

Operational and real-time Business Intelligence

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A key component of a company's IT framework is a business intelligence (BI) system. BI enables business users to report on, analyze and optimize business operations to reduce costs and increase revenues. Organizations use BI for strategic and tactical decision making where the decision-making cycle may span a time period of several weeks (e.g., campaign management) or months (e.g., improving customer satisfaction).

Competitive pressures coming from a very dynamic business environment are forcing companies to react faster to changing business conditions and customer requirements. As a result, there is now a need to use BI to help drive and optimize business operations on a daily basis, and, in some cases, even for intraday decision making. This type of BI is usually called operational business intelligence and real-time business intelligence.

Keywords: Operational Business Intelligence, Real Time Business Intelligence, strategic, tactical, operational, real-time.

The history of the informatics systems for management is marked by 3 key moments.

The first key moment was at the beginning of the 70s when operational transactional systems (OLTP) first appeared. The goal of these systems was to structure and automate the business processes. They were optimized for transactional operations and were static in architecture, structure and logic.

The second key moment was the moment when analytic applications appeared. The analytic applications offer feedback about how well the organization is doing. They adapt to the business model, answer questions about business, are designed and optimized for answering to user queries and are continuously evolving; in other words they suffer changes in architecture, structure and logic.

Here is where data warehouses (DW), business intelligence (BI) and business performance management systems (BPM) can be found.

Business intelligence refers to technologies, applications and practices for the collection, integration, analysis, and presentation of business information. Business intelligence uses key performance indicators (KPIs) to assess the present state of business and to prescribe a course of action. Examples of KPIs: lead conversion rate (in sales), invento-

ry turnover (in inventory management). Prior to the widespread adoption of computer and web applications, when information had to be manually input and calculated, performance data was often not available for weeks or months.

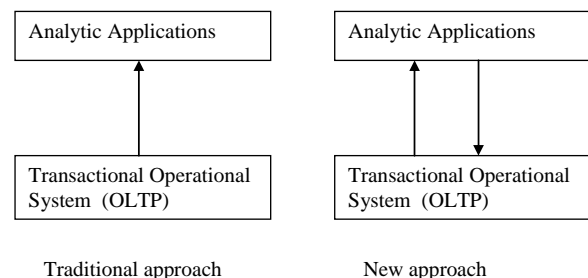


Fig.1. Communication between OLTP systems and analytic applications

The communication between the two types of systems (operational transactional and analytical) is unidirectional because analytic systems are fed with data from the operational systems. If true analytic systems offer feedback about the business processes and help the management in making decisions, but they have a great disadvantage: they cannot modify or influence the operational systems. The competitive and very dynamic business environment puts pressure on businesses. In order to be competitive companies are forced to react faster to changing business conditions and customer requirements. This is how a new need appeared: the need for the analyt-

ic systems to influence the operational systems. This is **the third key moment** in the history of informatics systems for management, moment that markets the born of the Operational Business Intelligence.

Operational BI allows bidirectional communication between the operational systems and

the analytic applications. The information and knowledge obtained from the analytic systems is used not only for decision making but to improve the business processes and to adapt the operational systems for better responsiveness to the changing conditions in the market.

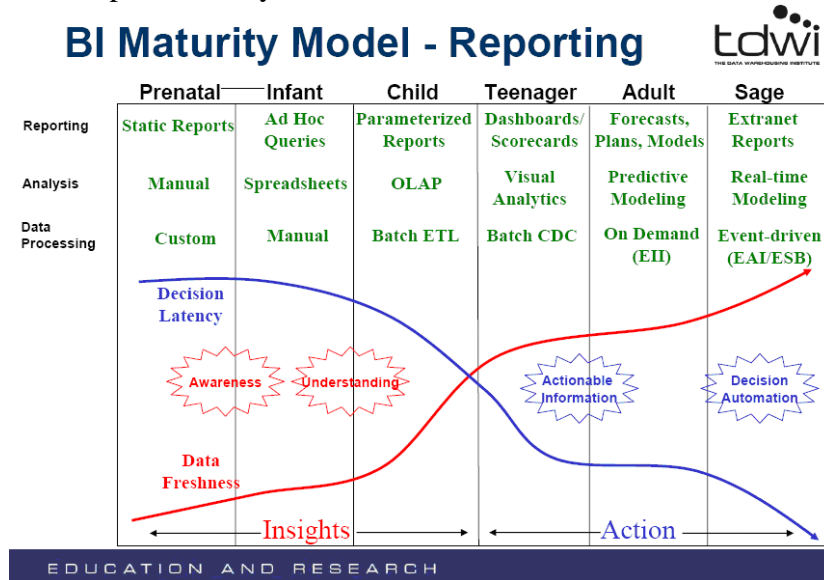


Fig.2. Maturity model for Business Intelligence (source: Wayne W. Eckerson, TDWI)

Wayne W. Eckerson, research director at the TDWI - The DataWarehouse Institute, in his paper [WAECK07] created a maturity model for BI presented in figure 2.

The model is based on the concept of *latency*. Latency is the temporal delay between the moment of an event initiation and the moment the event's effects show up.

The red line in the model stands for the freshness of the data (indicate how new or old the data is). The blue line in the model stands for the latency of the decision process. There are three types of latency in a decision making process.

- data latency: the period of time needed to collect the data from the source systems, to prepare it for analysis and save it into the data warehouse or data centers;
- analytic latency: the period of time needed to access and analyze the data, to transform the data in information, to apply the business rules.
- decisional latency: the period of time needed to review the analysis, decide the action to be taken and implement the action.

