Business Intelligence: A Strategy for Business Development

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Abstract
Today, in a context where information resources are fragmented, voluminous and complex, there is a real need to consolidate and analyze them in order to have a global vision and optimize the company's assets. The objective of the BI is to create information and knowledge, not only from the company's data, but also external to the company, from the executives to the operational staff, in their steering. BI can be the subject of very different approaches from one company to another. Its objective is to help managers in their decision-making and in the performance analysis of their company. Business intelligence has become an unavoidable subject considering its impact on the performance of the company. It is a continuous process within companies, and not a one-off project.

Keywords:*Business Intelligence, ODS, OLAP, Information System, DW*

I. INTRODUCTION

Business Intelligence (BI) is information technology for decision-makers and companies. BI systems are used by decision-makers to gain in-depth knowledge of the company and to define and support their business strategies, for example: to gain a competitive advantage, improve the performance of the company, respond more quickly to changes, increase profitability, and in general the creation of an added value of the company. Business Intelligence is one of the main concerns within the IT system department of large companies. Indeed, in the current context of hyper competition, Business Intelligence represents an opportunity for companies to optimize the management of their activities and to anticipate changes in the behavior of customers and consumers.

II. HISTORY OF BI

At the very beginning, historical data mining methods and tools were used for strategic managerial reporting purposes.

The second stage is characterized by On-Line Analytic Processing (OLAP) technologies and dimensional analysis of data stored in data warehouses and data marts.

In the third stage Balanced Scorecard methodology is used as a means of Business Intelligence creation.With the emergence and growing popularity of E-Business and other Internet applications and services the new stage of BI appeared since Web analytics and Web mining as a form of BI began to attract the wide professional attention.

The fourth development stage started when usage of Business Dashboard technology became a core component of alerting and alarming systems in business decision-making supported by BI.

Finally, nowadays we are witnessing the era ofMobile and location-based Business Intelligence founded on appropriate mobile and location-aware technologies.As far as it can be seen from today's perspective, the further development in the near future can be expected in the field on unstructured content and so-called big data analysis as a form of sophisticated Business Intelligence. [1]

III. BUSINESS INTELLIGENCE ARCHITECTURE

Business Intelligence architecture is a set of concepts, tools, methods and technologies that, once connected, create knowledge and meet the strategic needs of the company. It is a framework that enables an appropriate organization of the data. Business Intelligence proposes to use the data transmitted by the information system, most often production data, into information that can be exploited for decision-making purposes. On the practical and technical level, Business Intelligence consists of a set of computer tools and software packages that ensure the functioning of the information processing chain. Business intelligence is part of the broader architecture of an information system.

The traditional applications of an organization allow to store, restore, modify the data of the different operational departments of the company (logistics, quality management, marketing …). These different services each have one or more specific applications, and the data are rarely structured or codified in the same way as in the other services. Each service often has its own dashboards, and it is rare that indicators are measured everywhere in the same way, according to the same rules. In order to obtain a synthetic view of each service or the whole company, it is therefore necessary that these data be filtered, and reclassified in a central data warehouse. This data warehouse will allow business executives

and analysts to see the data at a global level and thus make more relevant decisions.

A decision-making project consists of 4 key phases:
- The collection phase
- The integration phase
- The organizational phase
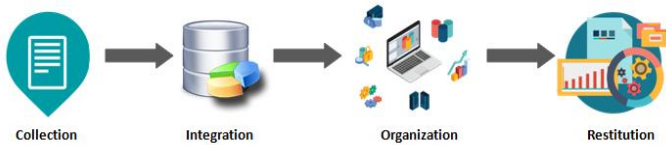- The restitution phase

Figure 1: data processing process of a decision-making system

A. Collection phase

The collection uses data called: source data. These data can be presented in different formats.

It can be flat files (XML files, ASCII files ...) but also database systems (MySQL, PostgreSQL, DB2, ORACLE ...). These data sources are therefore generally heterogeneous that is why an integration phase is necessary to be able to manipulate them before storing them in a decision support system.

B. Integration phase

It is at this level that the first software layer of the decision-making environment appears, named the ETL for Extract, Transform and Load. This layer provides functions for extracting data from different systems (internal or external), transforming these data and loading them into an intermediate ODS or directly into the DW (data warehouse). It ensures a better availability of the sources.

The second software layer is ODS, which acts as an intermediate structure for storing data from operational production systems. These are some sort of preparation areas before data integration in the DW. In general, there are two types of schema: a raw ODS schema that contains tables that receive the raw data from the different sources and a "final ODS" schema that contains tables with the most structure (associated fields and constraints) Close to the DW scheme as these data will then be frozen in the warehouse. The ODS only contains data over a short period of time and these data will be manipulated, transformed, processed, modified several times before being copied to the DW. It is possible to not use the ODS in only one case: if the data of the DW are a simple copy, which means that there is no processing to be done and the extracted data will not evolve) of production data (sources) which is unfortunately almost never the case in large structures.

