Intelligent tools and techniques for modern management

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Abstract: In order to make decisions all companies need information. As a rule, all the informatics systems of a company contain a multitude of data and turn these data into information that has to be analyzed in order to make decisions. It is a slow process. The solution of this drawback is given by Business Intelligence (BI) applications that can help companies increase income or diminish costs by offering the executive management appropriate information on the basis of which quick and efficient decisions can be taken.

The main purpose of the paper is to prove the necessity that BI tools should be used by the modern manager. Managers are aware of that by putting into practice the BI solutions, opportunities of getting control over the business process and methods are improved and better, timely analysis functions of the performance parameters can be obtained.

Key words: Business Intelligence; modern manager; intelligent tools and techniques; drill-up; drill-down; slice and dice datas

1. Introduction

The modern manager is the greatest information consumer because through classical approach, he wants to know everything about the future of his organization and also about his business witch he manages. This tendency could maintain him in the position of first producer by information, if he has all the tools provided by information technologies like: Business Intelligence, E-business, Internet, etc.

Business Intelligence (BI) is a term currently used to describe a discipline which captures and assesses various aspects of a company, its customers and competitors. This includes a variety of processes and applications. These methods assist in gathering, storing, analyzing, and providing access to intelligent information on a company's data in order to identify significant trends or patterns that ultimately facilitate the decision-making process and provide the company with a competitive advantage.

The literature are rich with Business Intelligence definition, however, the definitions are subjective to the context of study, the author attempts to give a rounded definition to the Business Intelligence (BI), as ZENG, et al. in *Techniques, Process, and Enterprise Solutions of Business Intelligence* highlighted BI has many facets.

BI ideally serves as a unified presentation layer for data that originates in one or more data sources such as a transaction or ERP systems. Optimally, BI shares this data in a more intuitive manner that allows business users to

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easily comprehend the issues depicted by the figures and to take appropriate action.

The Business Intelligence requires the in-depth analysis of the internal and external data related to the functioning of the business enterprise so as to enable the efficient and effective tactical, operational and strategic decisions across each organization level of the company.

The Business Intelligence evolves by using the appropriate technology application to the business processes in order to streamline them and organizing and consolidating the unwieldy collections of information into knowledge to facilitate fact based assessments to the business activities swiftly and effectively (Vitt E., Luckevich M. & Misner S., 2002).

2. Business Intelligence tools

Intelligence is the product resulting from the collection, collation, evaluation, analysis, integration, and interpretation of collected information. One of the most important functions of intelligence is the reduction of the ambiguity inherent in the observation of external activities. The process through intelligence is obtained, produced, and made available to users is named the intelligence cycle. The steps in the intelligence cycle are depicted in the following Fig. 1:
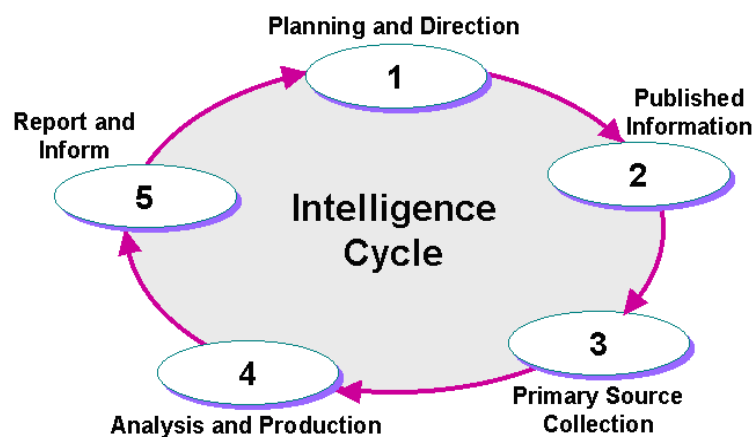

Fig. 1   The intelligence cycle (Fuld & Company, 2002)

Organisations invest in information technology in an effort to more expeditiously gather and analyse information and to create and share knowledge that can be leveraged for improving performance. An important component of this investment is in Business Intelligence (BI) systems.

Business Intelligence (BI) tools enable organisations to understand their internal and external environment through the systematic acquisition, collation, analysis, interpretation and exploitation of information. Two classes of intelligence tools are defined by Carvalho R. and M. Ferreira in Carvalho R. & Ferreira M. (2001): front-end systems and back-end systems: data warehouse, data mart and data mining.

