

Management Aspects of the Business Intelligent Systems Development

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Summary:

In today's era of the intelligent economy companies are operating in an environment of fierce competition that could be measured and analyzed by the level of successful management. Corporate performance is faced with the challenge to meet the requirements of the dynamically changing market conditions and is based on the proper and timely management decision making. Organizations have to become intelligent in collecting, understanding and using data for making management decisions in order to successfully carry out business activities. Business Intelligent Systems (BIS) become the key functional component of modern companies that links data, information, people and technology, and results in successful organization management.

Business Intelligence (BI) is a set of concepts, methods and processes that support the improvement of the decision making process by using different sources of information, applying previous experience and defining assumptions to obtain an accurate picture of business dynamics. The logical architecture of BIS is structured in three main layers, Management of Data, Management

of Data Integration and Analytical Models, and Management of Data Visualization, each providing specific tools for user interaction. The successful implementation of BIS requires an appropriate use of all the data generated in the enterprise to improve the managerial capacity for transforming data into information and information into knowledge and competitive advantage. Strategic aspects at various levels, Information, Users and Organization, should be taken into consideration in BI project planning and development, in order for those initiatives to be successfully fulfilled.

This article presents the main advantages and disadvantages of the BI solutions developed by the leading BI vendors, identified in the Gartner's Magic Quadrant for BI Platforms 2012. Characteristics that will be leading in the next generation BI decisions are described, exposing some of the underperformed BI solutions which are already focusing on them. Visioning forward, BI tools vendors will begin introducing embedded BI in operational applications and mission-critical business processes.

Key words: business intelligence, managerial decision making, corporate performance management, business intelligence alignment

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1. Introduction

In today's era of the intelligent economy, companies operate amid strong competition that could be measured and analyzed by the level of successful management. Corporate performance is faced with the challenge to adapt constantly to the changing market conditions based on a proper and timely management decision making. The business processes by which organizations operate today are very complicated and for obtaining high quality information at the right time and place they need advanced technological solutions to support management.

In 1999, Drucker [4] correctly pointed out that the information revolution up to that time had mainly produced software systems that "routinize" traditional business processes with tremendous savings in time and possibly cost. By contrast, the systems had little impact on the ways in which business decisions were made. More recently, managers have come to understand this limitation. As a result, the acquisition and application of business intelligence (BI) systems have grown significantly [11].

Business Intelligent Systems (BIS) turned out to be the key functional component of the modern companies that links data, information, people and technology, and results in successful organization management. Companies that follow the market trends implement BI solutions to turn operational data into information and information into competitive advantages.

BIS introduce an intelligent extraction, integration, aggregation and a multidimensional analysis of data that come from dif-

ferent sources (Olszak&Ziemba, 2007). They combine data from the transactional systems that are internal for the organization, integrating these data aggregating them with the external ones coming from the particular environment - statistics, financial portals, databases. The main objectives of those systems are directed towards the provision of adequate and reliable information that could explain and analyze the enterprise's activities and support the decision making process.

2. Business Intelligence Concept

Business intelligence is a term that has been introduced in order to describe the new level of information systems growth - advanced analytics. It encompasses different elements - technologies, applications, and processes for gathering, storing, accessing, and analyzing data to support the management users in taking appropriate decisions (Wixom & Watson, 2010).

The rapidly changing economic environment requires organizations to become intelligent in collecting, understanding and using data for making management decisions in order to successfully carry out business activities.

The term "Business Intelligence" grew in use mostly in the 1990s, but actually it originated much earlier:

- The first information systems that address the information support of the decision process are called Management Information Systems and emerged in 1970s. Their main characteristics are - Records and Reports that are static, two-dimensional and without analytic functions.

- The development of Information Systems in early 1980s is related to the Strategic Management (Executive Information Systems), assisting the senior management of organizations. These systems are able to process Dynamic multidimensional queries and reports, prediction and forecasting, trend analysis, detailed research data, analysis of state and critical success factors.
- The mid 1990s proved that BIS was well introduced in the companies and that numerous commercial software products were elaborated and advanced analytical tools were incorporated.
- The late 1990s gave the great push for the further development of new features in the newly emerged business intelligence systems. That is the period when the new common understanding was established that all the information required by the organization management to support the timely and appropriate decision making can be found in a business intelligent system covering the whole enterprise.
- After 2005 business intelligent systems began to provide powerful analytic tools and features that help perform innovative and advanced analytical tasks.
- Today the new generation of Business Intelligence is flourishing, expanding in various development directions.

