining is a process of employing one or more computer learning techniques to automatically analyze and extract knowledge from data contained within a database. Data Mining is also used typically to explore large amount of business or market related data to find out consistent patterns and/or systematic relationships between variables, and then to validate the findings by applying the detected patterns to new subsets of data. The ultimate goal of data mining is prediction - and predictive data mining is the most common type of data mining and one that has the most direct business applications. Business Intelligence Solution allows organizations to accurately monitor and analyze critical business data. This information is then used to make informed business decisions for continuous improvement and improved productivity.

## **DATA WAREHOUSE: SOURCE OF DATA FOR MINING**

It is an information delivery system. It is subject oriented, integrated, nonvolatile, and time variant collection of data in support of management's decisions.

**Subject Oriented:** The data warehouse is oriented toward those major subject areas of the organization, which have been defined in the data model. Examples of typical subject areas include the following: customer, product, transaction or activity, account, etc.

**Integrated:** The data warehouse potentially can receive data from a number of sources. Each of these sources had an application designer(s) each freely encoding, naming conventions, physically attributes, and measurement of attributes. The filtering and translation necessary to transform the many sources into one consistent database is known as integration.

**Nonvolatile:** While it is common in the operational environment for data to be updated and, therefore, changed, the same is not true in the data warehouse. The data is loaded and accessed but not changed.

**Time Variant:** A data warehouse because of its very nature of its purpose, has to contain historical data, not just current values. Data is stored as snapshots over past and current periods. Every data structure in the data warehouse contains the time element.

## BUSINESS USE OF A DATA WARE HOUSE

No discussion of the data warehousing systems is complete without review of the type of activity supported by a data warehouse. Some of the activities against today's data warehouse is predefined and not much different from traditional analysis activity. Other processes such as multi-dimensional analysis and information visualization were not available with traditional analysis tools and methods. There is a very interesting phenomenon that is observed with data warehousing projects. The users of the new data warehouse only wish to get the information that they were able to get using the old tools and methods. They wish to replicate their queries and reports with the data warehouse and make sure that all the numbers match. Often there is an much apprehension of the new tools and the data warehouse as there is excitement. It is only after using the new data warehouse for a period of time that they start to explore and discover the new capabilities that are available to them. Soon, after , they start to have significant input into the data warehouse enhancement process and they happily become the mentors for the new users.

### Organizational Use of a Data Ware House

Organizations worldwide have realized that to stay ahead in an extremely competitive marketplace, it is imperative to take effective and quick decisions. Right decisions and right information can facilitate the decision making process. Organizations, functions and departments are seeking the Business Intelligence Applications to deliver cost-effective, high-speed information, thereby exploiting newer growth opportunities and gain competitive advantage.

Many Business Intelligence soft wares are available that can provide the right information to everyone in the enterprise - including in-depth analysis and reporting capabilities that are

required to understand business, make the right decisions, gain the competitive edge and increase profitability. Business Intelligence service focus includes Data Warehouse creation and maintenance, Metadata Management, On-Line Analytical Processing solutions, Data Mining solutions and End-to-End Consulting services in the Business Intelligence and Data Warehousing domain. BI/DW practice assists clients to access, analyze, share and leverage disparate business-critical information across their enterprise and translate their valuable data into organized and managed knowledge thus empowering them to make intelligent, timely and actionable decisions. In-depth BI/DW experience spans across various verticals, methodologies, technologies and tools, enabling to optimize business performance.

BI/DW solutions have helped people manage, change and transform their businesses through focused, high-quality, cost-effective business information solutions. Wide range of Business Intelligence solutions and services available, which include:

Data Warehousing, a methodology that allows project managers ensure that client's objectives are well handled through a logical, step-by-step approach. The purpose of this methodology is to provide a structured approach for project teams helping them achieve consistent successful solution implementation, and helping clients meet their organizational objectives.