The first class of tools is used to manipulate massive operational data extract essential business information from them. Examples include decision support systems, executive information systems, online-analytical processing (OLAP), data warehouses and data mining systems. They are built on database management systems and are used to reveal trends and patterns that would otherwise be buried in their huge operational databases (Tvrdikova M., 2007). The second class of tools, sometimes called competitive intelligence tools, aims at

systematically collecting and analysing information from the competitive environment to assist organisational decision making. This review focuses on the second class of tools, where information is mainly gathered from public sources such as the Web.

Fuld, et al found that the global interest in intelligence technology has increased significantly over the years (Fuld & Company, 2003). They compared 13 BI tools based on the five-stage intelligence cycle (Fuld & Company, 2002): (1) Planning and direction; (2) Published information collection; (3) Source collection from human; (4) Analysis; and (5) Report and inform (see Fig. 1).

For each stage of the intelligence cycle, we are interested to give an overview of current business intelligence tools shown in Fig. 2. Fundamentally, BI tools are designed to interrogate data and display it on screen in such a way that the non-technical business users can navigate through it and find what they need.

Typically in the Stage-Planning, this takes the form of dynamic charts, graphs and tables, which can be brought together and arranged in the form of dashboards and scorecards in larger implementations. By using a single access point to a range of disparate data sources, managers can track and analyze the important metrics of their business without having to know which systems they have been generated from, which means that they can spend more time deciding what to do, and less time searching for the right numbers in the first place.

In the Stage-Published it is necessary to use intelligent agents to dynamically retrieve information, for the stage 4, BI tools provides structured organizational framework, collection framework for searching or comparison matrices and profiles, competitive assessment and reporting. These tools generally provide good reporting capabilities in textual, table or chart formats for the stage 5 (Wingyan C., Hsinchun C. & Nunamaker J. F., 2003).
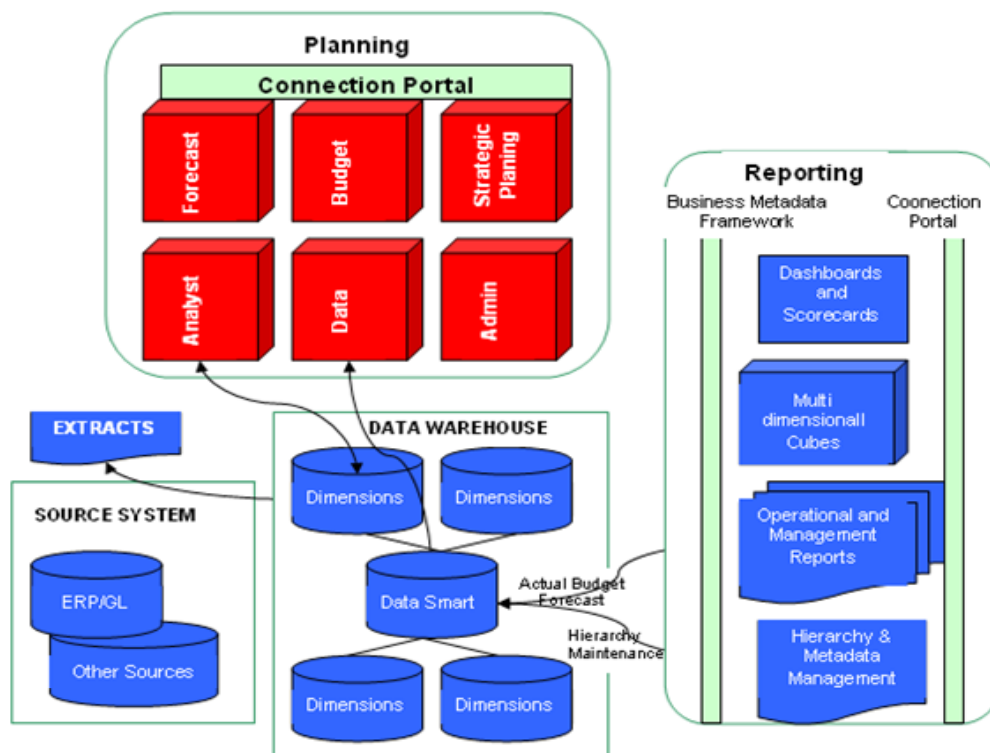

Fig. 2   Current business intelligence tools

Data source: http://www.gartner.com.