During the period of BI and BIS industry implementations a broad range of definitions of related terminology was made, refined and supplemented.

Definitions reveal the general characteristics of BIS, namely that they realize the processes of analyzing large volumes of historical

corporate data (integrated in data warehouses), managing business performance, extracting trends and guidelines for better management decisions.

Based on the BI definitions analysis we can summarize that:

Business intelligence is a set of concepts, methods and processes that support the improvement of the decision making process by using different sources of information, applying previous experience and defining assumptions to obtain an accurate picture of the business dynamics.

The successful implementation of BIS requires the appropriate use of all the data generated in the enterprise to improve the managerial capacity for transforming data into information and information into knowledge and competitive advantage. Therefore, BIS is an accumulative term, including processes, tools and technologies used to implement the conversion of data into support business decision making.

3. Business Intelligent Systems Components

The components of the BI systems could be presented and analyzed according to the technological view [8]. BI systems consist of set of tools, technologies and software products that elaborate a collection of heterogeneous data from dispersed sources, integrate, analyze them and present the results.

BIS architecture is structured in three main layers with specific tools for each [2]:

- Management of Data – this layer includes relational databases and all the enterprise data sources. The role

of this layer is to collect, integrate and organize data from internal and external sources. Data sources contain historical and current data. According to the type and scope, the enterprises could decide what alternative procedures for data integration could be selected.

- Management of Data Integration and Analytical Models – this layer is responsible for incorporating the enterprise data in a Data Warehouse, mainly implementing procedures for extraction, transformation and load (ETL). This layer figures out the different type of analytical models to be used for data processing– analysis, forecasting, trends, patterns, etc. The main solutions implemented at this layer are: On-line Analytical Processing (OLAP), Data Mining, and Analytical Reporting.

○ Tools:

- ◆ ETL tools are mainly responsible for the data transfer from transaction systems and the Internet to data warehouses;
- ◆ Data Warehouses provided an integrated space for thematic storing of aggregated data;
- ◆ OLAP tools support users access, analyze and model business problems. The OLAP engine is a query generator that provides users with the ability to explore and analyze summary and detailed information from a multi-dimensional database. Analytic workers could use OLAP for operations like "slicing and dicing" data by various dimensions and then drilling down into the source data or rolling-up to aggregate levels.
- ◆ Data mining tools could enable users to discover various patterns, generalizations, regularities and rules in data resources.

These tools are appropriate for large and complex datasets. Applying statistical or modeling techniques, the data mining tools support discovery of hidden trends or rules within the large database. OLAM (on-line analytical data mining) systems are OLAP systems used for data mining, implemented to discover new information from multidimensional data.

◆ Management of Data Visualization – this layer's main tasks include a visual drill capacity to identify complex relationships and sophisticated graphical instruments and tools for reporting and presenting data in the most convincing and friendly manner. This layer could also incorporate a business intelligence portal to integrate data and information from a range of applications and repositories to allow visualization through a unique Web interface [3].

○ Tools:

- ◆ Reporting and ad hoc inquiring tools allow creating and utilizing different synthetic reports.
- ◆ Presentation tools include applications with graphical and multimedia interfaces to provide users with information in a comfortable and accessible format.

In summary, the most important components of the BI technological infrastructure are based on the Enterprise Transaction Databases and consist of information technologies that are related to the data acquisition and storing, and information technologies with potential for versatile analyses of data along with advanced presentation tools.

The model of the BIS architecture, based on the three above described layers is presented on Figure 1.