## Database Management for Business Intelligence Systems

The use of consumer data for market analysis has been used since ancient times when the Mesopotamians sold shipments of olive oil and other commodities to the Ancient Grecian empire. While the foundations of the data storage have changed dramatically from Mesopotamian clay tablets to today's modern database management systems, the goals of business intelligence and data mining remain unchanged.

The basic tenet of business intelligence is that one can predict the future by analyzing the past, and by grouping together related groups of consumers, you can develop highly sophisticated and accurate predictive models that can save billions of dollars a year in advertising expenses. At the same time, consumers are provided with targeted marketing which is most appropriate to their needs.

Business intelligence is not limited exclusively to the area of marketing and sales. Hospitals group patients together in terms of their age and symptoms (a "cohort"), and analyze treatment regimens in order to determine the best course of treatment for their specific patient populations.

## Database Management for Business Intelligence

The storage of online data began in the 1960s as organizations began to develop the digital means to store information about stock prices, consumer trend behaviors, and so on. Unfortunately, this information had to be stored on large volumes of magnetic tape, and simple decision support queries for correlations could take days, making it difficult for a manager to follow any 'flow' of a decision process. It was only as disk storage began to become cheaper that this information was able to be brought online, so that the information could be indexed, pre-computed, and organized in such a fashion that the user of the business intelligence system could quickly get feedback on given questions. This would stimulate new questions, and provide a platform for making more informed business decisions. But as today's corporations start collecting "raw" data from their observable world, several problems have to be undertaken:

- **Data cleansing** - Data is only as good as the input to that system, and common keyboarding errors from individuals can skew the quality of the information. Today we recognize that all data must be cleaned, scrubbed, and standardized in order to get meaningful information from it.
- **Data summarization** - In data summarization, we find the problem of pre-computing large scale aggregations from mammoth volumes of data in real time. A simple question like "how many consumers of widgets are there in New York?", might require millions of data block I/Os, and a significant amount of computing power. Even with today's super fast computer systems and super cheap disk storage, the decision support system or expert system must be able to have this information available at the fingertips of the decision maker, which often requires pre-summarization and pre-aggregation of the salient data factors. Hence, today's database managers devote a significant amount of time to observing the decision patterns of their end user base, using tools such as

Oracle materialized views, Oracle's star query joins; allowing the information to be accessible to the end user base in a real time fashion. We also see today's business intelligence applications supporting a drill down mechanism whereby they can take a look at the behavior of a cohort as a whole, then double click through to see the information at successive levels of usage. Today, we see tools such as the Urchin software (now called Google Analytics) which allow website referrer stats to be organized in such a way that an SEO, or search engine optimization expert, can quickly drill through and see how customers are visiting their individual websites.

We also see a paradigm change on the Internet whereby referrer statistics can now measure not only the number of page viewed for an individual webpage but how long an individual actually spends on that page; a far better indicator of the actual popularity of a web page. These types of technology are fostering a whole new way that we use information in order to make predictions.

## HYPOTHESIS TESTING IN BUSINESS INTELLIGENCE

The aircraft industry learned in the 1960s that large-scale computers could be used to simulate the flying of a new aircraft without putting pilot's lives at risk, and we are starting to see the same application of hypothesis testing being used within the business community today. Prior to launching a 100 million dollar ad campaign, the behavior of that can be simulated using sophisticated algorithms and techniques which will model the actual advertising campaign in order for the marketing executive to see what kind of an ROI (return on investment) the marketing campaign might do.

Hypothesis testing is generally a "what if" type of question, whereby the business intelligence expert can isolate individual variables within their database and manipulate them over time based on well defined preconditions. This "ceteris paribus" approach (ceteris paribus literally means "all else being equal"), allows the decision maker to keep everything except their problem domain fixed. By fixing all but a single variable, and testing it against a well known universe, the business intelligence person can develop models which are far more sophisticated than traditional predictive analysis.

## THE COSTS OF BUSINESS INTELLIGENCE

It's often said in the information technology world that you 'can't afford not to have a data mining technique with in your organization'. It's not uncommon to hear stories of payback periods compressed into mere weeks even on data mining projects that cost tens of millions of dollars, because of the high value of the information that comes from these, and the end users savings for consumers.