BI supports a range of business applications such as data mining, querying, analysis, and management reporting. In contrast to operational information systems, many of the benefits of BI may not be realized for months, perhaps years after going into production. Strategic-level benefits might even be recognized in another area of the organization's financial statements, therefore the business value might not be attributed to the system directly. Richardson, et al note in *Magic Quadrant for Business Intelligence Platforms* (Richardson J., Schlegel K., Hostmann B. & McMurchy N., 2008) that the direct benefits such as cost reduction and revenue growth appear quickly in financial statements and are easy to track; however indirect benefits such as risk reduction, cost avoidance, and competitive gain are more difficult to relate as being due to IT investments.

BI provides access to data that has been integrated and cleaned so that it can be analyzed, manipulated, transformed, and combined to discover correlations, trends, and patterns that offer new insights, aid in decision making, and alter the competitive scene.

From our literature review (Muntean M., 2007; Ştefănescu A., 2007), we found three research gaps. First, existing business intelligence tools suffer from a lack of analysis and visualization capabilities. There is a need to develop better methods to enable visualization of landscape and discovery of communities from public sources such as the Web.

Second, hierarchical and map displays were shown to be effective ways to access and browse information. Third, none of the in developing business intelligence systems, existing search engines allows users to visualize the relationships among the search results in terms of the relative closeness of them. Therefore, we identified two research questions:

(1) How can document analysis techniques be used to assist in the Business Intelligence cycle?

(2) How can hierarchical and map display of information help to discover business intelligence on the Web to improve performance of modern manager?

In the Romanian business environment, a tendency to apply modern management techniques is more and more noticed. Such methods are Balanced Core Card, Management Objectives, Key Performance Indicators, Empowerment, and Organizational Decentralization. This tendency is a strong motor of the organizational efficiency. In order to apply these methods, strong technologies are needed for support.

3. The benefits of Business Intelligence to modern manager

Modern management usually means highly controlled organization, relying on sophisticated control measurements and tools, among them large integrated management information systems. Workflows, global business process and networked economics belong to these situations. Research and industries search for improved use of information technologies for the reintegration in human practice through various kinds of coordinating mechanisms.

The single greatest advantage in utilizing BI survey tools is the ability to rapidly acquire the customer and employee feedback critical in identifying issues, concerns and trends that contribute to dissatisfaction and attrition. Rather than the weeks or months required to distribute paper questionnaires and receive the results or to contact respondents by telephone, the Internet allows responses to be collected in a matter of hours. Bolstered with this information, organizations can take necessary actions to implement strategic and tactical solutions to increase satisfaction, reduce employee attrition and increase client retention (Moss L. and Atre S., 2003).
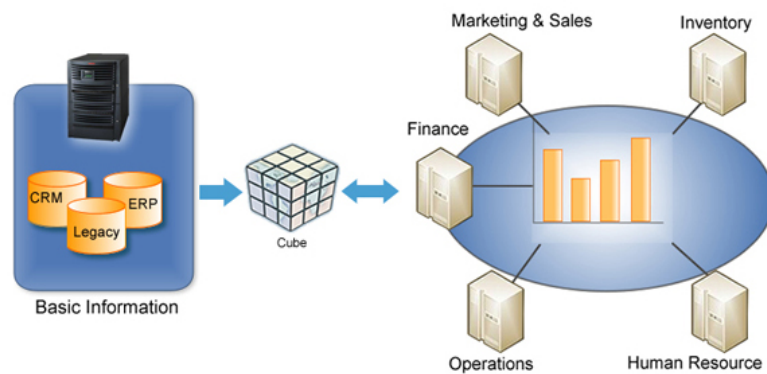
Fig. 3 Areas of Business Intelligence

Business Intelligence as tool for modern manager help him to gather, store, access and analyze corporate data to aid in decision-making. Generally these systems will illustrate business intelligence in the areas of customer profiling, customer support, market research, market segmentation, product profitability, statistical analysis and inventory, distribution analysis.

In the Table 1, we summarize the usability of BI across the enterprise for strategic management, senior management and business users.