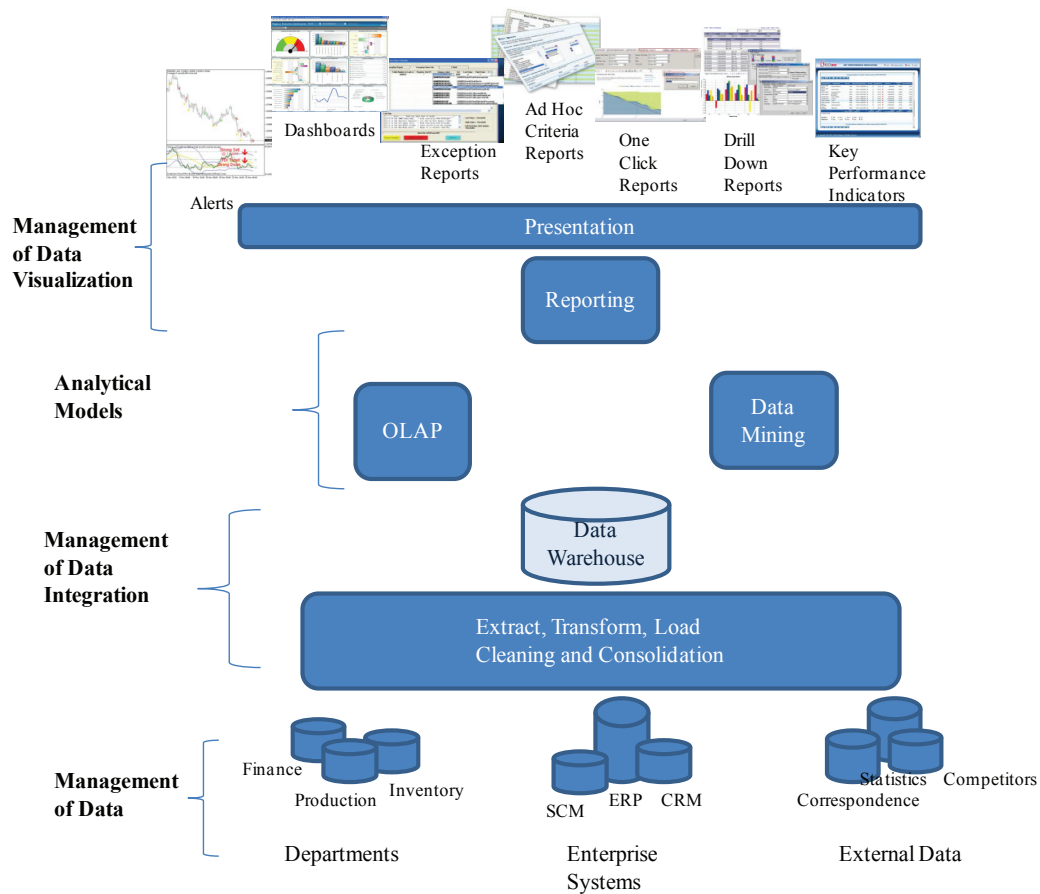


Fig. 1: A BI System Model

To build a BI System Model, taking into consideration the main business goals and objectives on one hand, and the possible technological solutions, on the other, the company could reconsider its own understanding and create a specific model or could select developed solutions. The modeling process typically follows an open approach whereby the model builders use their knowledge and intuition to construct and position the models. Gaining experience, recently BI vendors have started elaborating systems models for repeatable applications such as inventory optimization,

supply chain analyses, cost effectiveness of advertising campaigns, sales force analysis and optimization, and others.

4. Business Intelligence Realm

Companies everywhere are overloaded with piles of data about products, competitors, suppliers, customers. The information expansion is a problem that companies face when they start organizing the data management and analytics. Every day executives make critical business decisions based on uncoordinated information from a variety of sources and they need to understand the process related to the BI project

organization. The BI project planning and development should take into consideration the following strategic aspects [5]:

Information Strategy

The BI strategy should take into account all sources of data used for business decisions: operational systems, departmental data marts, key spreadsheets, and unstructured data, Web pages, and other corporate systems. Data sources should include not only internal systems, but also information stored in the systems of customers, partners, and suppliers. The enterprise data warehouse is the central pillar of any BI strategy. Data of all diverse operational systems should be integrated, made consistent, and optimized for analysis.

User Strategy

The most important approach to the BI project is that information is considered to be irrelevant unless it is used in decision making to facilitate the specific business operations. The BI strategy should examine who needs which information, from which systems, and how to be interacted. The goal is to ensure that all people and processes have the information they need and whenever they need it in order to perform their roles.

Organizational Strategy

The BI strategy should be in line with the overall organization and processes that require information to be managed to reach the corporate goals. A working group for the BI project management should be established to ensure the realization of the information value added. Appropriate

governance should be introduced to set priorities and align the information use with the overall strategy of the organization.

a. Business Management Levels and BI Project Development

To intelligently manage a company today, the business alignment [12,1,13] is a very important process that should be developed with responsibility. Strategies are developed and goals are set in compliance with the company's vision of the position focus and when they change, the BI program becomes the only solution for a swift, easy and effective adaptation to the new realities. Figure 2 illustrates the components of a BI program management:



Fig. 2: Components Alignment of Business Management and BI Program (Based on [12])

Strategies: Enterprises should understand and analyze all types of drivers that could influence the industry and market development. They should bring the company performance in line with the analysis of the changing behavior of the business drivers and accordingly develop the strategy to be followed and monitored within the next period.