The best example of this of course is within predicting consumer behavior, where organizations save hundreds of millions of dollars in broadcast advertising, replacing it instead with well-targeted advertising and a high probability of buying a specific product. The consumers appreciate the targeted marketing, and the reduced costs allow products to be offered more cheaply; benefiting everyone.

If we take a close look at the shift of the costs, we find back in the 1970s the major cost of any data warehousing or any data mining operation was the hardware itself which would often comprise more than 80% of the total cost. In the early twenty-first century we see a complete reversal of this, whereby the disk storage, while significant, are minimized by the amount of work required by both the database administrator and the business intelligence analyst. A highly skilled database administrator must be put in place in order to capture the real time data and organize it in such a fashion, so that the information can be more easily accessed by the statistical managers.

Once the data has been collected, organized, and aggregates are pre-computed and summarized, the largest expense is that of the business analyst themselves. These people must have very extensive backgrounds in multivariate statistics and understand in detail how all of the algorithms work, so that they can tear through all of this data in order to make statistically meaningful correlations between the data. In some, the lion's share of today's costs of data

business analysis are in the human resources arena, propelling an experienced data mining analyst into the realm of some of the most highly paid people within the information systems industry.

## Implications of Business Intelligence Systems

Even though the use of business intelligence saves lives, BI technology has broader social implications. First and foremost is the issue of data privacy. As consumer monitoring becomes more and more ubiquitous (*note how your purchasing behavior is controlled at super markets via your buyers club card*), we see that many privacy advocates do not want even our most innocuous behaviors recorded.

Fortunately, most consumers don't care whether you prefer peas to string beans and they allow point of sale systems to readily track purchases. Via the use of buyers club cards, the BI expert ties individual purchases to background demographic information. When consumers apply for buyer's club cards, they provide basic demographic information which is in turn analyzed with publicly available information on major life events and income (such as the purchase of a house, a divorce, the presence or absence of children). Hence, the database has detailed information not only about what products are being purchased, but the basic demographics of the person who is purchasing the goods or services.

The issue of data storage has always been important to business intelligence because of the dynamics of changing technology. Disk prices are falling radically each and every year.

Given our ability to store large amounts of empirical information cheaply, the goal of the business intelligence manager is to somehow be able to cleanse and manipulate this data in such a way that accurate predictive models can be built.

Let's take a closer look at the evolution of business intelligence from the perspective of the database manager, and explore how the database influences the manipulation of these vast quantities of observable data in the real world.

## Applications of Business Intelligence

The idea of data mining allows us to do far more than predict the future behavior of a consumer. Companies such as Amazon pioneered the idea of a "recommendation engine", which analyzed patterns of behavior amongst known consumers, extrapolated them online, and made on-point recommendations for future purchases.

Another good example of data mining is the role of a bank loan officer. Traditionally, bank loan officers all have access to the same set of data, but it is undeniable that some people serve as better loan officers than others. This could be blamed on human intuition, whereby the loan officer recognizes someone as either having a good or a bad propensity to repay the loan based on non quantifiable characteristics.

It is largely understood now that the role of an experienced bank loan officer has more to do with the subtle nuances of the applicant; and being able to recognize them. Hence, today's bank loan officers are largely constrained by following the computer whereby an individual borrowers is compared against a cohort (the term "cohort" is the arbitrary grouping of like minded people).

In some, the rapid falling prices of disk storage technology have now made it feasible for organizations of even a modest budget to store trillions of bytes of real time information about their business processes. The immediate challenge is how to store, organize, and extrapolate from this information in order to make valuable business decisions.

Let's take a closer look at the underlying database technology, and explore how today's database management systems help business intelligence experts to organize, collect, and make valid predictive models.