C. Organizational phase

The third phase allows storing the data in a warehouse called: Data warehouse. This warehouse contains business-oriented, non-volatile, historical and documented data. Data stored in the DW must not change once inside. These are consolidated and fixed data that will allow us to do all kinds of analyses and statistics. Once this data is stored in the Data warehouse, we will be able to create data stores called: Data marts.

The data are generally equivalent to those present in the main DW, but they are represented in a way adapted to the specific needs of the function and / or the user domain (for example, a dedicated DM for the Marketing or Commercial department).

D. Restitution phase

The last phase concerns the restitution of the results, we distinguish at this level several different types of tools:
- Reporting and querying tools
- Analysis tools
- Datamining phase

The reporting and query tools allow the provision of periodic reports, pre-formatted and parameterizable by the operational staff. They offer a layer of business-oriented abstraction to facilitate reporting by users themselves by querying the datawarehouse through cross-analysis. They also allow the production of dashboards with high-level indicators for managers, synthesizing different performance criteria.

OLAP analysis tools allow data to be processed and displayed in multidimensional cubes and navigated in different dimensions. This arrangement of the data makes it possible to obtain several representations of the same result in a single request under a top-down approach from the aggregated levels to the detailed levels (Drill-down, Roll-up). Datamining tools offer a more in-depth analysis of historical data to reveal hidden knowledge in data such as the detection of correlations and trends, the establishment of typologies and segmentations, and forecasts. Datamining is based on statistical andmathematical algorithms.

IV. DATA WAREHOUSE

A data warehouse is a database, which is kept separate from the organization's operational database. [2] It is a collection of corporate information, derived directly from operational system and some external data sources. [3] There is no frequent updating done when using a data warehouse. The functions of a data warehouse are recovering existing data from different source databases, store data (history) and provide data foe interrogation, visualization and research. The key features of a data warehouse are: subject oriented, integrated, time variant and non volatile.
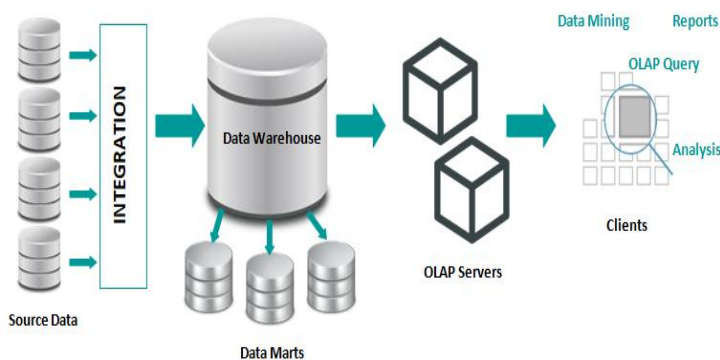
A. Subject oriented

Figure 2: Data warehousing architecture

There is no duplication of information common to several subjects. The database is built according to the themes that affect the services of the company (customers, products, risks, profitability, etc.). The basic data is, however, derived from operational Information systems.

B. Integrated

A data warehouse contains integrating data from heterogeneous sources such as relational databases, flat files, etc.

The data, coming from different production applications, can exist in all different forms. It must be integrated in order to homogenize it and give it a meaning that is clear and it must have a unique coding and description. When data are moved from the operational environment in to the Data warehouse, a consistent coding convention is needed.

C. Time Variant

In operational information system transactions are done in real time, and the data is updated constantly. The history of the values of these data is generally not preserved because it is useless. In a DW, the data is never updated.

The DW therefore stores the history of the values that the data will have taken over time.
A time frame is then associated with the data in order to be able to identify a particular value over time. Users have access to both current and historical data. The data in a data warehouse provides information from the historical point of view to be used for comparisons, trends, and forecasting.

D. Non Volatile

Information is considered volatile when data is regularly updated as in operational information systems. In operational information system, the queries relate to the current data. It is difficult to find an old result. In a DW, it is necessary to keep the history of the data. Thus, the same query performed at two-month intervals by specifying the reference date of the data, will give the same result.

V. GLOBAL GOVERNANCE OF THE BI STRATEGY

The organization of the company and its dynamics of growth greatly influence the setting up of a BI project.

There are three types of BI organization:
-A centralized organization around a BI group
- A decentralized organization on different sites, with a consolidated vision at the group level
-A decentralized organization with centralized governance

A. Organization of BI in a Centralized Context

Centralized BI is the system of storing and managing all business intelligence, or data, in one central location or department, for governance and security reasons. This model ensures data accuracy, veracity, and economy of scale. [4]

In a centralized organization, there is a single BI strategy for the entire group. In this context, the BI activity aims to consolidate the data directly from the different entities of the group that do not have BI tools and are dependent on the BI of the group.

The advantages of this organization are the financial gains, reduced data consolidation time, a single ETL series to a centralized database and a single type of database. This organization is an ideal solution for companies with a small number of entities.