Goals and Tactics: Based on the strategy, the company should identify specific measurable objectives and the respective actions needed to fulfill these objectives. The need for a revision of goals requires an appro-

appropriate change in the respective metrics. It is essential that this step be accurately followed because if goals are changed, then the actions should be adjusted and information needs identified.

Plans: At this step companies develop their plans for business management. Reflecting on the relations presented in Fig. 2, the company should establish a procedure for changing the plans and the processes, rules, results, metrics, and information needs should be accurately revised.

Results: The results are products and services that the company produces through its business operations. These results should be analyzed and brought in line with the Key Performance Indicators and corporate metrics. BI solutions process the corporate results in order to analyze the historical processes and prepare the forecasts for future performance. When goals and plans are changing, the results should reflect the changed metrics.

Processes: Business processes are positioned in the bases of most BI projects – Business Performance Management, Business Activity Monitoring, Supply Chain Management, etc. When the goals and strategies are changed some of the business processes may accordingly change to meet the new requirements. In order to change business processes, the company should decide what BI solutions to implement.

Personnel: The company personnel, referred to as knowledge workers who process the information and analysis, should incorporate the appropriate BI products in their activities. On the other hand, the per-

sonnel are analyzed in some BI applications (Business Activity Monitoring in particular) according to the BI metrics.

Metrics: The Key Performance Indicators are developed in order to support the business strategies and goals fulfillment. The metrics should always be changed in case strategies, goals, tactics, plans, processes, and personnel are revised. Dynamic changes within the business environment could be analyzed and business performance could be flexibly adjusted to them only with the help of BI today.

Rules: The business procedures that describe the way the business is to operate are structured in compliance with the business rules. To observe the business rules the following BI components are used: Data Warehouse structure, Data Integration methodologies, Information Services should be designed according to them. When the rules are changing the BI project should find the appropriate change in the BI products and the way they are being applied.

Transactions: Transactions describe the relations that the business establishes while operating within the environment – customers, suppliers, partners, etc. Transactions create volumes of business data which should be analyzed according to the used business metrics.

Workflows: The workflow describes the way the personnel perform the sequence of activities, beginning with identifying the need and ending with a result. The workflow analysis involves building proper mappings of relationships and information sharing and analyzing the information gaps and the demand for integration and consistency.

Information Services: The information services involve all tools, techniques, and applications used to provide information to support the business needs.

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Information Systems and Data Resources: Transactional systems and their relational databases are the source for building the Data Warehouse, which becomes the main source of the business analysis tools. All the changes within the systems and resources put strong pressure on the BI solutions and require their change.

Implementation Projects: The BI project describes a development and implementation process that takes into consideration all the components presented above. For managing a BI project some companies establish a Business Intelligence Competency Center in order to manage centrally all activities, fulfill the alignment with the business components and reflect appropriately their changes.

Technology Platforms: Technology solutions should be constructed in line with the projects and their goals. A tested business lesson is that the introduction of innovative technologies invariably affects the business processes, the expectations about information services and program implementation goals.

In summary, the alignment between the Business Management and a BI project design should be achieved as a specialized program comprising components that should be equally analyzed and accurately described in order to help the management realize the full

potential of business intelligence and ensure the capacity to provide sustainable support to the company's competitive advantages. Today, most of the presented business management components could not be successfully realized without BI solutions. It is impossible to integrate, consolidate and analyze such diverse data and bring corporate strategy and goals in line with the traditional information systems.

b. Business Intelligent Systems Main Characteristics and Business Areas

Modern companies feel the need to design and develop Business Intelligent Systems (BIS) in order to understand in depth all the meanings that their operational systems keep in the volumes of transactional historical data. They should improve their understanding and analysis of the information about the processes happening within the separate business segments - employees, customers, suppliers, and partners, which will accordingly improve decision making. BISs are the innovative solutions that can transform data and information into successful strategies and tactics to boost enterprises' efficiency.

Business Intelligent Systems are designed to allow companies to elaborate sophisticated analysis and support making informed decisions. Their key advantages are that they:

- consolidate and integrate data from different internal and external sources;
- sort out and filter huge volumes of data and information;
- support the development of improved strategies and plans;
- assist the improvement of tactical decisions;

- support the establishment of efficient processes;
- facilitate the faster and more accurate reporting;
- describe the single version of truth for the business performance;

the enterprise monitor the processes, activities, results and support decision making by analysis and forecasts. BIS help management solve problems related to risk management and business performance improvement.