Table 1   BI usability across the enterprise

	Strategic BI	Tactical BI	Operational BI
Objective	Increase market share Increase customer spending	Campaigns launches Product pricing	Discounts to increase sales Outstanding credit payments
BI needs	Market share analysis Revenue analysis	Customer analysis Retail analysis	Real time sales analysis Fraud analysis
Period	Months	Weeks	Intra-day
Users	CEO Strategic planner	Senior manager	Line manager Operations manager

Strategic BI is not concerned with achievement of immediate business goals by making rapid decisions whereas operational BI optimizes daily business operations which require fast action time. Strategic decisions are mostly made at corporate level whereas operational decisions are made by line managers.

Operational BI can automate operational data integration and management. It can also report and notify certain decisions or actions. For example, if survey conducted has an unexpected decline of response from certain demographic groups, an alert is sent to the research manager. The research managers can react rapidly to solve business problems at the operational levels (Liebpwitz J., 2006).

The root cause can be analyzed immediately by drilling down to the underlying problem areas. The data can be drilled in multiple ways: by geographic location or demographic group. Based on the results, management can prioritize activities such as marketing campaigns instantly rather waiting for the opportunity to get lapsed.

A good example for drilling dates is Enterprise Information Portal (EIP) developed by Breckner J. in *Architectures for enterprise information portals: An approach to integrate data warehousing and content management* to provide a type-independent, single point of access to information. In Fig. 4 each content element is described by EIP metadata. This EIP metadata enables type independent search on the content. Starting the EIP, the search vector is initialised with terms being supposed to be relevant for the user. In case no OLAP report

matching a search vector can be found, a dynamic definition of a new report can be supported. Therefore, the terms of the search vector representing technical metadata of an OLAP report (reference objects and ratios) can be selected for an initial definition of a new OLAP report. Information insufficient to fully specify a report can be addressed by default rules.
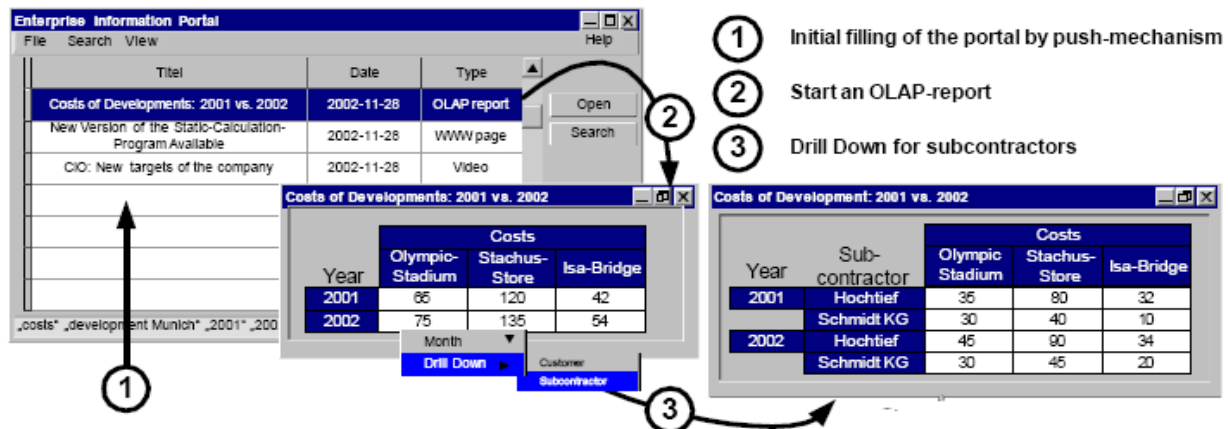

Fig. 4   Context sensitive navigation within EIP content using metadata (Becker J., Knackstedt R., Serries T., 2003)