## BUSINESS INTELLIGENCE AND ITS BENEFITS

Data mining technology delivers two key business intelligence benefits:

1. It enables enterprises, regardless of industry or size, in the context of defined business objectives, to **automatically** explore, visualize and understand their data, and to identify patterns, relationships and dependencies that impact on business outcomes (such as revenue growth, profit improvement, cost containment, and risk management) - a **descriptive** function.
2. It enables relationships uncovered and identified through the data mining process to be expressed as business rules, or predictive models. These outputs can be communicated in traditional reporting formats (presentations, briefs, electronic information sharing) to guide business planning and strategy. Also these outputs, expressed as programming code, can be deployed or "hard wired" into business operating systems to generate predictions of future outcomes, based on newly generated data, with higher accuracy and certainty - a **predictive** function.

In the "CRM" arena a business can evaluate and develop a set of business intelligence rules about all aspects of its customer interactions. A simple example is modeling the likelihood of response to a specific solicitation of a new product or service. Based on these business rules, the business can target its marketing campaigns for maximum response to generate a desired level of response, revenue or profitability. Other typical "CRM" business examples would include:

- Modeling customer acquisition (for targeted marketing and other CRM initiatives)
- Assessing customer defection (for customer service and reclamation purposes)
- Monitoring risk of loss (for customer scoring and credit approval decision making)
- Abuse intervention (to reduce losses through investigation of incidence of fraud)

However, the reach of data mining technology extends far beyond "CRM" to encompass any process involving the acquisition, interpretation and acting on of data (internally or externally sourced). In the business domain this would include areas as diverse as internal audit and expense control through to research and development for new products or services.

## BUSINESS INTELLIGENCE TOOLS

Business intelligence tools are a type of application software designed to help the business intelligence (BI) business processes. Specifically they are generally tools that aid in the analysis, and presentation of data. While some business intelligence tools include Extract Transform and Load (ETL) functionality, Extract Transform and Load (ETL) tools are generally not considered business intelligence tools

## **Excel**

One of the most common business intelligence tools is Microsoft Excel. Excel is best used for business operations reporting and goals tracking. The reasons for its popularity is

- It's relatively cheap.
- It's commonly used. You can easily send an Excel sheet to another person without worrying whether the recipient knows how to read the numbers.
- It has most of the functionalities users need to display data.

In fact, it is so popular that all third-party reporting / OLAP tools have an "export to Excel" functionality.

## **Pentaho - Business Intelligence Suite**

The Pentaho provides enterprise-class reporting, analysis, dashboard, data mining and workflow capabilities that help organizations operate more efficiently and effectively. The software offers flexible deployment options that enable use as embeddable components, customized BI application solutions, and as a complete out-of-the-box, integrated BI platform. It is one of the best open source business intelligence suites.

## **OpenI**

The OpenI (pronounced "open eye") is a powerful, open source business intelligence platform that will enable companies of all sizes to harness the power of their data. Goal of BI is to transform data into actionable insights. Commercial BI tools have mainly focused on providing a black-box infrastructure to address this need, leaving the end users on their own to figure out how to build intelligence, which is painfully expensive and time-consuming. The OpenI project

attempts to open up the BI "Infrastructure" via open source, so that solution providers can deliver "Intelligence" without getting overwhelmed by proprietary infrastructures.

### **SpagoBI**

SpagoBI is an integration platform focused on business intelligence needs at the enterprise level. It is a full open source solution and does not have any professional edition. SpagoBI offers a complete analytical layer (e.g.: reporting, data mining, dashboards, free and visual data inquiring) with many solution for every area, allowing the end-user to compose the platform best suited for him/her, also mixing open source and proprietary products in order to maximize the overall ROI. SpagoBI is a natural choice for users looking for a unified open source platform for business intelligence as it is fully extensible. Its capabilities include reporting, OLAP (dimensional analysis), dashboards, data mining, QBE (query by example), booklet . processes support.

### **JasperIntelligence**

JasperIntelligence is the web platform project for JasperReports, iReport, JasperServer, and JasperAnalysis. It is an open source business intelligence platform providing common services like security and metadata management, and the capability to easily add additional functionality. It is a business intelligence platform built by the developers of JasperReports, the leading open source reporting engine. It provides a Web and Web services based environment for reporting, data analysis (OLAP) and data integration.