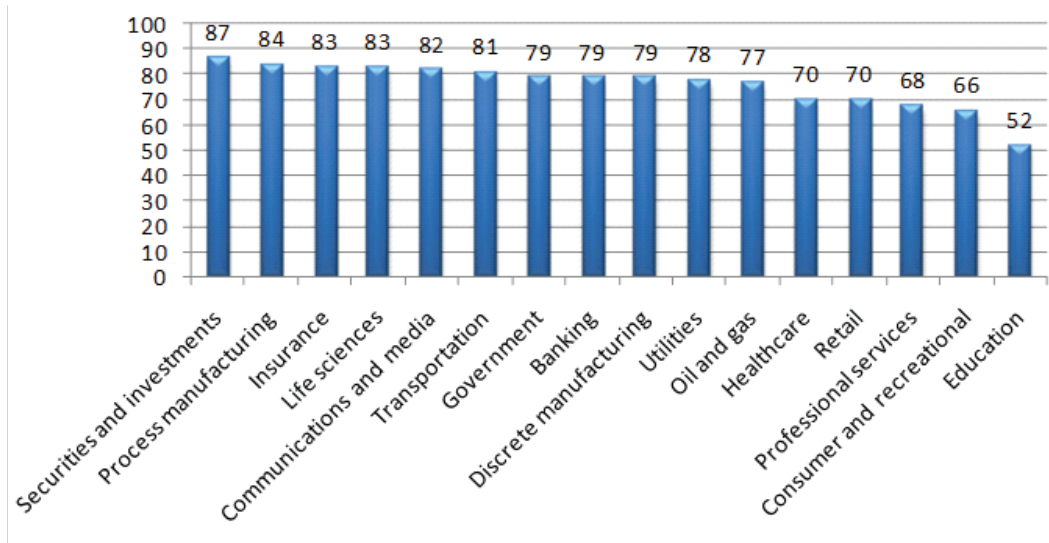


Fig. 3: BI Penetration Rate by Industry (Based on IDC's Vertical Research Survey, 2011)

- provide the specialized tools for meaningful data visualization and presentation;
- ensure predictive analytics.

BIS aims to provide decision makers with accurate information and a multidimensional analysis of all the diverse business problems they face such as the need to reduce prices, attract new customers and retain the loyal ones, increase the sales of specific products, penetrate into new markets, etc.

Some of the important tasks performed by the BIS are the extraction and structuring of the raw data stored in different operational systems and their transformation into integrated information that could help

Using BIS, *financial institutions* manage credit and monetary risk, analyze their accounting, budget, assets and liabilities, customer groups, control the operation of branches, detect frauds, etc. *Commercial companies* analyze their sales according to different qualitative and quantitative indicators – the nomenclature of the products, trademarks, the dynamics of sales by product, region, period of time, trade agent, promotion campaign, etc. *Manufacturing enterprises* implement BI solutions to optimize their production process, reach high quality assurance, analyze inventory, improve performance, control distribution channels, analyze customers and suppliers, etc.

Central and Local Government administrations accumulate data volumes and need to introduce BI systems in order to make analyses taking account of the variety of indicators - the structure and characteristics of the population, the specificity of a country or region, profiling businesses, patterns of business opportunities, health services, welfare work, infrastructure problems, crime and fraud detection, etc.

Focusing on the different industry areas and their main problems in which BI could support the management processes, it is worth revealing the BI adoption rate by industry. IDC's Vertical Research Survey, 2011 (Fig. 3) shows an 87% BI adoption rate in the securities and investments industry compared to the 52% BI rate in education.

The findings in the Gartner's survey [10] show that BI market will keep its position in the fastest growing software market. Organizations continue to implement BI because they vitally need to take smart, real-time, flexible business decisions. The BI platform market's compound annual growth rate through 2015 is expected to be 8.1%. It should be noted that BI users are increasing not only in number but also in type. Business analysts, advanced analytical experts and business executives are growing in number and new types such as line managers, suppliers, customers, regulators are emerging.

There are two main approaches that companies could apply when introducing BI solutions and implementing analytics to this effect – they could either develop a solution or buy a ready made solution. A tailored custom analytics solution could be developed without using BI tools and instruments. Another possible approach is to purchase a

BI application and customize it according to the specific business field and management processes. The current surveys find that most organizations prefer buying analytical solutions to developing them. This has been a rising tendency in the last decade that covers all types of BI applications.