In the Wayne Eckerson's model, traditional

business intelligence corresponds to the *pre-natal* and *child* phases. These are phases characterized by high latency in the decision making process and low freshness of data.

Phases *teenager* and *sage* correspond to operational business intelligence. These phases are characterized by low latency in the decision making process and high freshness of data.

We can say that a **business intelligence system becomes more operational with the age**.

In conclusion we can identify 4 types of business intelligence.

1. Strategic BI.

Focuses on reaching long term objectives, strategic goals such as: increase profit, cut costs, gain new market shares, improve customer relationships. Strategic BI is used by top management and financial analysts who are interested in analyzing the company's performance in areas with a key role in reaching the strategic objectives. The analysis is done on data with a temporal window of months - years of historic data.

2. Tactical BI.

Focuses on reaching the tactical objectives defined for the strategic goals. Marketing and publicity campaigns for releasing a new product on the market, new promotions programs and so on are subject to tactical BI. Tactical BI is used by top management, financial analysts and line of business managers. A line of business manager is responsible for managing and monitoring daily business operations (for example: risk managers, retail merchandisers, plant floor managers). The analysis is done on data with a temporal window of days - months of historic data.

Strategical and Tactical BI form the traditional BI. In the traditional BI the valuable information needed to monitor the key performance metrics is available only to senior executives and analysts, not the operational workers on the front lines of business. In fact, according to IDC, only 15% of employees in an average organization have access to business intelligence information. According to Gartner, the three key barriers to widespread use of BI are:

- **Users lack the necessary skills to use complex BI tools.** Operational workers in functional areas such as logistics and call centers often lack the necessary skills to handle BI software that was designed for analysts and power users.
- **The cost of ownership of deploying traditional BI tools to a large number of users is too high.** Between seat licenses and user maintenance, traditional BI software is too costly to deploy to large numbers of operational users. And scalability is also a major issue: the performance of traditional systems deteriorates dramatically as more users are added, which means more servers must be deployed, adding to the cost and maintenance headaches.
- **Existing BI tools are difficult to learn and to use.** Companies have found that training thousands of workers to slice and dice data with traditional BI tools just isn't feasible.

3. Operational BI

In spite of the obstacles presented above, the

concept of operational BI has tremendous momentum. Companies are eager to provide visibility into the current status of business operations to thousands of users across the organization. They want to be able to set key performance metrics and then actively track execution against those goals. They want their workers to be able to spot emerging trends, make faster decisions, immediately take action when problems arise and positively affect their company's bottom line.

There are strong reasons that generated this kind of shift in the company's attitude regarding the BI visibility to all categories of users. Nowadays the business environment is extremely competitive (from the competitors point of view) and dynamic (clients have changing and higher expectancies). The law for surviving in such conditions is the **4R law: the right information, in the right format, to the right people, at the right time**. Only abiding to this rule the company has a competitive advantage on the market. With unlimited access to the BI information, all categories of users – including the operational users – can identify trends, take decisions, and act as soon as a problem appears in order to correct it. This way all categories of users work together for reaching the company's strategic goals.

Operational BI touches a bigger number of business decisions than the traditional BI and the BI functionalities are seen as daily operational transactions. The data analysis is made within a day frame time (a couple of hours, at maximum 1 day). For example operational BI allows monitoring the current marketing campaign or the order status within a working day. This kind of analysis involves immediate access to the detailed, operational and refreshed data (data describing the business processes now, today) but also access to historic data (for trend analysis).

4. Real-Time BI

Operational BI evolves into Real-Time BI. In Real-Time BI the data is analyzed as soon as it enters the organization. In this context, *real-time* means delivering information in a range from milliseconds to a few seconds af-

ter the business event.

The latency in this case is reduced to zero (no data, analysis, decision latency). For example, a line of business manager can monitor the stock level in order to assure that the ongoing online marketing campaign will not fail because of unavailable stock situations.

An operational / real time BI system is based on an *operational / real time data warehouse*, a data warehouse with increased refresh cycles to update the data more frequently. These real-time data warehouse systems can achieve near real-time update of data, where the data latency typically is in the range from minutes to hours out of date.

Operational and real-time BI optimize the decision making process by reducing to eliminating latency. Implementing real-time BI is extremely costly and not always necessary. However companies do not always need to reduce latency to zero and do not always need to take and implement decisions in real time. The important issue is to define an optimum frame time, the *right-time* for any decision process, an interval that should reflect the business needs and that should offer the best risks-costs ratio.

Table below reviews the differences in the various types of Business Intelligence.

Table 1. Business Intelligence types

Characteristics	Business Intelligence type		
	Strategic	Tactical	Operational/ Real-Time
Business objectives	Long term (strategic)	Tactical	Manage and optimize daily business operations
User type	Top/senior manager, financial analysts	Top/senior manager, financial analysts, operational managers	Top/senior manager, financial analysts, operational managers, operational users (call center, sales agent),
User population	Tens	Tens- hundreds	Tens - thousands
Time framework for analysis	Months – years	Days - months	1 day / seconds
Data type	Historic	Historic	Historic, current (zero latency)
Query response time	Hours – minutes	Hours - seconds	Minutes - seconds
Instruments for data access	Excel, BI specific tools	Excel, BI specific tools	Portals, Dashboards, Scorecards, Alerts
Data disponibility	Non critical: Tolerant to non-disponibility	Non critical: Tolerant to non-disponibility	Critical: Cannot tolerate non-disponibility
Latency	High	High-medium	Low
Data freshness	Old	Old-new	New

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