### **ADempiere ERP Bazaar**

Adempiere is an ERP Bazaar for open source developers that contribute improvements of Compiere, CRM, Shopfloor, POS, Helpdesk, Financials Accounting, Supply Chain, Knowledge and Business apps in an open and unabated fashion.

### **Openbravo ERP**

Nowadays, business organizations handle a great deal of data in the practice of their business activities. This does not necessarily mean that they have available to them the necessary

information for the management of their enterprise. The BI component of Openbravo, integrated into the management system, will help you to carry out continuous monitoring of the state of your company, providing you with the relevant information for decision-making. Openbravo is a pure web-based extended ERP for SMEs (Small and Midsize Enterprises). This web-based extended ERP solution includes robust functionalities allowing for the management of procurement, warehouse, projects, manufacturing, sales and financials. Basic CRM (Customer Relationship Management) and BI (Business Intelligence) are built in as well.

### **Compiere Business Intelligence**

Compiere BI (Business Intelligence) is an integration of JPivot/Mondrian project into Compiere ERP/CRM. It provides software and database integration. It aims to develop vertical BI case study models for enterprises.

### **Digital Dashboards**

Also known as Business Intelligence Dashboards, Enterprise Dashboards, or Executive Dashboards, these are visually-based summaries of business data that show at-a-glance understanding of business conditions through metrics and Key Performance Indicators (KPIs). A very popular BI tool that has arisen in the last few years.

### **Benefits of digital dashboards**

Most organizations have various departments all contributing to its overall success and thus it is important to be able to assess the progress of each department. Digital dashboards, which are a type of executive information system, allow managers to do just that. To gauge exactly how well an organization is performing overall, digital dashboards allow you to capture and report specific data points from each department within the organization, thus providing a "snapshot" of performance.

### **Benefits to using digital dashboards include**

- Visual presentation of performance measures
- Elimination of duplicate data entry.

- Ability to identify and correct negative trends.
- Measure efficiencies/inefficiencies.
- Ability to generate detailed reports showing new trends.
- Increase overall revenues.
- Ability to make more informed decisions based on collected BI (business intelligence)
- Align strategies and organizational goals.

### **Online Analytical Processing (OLAP)**

**OLAP**, is an approach to quickly answer multi-dimensional analytical queries. OLAP is part of the broader category of business intelligence, which also encompasses relational reporting and data mining. 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). Databases configured for OLAP use a multidimensional data model, allowing for complex analytical and ad-hoc queries with a rapid execution time. They borrow aspects of navigational databases and hierarchical databases that are faster than relational databases.

The output of an OLAP query is typically displayed in a matrix (or pivot) format. The dimensions form the rows and columns of the matrix; the measures form the values.

### **ROLAP**

The underlying data in this model is stored in relational databases. Since the data is stored in relational databases this model gives the appearance of traditional OLAP's slicing and dicing functionality. The advantage of this model is it can handle a large amount of data and can leverage all the functionalities of the relational database. The disadvantages are that the performance is slow and each ROLAP report is an SQL query with all the limitations of the genre. It is also limited by SQL functionalities. ROLAP vendors have tried to mitigate this

problem by building into the tool out-of-the-box complex functions as well as providing the users with an ability to define their own functions.

**ROLAP** may be applicable for very large, infrequently used data access. Slow processing, slow query response and huge storage requirements are ROLAP's chief characteristics.

**ROLAP** reduces your overall storage requirements since you are going directly against your warehouse. Also, large warehouses can be designed to present data to users in a timely fashion.

Just because it's pre-summarized doesn't necessarily define ROLAP as "duplicated." The data is in a different format because it's pre-summarized. The whole evolution has been to improve access to information for end users, including query response time.

**ROLAP** may indeed reduce storage but how can you compare the cost of disk to response time? To get the same ROLAP response time you may need to dramatically increase processing power so what have you really saved.