5. Business Intelligent Systems Vendors

Gartner has conducted the BI vendor survey [10] to help the enterprises get oriented toward the innovative BI solutions, on one hand, and obtain usability feedback of the implementations and use of the solutions, on the other. Vendors are evaluated according to the ability to transform the concept and vision into a market reality. Leading vendors are aware of their ability to implement enterprise-wide developments that support the appropriate BI strategy and operational capabilities to compete on a global scale.

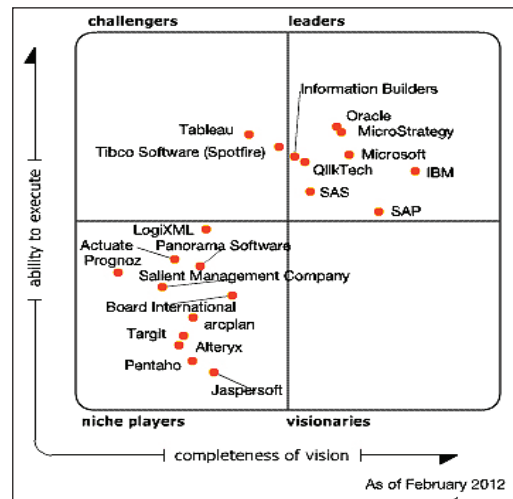


Fig. 4: Gartner's Magic Quadrant for BI Vendors (Source: Roe, 2012)

The Leaders in the fourth quadrant are presented in alphabetical order with their main advantages and disadvantages (Table 1):

Table 1: BI Leaders according to the Gartner Survey 2012

Company	Advantages	Disadvantages
IBM	IBM takes the position on the completeness of Vision axis. IBM keeps the approach to the <i>holistic vision</i> of unified BI, <i>analytics and performance</i> . The result is a product that maintains both a tools-based and a solution-driven offering, along with a significant vertical expertise, to customers and prospects. IBM last product - Cognos 10, was introduced in the fourth quarter of 2010.	Cognos is more <i>difficult to implement</i> and use than the products of competitors, because of its sophistications and complexity.
Information Builders	Information Builders' BI product is WebFocus. The most commonly cited reason for choosing WebFocus is because of its ability to <i>integrate</i> with other parts of information infrastructure like <i>databases and middleware</i> .	WebFocus deployments, while easier to implement, are also more <i>limited in scope</i> .
Microsoft	Microsoft continues to develop BI for three of its core products: Office, SQL Server and SharePoint. It has a <i>low licensing cost</i> and is appealing to organizations that want to make it attractive to a <i>wider range of users</i> . Market success is also driven by BI authoring tools in SQL Server, which are based on Visual Studio and widely adopted by developers.	Microsoft is scored below the average because of the overall <i>product functionality</i> . It also stays behind other BI vendors in delivering mobile BI capabilities.
Micro Strategy	Micro Strategy is a specialist in BI deployments processing <i>large enterprise data warehouses</i> and supporting <i>broad functionalities</i> . Its deployments are among the most complex in terms of large numbers of users. Building <i>complex analytic applications</i> is one of the most Micro Strategy's strengths. IT proactive tools for managing and supporting y deployments.	Micro Strategy requires a <i>steep learning curve</i> even for report developers. Customers continue to rate the platform below average for ease of use and for <i>license and implementation costs</i> per user. Micro Strategy needs to fully realize the potential of its mobile, data discovery and cloud offerings.
Oracle	The Oracle Business Intelligence Foundation Suite recorded the highest aggregate Ability to Through Oracle Business Intelligence Applications (OBIA) it provides horizontal analytics across business processes including finance, procurement and sales analysis.	Oracle users are finding OBIA difficult to implement, while it has been slow to respond to the data discovery trend. Customers are using the current version of the BI suite, significantly below average for vendors in this analysis.
QlikTech	QlikTech self-contained BI platform is based on a wholly <i>in-memory data store</i> , with a set of well integrated BI tools. Deployment of its BI product QlikView has grown over the last 2 years of the number of customers using it. Making better information available to <i>more users</i> and expanding the <i>type of analysis</i> undertaken.	QlikView became <i>less successful</i> in the previous year. It also faces increasing competition from larger BI vendors offering in-memory offerings