B. Organization of BI in a Decentralized Context

Decentralized BI is the system of storing and managing business intelligence, or data, independently by respective department, rather than centrally. Essentially, every division handles its own data requirements and any analytics applications they need with little corporate involvement. A truly decentralized environment can result in insufficiencies and/or redundancies in BI software, staff, and applications across a company. [5]

This organization ensures a greater responsiveness and a better match to the local needs and allows a consolidation of the data in a heterogeneous park at the level of the group.

C. Organization of BI in a Decentralized Organization With Centralized Governance

A centralized BI organization has the advantage that the different entities of the same group, are able to work on the basis of common standards and references, with identical solutions. But this centralized organization is not adaptable to all companies because some of them have very different local needs in terms of BI.

In such a context, a fully decentralized BI organization is not the solution either because it does not make it possible to ensure the overall coherence of the approach at group level. A group in this situation must therefore think globally and act locally. Thus, if decision-making information systems are decentralized, coherence of the overall strategy is ensured by centralized governance at the group level, with the existence of processes shared and used by all the entities of the same group. Among the advantages of this organization is better governance of the processes of the different entities, capitalization and sharing of BI competencies as well as a homogeneity of the data repositories.

VI. ORGANIZATION OF THE BI DEPENDING ON THE EVOLUTION OF THE COMPANY

The organization of the BI is highly dependent on the history of the company and its evolution. The maturity of the company in terms of BI is defined by the capacity of the organization to standardize and rationalize its processes and references. When an enterprise is expended by external growth, it will tend to find itself in a temporary decentralized situation. In the case of internal growth, the company is moving towards a decentralized organization with centralized governance.

Companies in all industries are using BI systems for successful decision making. These companies beat their competition and identify new opportunities to optimize their businesses.
They also reduce resources for manual effort and rededicate people to analyzing data and preparing decision memos.[6]

VII. BENEFITS OF BI

Business Intelligence is a personal assistant that helps you make the best decisions for your business: improving performance, deploying a competitive advantage, anticipating behavior.
The firms have recognized the importance of Business Intelligence. Some of them are listed below.

- **A real-time overview of the activity:**

Thanks to the computing power and the speed of data processing by the new algorithms, thanks to simple interfaces and solutions in the cloud mode, BI collects, sorts and analyzes all the data of a company: accounting, stocks, production, customer base, etc. It provides a live view of all the key indicators of the company, updated in real time.
A BI solution provides a complete and integrated dashboard for the management of a company.

- **A reference tool for governance:**

With a business intelligence tool, indicators and vocabulary are common to all employees. This standardization allows a better understanding of the

subjects and generates a reinforced synergy. It speeds up the decision-making process.

- **Anticipation of events:**

Business intelligence has an effective predictive power. It allows you to anticipate market trends, customer demands, or provide opportunities for growth and improvement in the various business sectors of the company.

In short, BI is a growth vector for the company: live analysis of key indicators provides managers with all the essential information (production, inventory management, sales, customers, accounting, etc.) in order to make strategic decisions.

VIII. FUTURE OF BUSINESS INTELLIGENCE

In this rapidly changing world consumers arenow demanding quicker more efficient servicefrom businesses. In order to stay aware of trends and future events, companies must develop their business intelligence systems. In the near future business information will become more democratized where end usersfrom throughout the organization will be able to view information on their particular segment to see how it's performing.

So, in the future, the capability requirements of business intelligence will increase in the sameway that consumer expectations increase. It is therefore imperative that companies increase at the same pace or even faster to stay competitive. [7]

IX. BUSINESS INTELLIGENCE VS DATA ANALYTICS

There is a clear overlap between BI and Data analytics. Even if many enterprise organizations deploy these two at the same time, they are completely different.

Business Intelligence encompasses the various tools, applications and methodologies that enable the enterprise to collect data from internal systems and external sources, prepare them for analysis, develop queries and apply them to these data. The data is used in a predictive environment.

Analytics is a data science. BI takes care of the decision-making part while Data Analytics is the process of asking questions. Analytics tools are used when company needs to do a forecasting and wants to know what will happen in the future, while BI tools help to transform those forecasts into common language. Analytics process is what enables business users to make predictions accurately.

X. CONCLUSION

Business Intelligence is the set of tools and methods for transmitting relevant information to company managers. Its goal is to help them understand their environment and to support them in

their strategic decision-making. It is more akin to a continuous process within companies, framed by a strategy, than to a one-off project. Today, the main challenges for the success of BI projects are the ability of its units to consolidate and structure information in line with the company's strategy and without performance problems due to constantly increasing volumes, to successfully accompany changes. The business intelligence (BI) has evolved over the past decade to rely increasingly on real time data. While Business Intelligence helps in making business decisions based on past results, Data Analytics helps in making predictions that helps in the future. The paper explored the concepts of BI, its architecture and its organization based on the evolution of the company. Data Analytics will be discussed in a future work.

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