## **MOLAP**

This is the traditional mode in OLAP analysis. In MOLAP data is stored in form of multidimensional cubes and not in relational databases. The advantages of this mode is that it provides excellent query performance and the cubes are built for fast data retrieval. All calculations are pre-generated when the cube is created and can be easily applied while querying data. The disadvantages of this model are that it can handle only a limited amount of data. Since all calculations have been pre-built when the cube was created, the cube cannot be derived from a large volume of data. This deficiency can be bypassed by including only summary level calculations while constructing the cube. This model also requires huge additional investment as cube technology is proprietary and the knowledge base may not exist in the organization.

**MOLAP** pre-summarizes the data to improve performance in querying and displaying the data. Products such as MS SQL Server Analysis Services even let you pre-determine how much of the data to pre-build for performance purposes

**MOLAP** does require data duplication as the users are going against a pre-summarized cube that is a separate structure from the main datawarehouse. How much duplication is dependent on the amount of detail you want to present to users, and how many different cubes you ending up building. Obviously, a cube only reproduces a piece of the warehouse

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## **HOLAP**

HOLAP technology tries to combine the strengths of the above two models. For summary type information HOLAP leverages cube technology and for drilling down into details it uses the ROLAP model

## **A COMPARISON: MOLAP, HOLAP AND ROLAP**

The type of storage medium impacts on cube processing time, cube storage and cube browsing speed. Some of the factors that affect MOLAP storage are:

Cube browsing is the fastest when using MOLAP. This is so even in cases where no aggregations have been done. The data is stored in a compressed multidimensional format and can be accessed quickly than in the relational database. Browsing is very slow in ROLAP about the same in HOLAP. Processing time is slower in ROLAP, especially at higher levels of aggregation.

MOLAP storage takes up more space than HOLAP as data is copied and at very low levels of aggregation it takes up more room than ROLAP. ROLAP takes almost no storage space as data

is not duplicated. However ROALP aggregations take up more space than MOLAP or HOLAP aggregations.

All data is stored in the cube in MOLAP and data can be viewed even when the original data source is not available. In ROLAP data cannot be viewed unless connected to the data source.

MOLAP can handle very limited data only as all data is stored in the cube.

## **THE BUSINESS INTELLIGENCE SUCCESS FACTORS**

**Clarity** – A consistent understanding of the company’s vision and mission, goals and expectations, values, roles and structure, rules and consequences are essential for the company to adapt to changes in today’s marketplace.

**Connection** – Employees who are connected to others as well as their own innate wisdom have the ability to identify and leverage opportunities quickly, which is especially critical in highly dynamic markets.

**Communication** – Today’s businesses require a highly specialized workforce. These are often comprised of people from all over the globe as well as broad ranges of talents and skill sets. Therefore, the need for strong communication skills is vital to all parts of the organization.

**Collaboration** – Workforce specialization as well as the move toward centralized data systems make it necessary for companies to develop or foster a collaborative environment. Company hierarchies with embedded competition may produce positive results in the short term. However, long term sustainable growth is best served by leaders who foster collaboration that unleashes the inherent wisdom from within a diverse workforce.

**Creativity** – Linear processes are quickly automated or outsourced leaving creative, nonlinear thinking as the new competitive advantage. An organizational culture that supports and encourages the creative process is essential for success in the new paradigm.

**Compassion** – Through their emotional awareness, compassionate employees have the ability to understand the ideas, beliefs and opinions of others. This lays the foundation for most of the other success factors. It also enables marketers to put themselves into the shoes of their customers, giving them an inside edge over their rivals.

**Credibility** – Consistent actions build trust which strengthens the connection between intention and results. Leaders who perform with authenticity and accountability are better able to maintain stability and alignment, leading to success in a dynamic marketplace.

**Conflict** – When skillfully executed and managed, conflict can allow for the emergence of original ideas and solutions. The adrenaline and energy released can be a powerful impetus for breakthrough ideas and insights.

**Change** – In our high-tech, globally competitive business arena, change is the only constant. To be resilient in this environment, the main competency here is adaptability. This is achieved through alignment of all aspects of the organization.