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<p>SAP</p>	<p>Between Business Objects and NetWeaverBW, SAP has the <i>biggest share</i> of the <i>BI platform market</i> with both platforms providing support for large enterprises. The best advantages are „corporate standards" and „integration with enterprise applications". The largest global direct sales, support channel and services ecosystems. SAP and Business Objects is the largest installed base in the BI platforms market.</p>	<p>There is confusion among SAP's customers about the roadmap for Business Objects, SAP BW and HANA, given the product and concerns about the <i>unknown costs of migrating</i>. This is the fifth year already that ratings for SAP's customer experience are the lowest of any vendor in the survey.</p>
<p>SAS</p>	<p>SAS's solution-oriented analytic application approach to the market is a differentiator. As a result, it is in a position to offer a wide variety of <i>cross-functional</i> and vertically <i>specific analytic</i> applications out of the box. The primary drivers are functionality and data integration. Major initiative to improve usability and implementation activities.</p>	<p>SAS is <i>difficult to be implemented</i> and dashboard capabilities are rated lowest of all the vendors in this research.</p>

Gartner says that "The BI market is a mature market that has been rapidly expanding. As a result this market has enjoyed a high level of innovation and significant and widespread acquisitions have taken place over the past five years"[10]. The BI market is still very dynamic with ongoing acquisitions. In 2011, for example, Oracle acquired Endeca, and IBM purchased Algorithmics. Furthermore, a number of analytics-related acquisitions since the start of 2012 have already been announced.

Another trend typical of the BI sector is that big vendors enrich their experience with thousands of customers in mobile applications and in-memory platforms.

A very important BI direction is the development of solutions for predictive analytics, advanced visualization, geospatial analysis and cloud-based analytic platforms.

Having gained experience in the BI field, the large vendors begin to develop packages for specific verticals such as consumer or financial services, insurance, healthcare, supply chain, logistics and others.





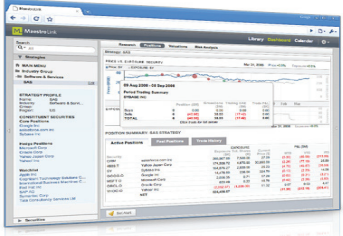
Analyzing the BI development trends

beyond the large vendors, it is worth considering some new and innovative solutions offered by other BI market actors. From a research point of view, it should be noted that small and medium-sized companies tend to look for specific developments that could readily meet their specific needs [6].

The goals of table 2 is to present the BI characteristics that will be leading in the next-generation decisions and are already present in solutions that have not been adopted by more than 8% of the BI end-user. The reason for describing these developments is to reveal the wide range of BI concepts that are implemented in a various configurations and product realizations. Hence, it should be pointed out that the solutions are useful and appropriate in this niche of the BI industry. Depending on their size, budget and expertise, enterprises have a broad range of BI products to select among, though they should always approach the advanced and promising solutions.

The categories (Table 2) that will largely determine the next generation of BI are

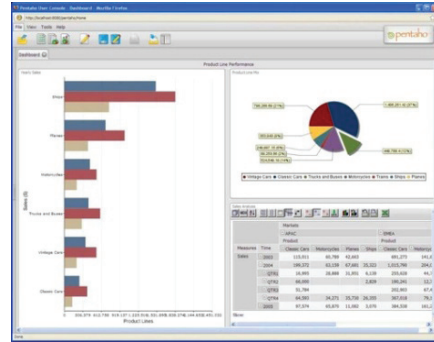
Table 2: Advanced BI Characteristics and Representative Vendors

Criteria	Company at First position	Company at Second Position
<p>Functionality rich Analyst tools Tools that support analysts to easily pull data from multiple sources, analyze, visualize and share it.</p>	<p>Tableau is the king of visual analytics tools. Tableau has added more web-based functionality to allow sophisticated online sharing and collaboration.</p> 	<p>Good Data introduced to the market a web-first platform designed to democratize analytics. Clients are impressed with the ease of use and high-quality data presentation.</p> 
<p>Easy to be designed Dashboards A frequently updated analytical display that is clear and concise</p>	<p>From the humble position of sparkline plug-in vendor, BonaVista has taken a leadership role in encouraging more effective dashboard design.</p> 	<p>QlikView Business Discovery platform is helping overcome the limitations of spreadsheets. Today, business users need a simple but powerful way to navigate through data to identify details and make timely, critical business decisions.</p> 
<p>Successfully built Targeted solutions Companies that serve a narrow slice of the BI world extremely ell. The general purpose BI could not serve unique problems of specific industries.</p>	<p>Wall Street on Demand is a brilliant, below-the-radar provider of information solutions to the financial sector. Their sparse, articulate marketing text and few screenshots hint at a company that knows exactly what they do and deliver high-quality BI solutions.</p> 	<p>The following are only a few companies that have focused on an industry or functional segment to deliver targeted BI solutions:</p> <ul style="list-style-type: none"> • Quantavo is for customer behavior analytics • LucidEra is for sale pipeline reporting and analytics • Visual IJO is for pharmaceuticals