This need for an operational BI has been encouraged by the need for real-time visibility of performance. Fig. 5 show us that analyzing sales date with Excel Pivot Table charts is a snap and the quarterly breakdown is helpful but it doesn't tell everything the manager need to know. Being able to quickly "slice and dice" all the data captured from enterprise applications leads to a much better understanding. BI tool can reorganize the information and will make easy to see that big quarter sales were mainly due to the great job. Also, it is easily to convert a large amount of data into a valuable tool for analyzing sales trends.
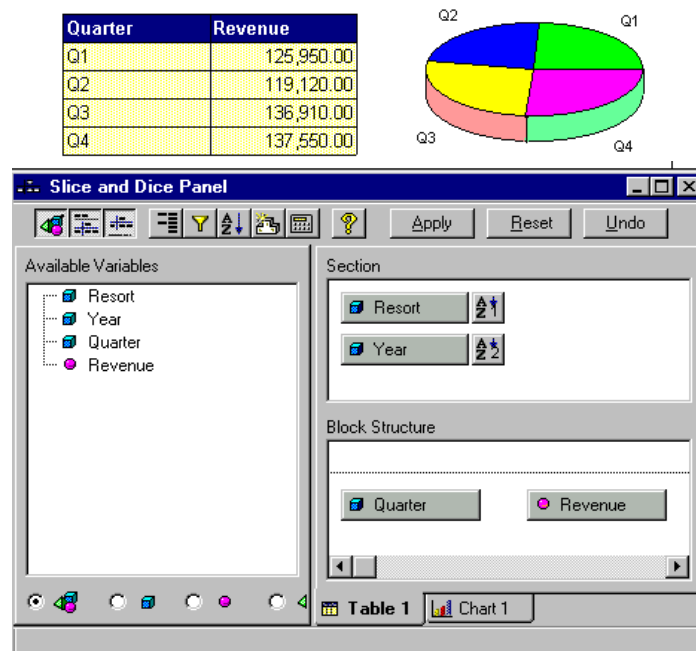

Fig. 5   Slice and dice dates

Since the collected data can be sliced across almost all the dimensions like time, location, product, promotion etc., valuable statistics like sales profit in one region for the current year can be calculated and compared with the previous year statistics.

Business analysts look at what has happened in the past, figure out why it has happened, and make changes for future strategies. Operational BI is not only intended for business analysts, but mainly for line managers, executives, analysts, employee, partners, suppliers, and customers. Sales manager and customer support staff need information to be presented in a form that relates to the business tasks and activities they perform in their every day jobs. They not only need information, but also workflows and guided analyses that help them interpret and analyze this information. This requires a process-centric, rather than data-centric approach to BI processing. Operational Business Intelligence guarantees significant business benefits and extends to a wide user audience.
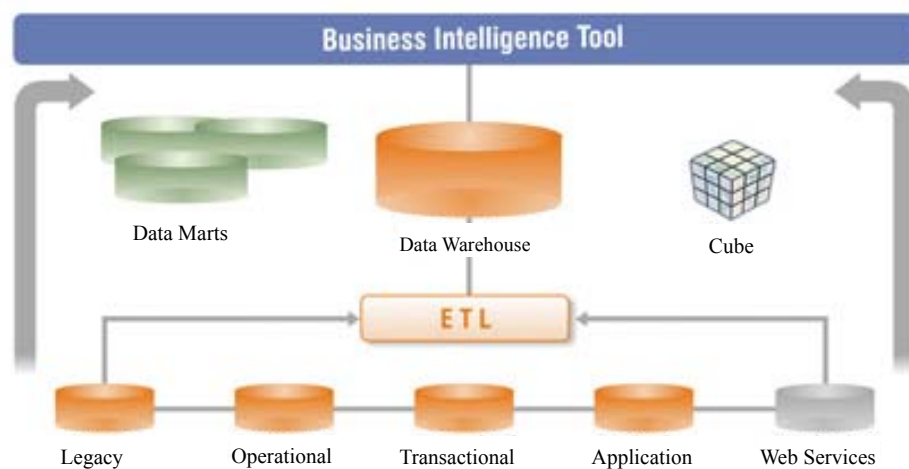

Fig. 6   Business Intelligence tools

With Business Intelligence tools (Fig. 6), various data like customer related, product related, sales related, time related, location related, employee related etc. are gathered and analysed based on which important strategies or rules are formed and goals to achieve their target are set. These decisions are very efficient and effective in promoting an organisation's growth.