**Courage** – Success in our dynamic global economy requires leaders to take calculated risks. As companies empower their workforce, risk-taking is encouraged at all levels. The mastery of these skills will facilitate the emergence of true alignment that allows you to adapt to changes in markets, technology and competitive forces yet to be determined. Adaptability through alignment is essential to sustainable growth and profitability.

## **THE FUTURE OF BUSINESS INTELLIGENCE**

A 2009 Gartner paper predicted these developments in business intelligence market

- In 2009, collaborative decision making will emerge as a new product category that combines social software with business intelligence platform capabilities.
- By 2010, 20 per cent of organizations will have an industry-specific analytic application delivered via software as a service as a standard component of their business intelligence portfolio.
- By 2012, business units will control at least 40 per cent of the total budget for business intelligence.
- Because of lack of information, processes, and tools, through 2012, more than 35 per cent of the top 5,000 global companies will regularly fail to make insightful decisions about significant changes in their business and markets.
- By 2012, one-third of analytic applications applied to business processes will be delivered through coarse-grained application mashups.

## **CONCLUSION**

We can expect to see a lot more demand for people who are highly skilled in quantitative aspects of data analyses. This is certainly an emerging area of information technology, one that requires many years of studies in statistics and understanding how to present information in a meaningful way to the decision maker.

There is potential for the business intelligence in the area of retail industries includes to do the analysis of data on various type of data, collected from different retail outlets at little more large scale to achieve more practical solutions regarding data mining in retail industry. Business communities have to adopt new techniques to sustain in the cut throat competitive business world. Thus, intelligent business world will be run through intelligent business techniques only. The futuristic business houses can not ignore the importance and role of business intelligence to be successful in the new competitive business paradigms.

## **REFERENCES**

Bakshi, Arun (2008), “*A Study on Applications of Data Mining Techniques in Business Intelligence*”. Unpublished M Phil Dissertation, Department of Engineering and Technology, Chaudhary Devi Lal University Sirsa, Haryana

Date C.J, Kannan A. & Swamynathan S, (2007), “*An Introduction to Database Systems*”, Pearson Education, Delhi

Elmasri R,& Navathe S.B, (2004), “*Fundamentals of Database Systems*”, Pearson Education, Delhi

Groth, R., (1997), “*Data Mining: A Hands-on Approach for Business Professionals*”, Prentice Hall, Delhi

Jiawei H. & Micheline K,” (2007), *Data Mining Concepts and Techniques*”, Morgan Kaufmann Publishers (Elsevier), Delhi

.Ponniah, P (2006) , **“Data Warehousing Fundamentals, A Comprehensive Guide For IT Professionals”**, Wiley India Pvt. Ltd

Prabhu C.S.R., (2002), **“Data Warehousing”**, New Delhi Prentice-Hall of India, Delhi

Richard J. R., Michael W.G., (2005), **“Data Mining, A Tutorial-Based Primer”**, Pearson Education, Delhi

Thomsen E., (1997), **“OLAP Solutions: Building Multidimensional Information Systems”**, John Wiley & Sons.

[www.thearling.com/index.htm](http://www.thearling.com/index.htm) (Last Accessed on 12, December, 2007)

[http://en.wikipedia.org/wiki/Decision\\_tree](http://en.wikipedia.org/wiki/Decision_tree) (Last Accessed on 19, December, 2007)

<http://www.stat.rutgers.edu/~madigan/datamining/intro/sld006.htm> (Last Accessed on 25, December, 2007)

<http://www.amstat.org/profession/index.cfm?fuseaction=dataminingfaq>, (Last Accessed on 10, February, 2008)

<http://en.wikipedia.org/wiki/OLAP> (Last access on 05 October, 2009)

<http://www.1keydata.com/datawarehousing/business-intelligence-tools.php> (Last Accessed 05October, 2009)

[http://en.wikipedia.org/wiki/Business\\_intelligence](http://en.wikipedia.org/wiki/Business_intelligence) ( Last Accessed 05 October, 2009)