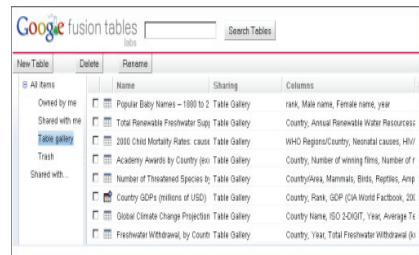
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Open-source
Freely available
BI products
for tailoring
and implemen-
tation

Pentaho offers an open-source end-to-end BI suite that is a competitive alternative to the big vendors. One aspect is important - the implementation is not enough cheap or easy.

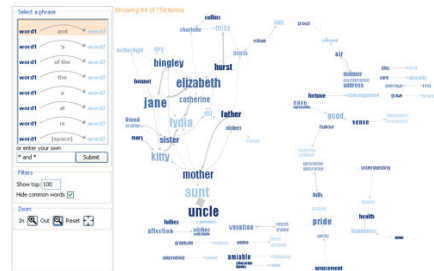


The Google Analytics model extended into more general data analysis and visualization tools. Google Fusion Tables could be seen as a tip of the iceberg.



Advanced
visualizations
development
Bringing
leading-edge
visualization
techniques out
of academia
and into the
business
world.

Many Eyes continues to impress with high-quality visualizations. They are easy to create and clear in design and usability.



Openviz/Advanced Visual Systems

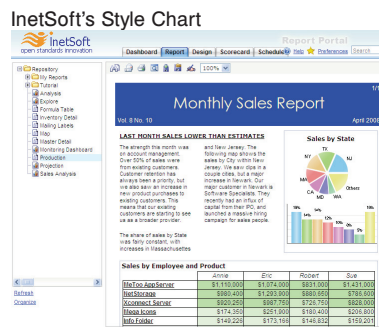


and Panopticon

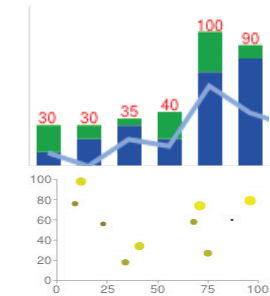


are the two BI vendors gaining the leadership in advanced visualization solutions.

Embeddable
charts
Free charts
with good de-
fault design



Google Charts



<p>Mobile BI <i>Beyond the desktop</i></p>	<p>Roam BI has a great-looking iPhone application that is designed to "transform the data into insightful, interactive visualizations delivered to the iPhone."</p>	
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as follows: Functionality rich Analyst tools; Easy to be designed Dashboards; Successfully built Targeted solutions; Open-source products implementation; Advanced visualizations development; Embedded charts; Mobile BI.

By way of conclusion, it could be summarized that BI tools should become easier to use and tailor to a diversity of information consumption styles. BI products tend to be transformed into "self-service BI" where users could meet and process their own information needs instead of relying only on BI professionals. Visioning forward, BI tools vendors will begin introducing embedded BI in operational applications and mission-critical business processes.

6. Conclusions

Companies of all sizes in various industries are already massively using transaction-oriented information systems to support their operations. However, these systems are not powerful enough to support those companies in their attempts to remain competitive in the global and dynamically changing business environment. To achieve competitive advantages and prosper, organizations are forced to implement and incorporate in their IT infrastructures

modern Business Intelligence solutions, providing advanced capabilities for utilizing and rediscovering the large volumes of data and information, generated daily by the numerous business transactions. The advanced BI systems available today offer sophisticated analytical methodologies and tools to extract valuable and actionable information and knowledge, which is provided to the right people at the moment they need it to help them make informed and relevant decisions in management.

BI systems are constantly being developed and innovated to meet the ever-growing demands of business users, providing opportunities for real-time analysis of business data, particularly the front-line operations. As a result of the implementation of advanced analytical methods and powerful visualization and alerting tools dashboards have been established in support of decision making at all management levels– strategic, tactical and operational.

BI vendors are constantly working to offer business users BI tools that are easier to use and are tailored to a range of information consumption styles. They are also introducing embedded BI in operational applications and mission-critical business processes.

Articles

BI products are expected to become "self-service BI" where users could meet and process their own information needs instead of relying only on BI professionals.

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