Technically, the Business Intelligence processes cover three main process steps: data integration, data storage and data usage (see Fig. 7). The most important step is data integration, which covers methods to extract data from internal or external data sources. Traditionally, the data is derived for example from database systems in a so-called ETL process (extract, transform, and load). A load process with a scheduler regularly uploads (e.g. daily, weekly, or monthly) the processed data into the final data base storage of the BI system, the data warehouse. This data storage holds the relevant data for decision makers in a dedicated, homogeneous database. An important characteristic of the data warehouse is the physical storage of data in a single, centralized data pool. It also covers the subject-oriented clustering of data organized by business processes, such as sales, production, or finance. With the information being well-organized in the data warehouse, data usage now can support decision making with predefined reporting for occasional users, ad-hoc data analysis for knowledge workers, or data mining for data analysis.
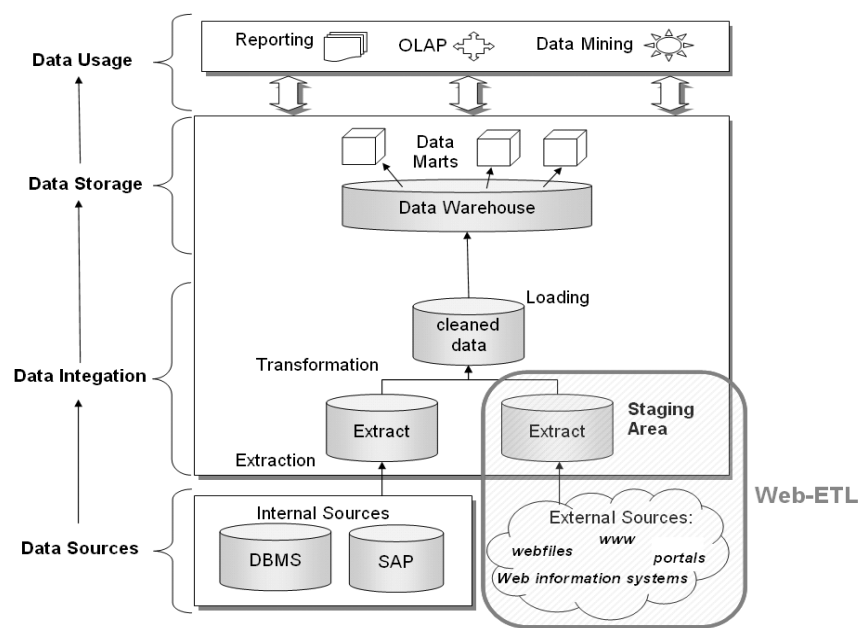
Fig. 7   The Business Intelligence reference process

Data source: Baumgartner R., Frölich O., Gottlob G., Harz P., Herzog M. & Lehmann P., 2005.

Many business questions or situations need to be analyzed in order to achieve the target of an enterprise with the help of several managers or executives in each cadre. Below are some of the samples of these questions.

(1) Business Intelligence: Finance:

What is the net income, expenses, gross profit, and net profit for this quarter, year?

(2) Business Intelligence: Accounts:

What is the sales amount this month and what is the outstanding pending payment?

(3) Business Intelligence: Purchase:

Who is the vendor to be contacted to purchase products?

(4) Business Intelligence: Production:

How many products are manufactured in each production unit today, weekly, monthly?

(5) Business Intelligence: Sales:

How many products have been sold in each area today, weekly, monthly?

(6) Business Intelligence: Quality:

How many products have been defective today, weekly, monthly, quarterly, yearly?

(7) Business Intelligence: Service:

Are the customers satisfied with the quality?

These business intelligence questions are related with why, what, how, when, and business intelligence reports (OLAP reports) are useful in providing solutions to the above questions by means of reporting, score cards, balance score cards that are helpful in managerial decisions.

The advantages of Business Intelligence can be shortly numbered such as:

(1) Increase the level of usage of systems and information;

(2) Supply the highest quality data in order to prepare homogenous and coherent information;

(3) Build and develop reporting and management platforms of preferment information;

(4) Manage and integrate models of business data.

4. Conclusions

The main advantages of using business intelligence for organizations will be to have interlinked integration for faster delivery of information in form of analysis, reports and actionable alerts to people with different responsibility.

Managers know that through a Business Intelligence solution they can have superior possibilities to gain control over the business practices and processes. They can also get the improvement of the analysis functions of performance metrics and indicators. For this, Business Intelligence uses a set of concepts, methods and technologies to improve the process of conversion of data into information, information into decisions and decisions into actions. All these can help companies to increase their income and lower their costs in order to supply pertinent information towards the executive management, information also used for fast and efficient decisions.

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