

# TECHNOLOGY VS BUSINESS NEEDS IN BUSINESS INTELLIGENCE PROJECTS

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**Abstract:** This article presents the development of a real industry business intelligence project, in a company that used an ERP system. We have focused on the main factors that influenced and affected the project development and it analyses the system evolution from technical point of view, the solutions found to fulfill the changing requirements, but also the impact of the company reorganization on the project. This particular experience can be of use to all those who are involved in building business intelligence solutions to reveal some of success factors, to prevent or to solve some of the inherent problems related to this type of projects.

## 1 INTRODUCTION

Many organizations use modern ERP systems for transaction processing and reporting. Information from applications within an ERP system is managed by a relational software database. Managers and executives need information for strategic and tactical decision that often requires the combination of data from ERP and non-ERP application sources. The ERP's database complex schema is not adequate for data analysis and reporting. Business Intelligence technologies can provide the best solution for extracting, transforming and presenting the huge information from within the database.

The specific aspects may come from the way of implementing the BI project. In our case, the BI project was implemented by the same developer that implemented the ERP system, and it was strongly related to the ERP project implementation, which continued to be extended along with our BI project.

This paper describes a BI project experience developed in the context of implementing Oracle ERP solution into a big company activating in Romanian oil industry services, with a complex organizational structure, having over 15000 employees. We'll analyze the difficulties and the problems met as the project was developed, and

finally we'll formulate some lessons learned of use for future implementations.

## 2 BI ENVIRONMENT: THE ERP SYSTEM AND THE BUSINESS REQUIREMENTS

In (Larissa T. Moss, 2001) we can find out that 60%-70% of business intelligence (BI) applications fail and these failures are not related only to the technology but to organizational, cultural, and infrastructure issues.

The ERP project apparently started on a solid ground, with Oracle Financial (FI) module implementation at the central unit. The ERP project then continued by implementing Oracle FI in all company branches, sectors and working points.

The implementation generated the need for processes reengineering and revealed important flaws of the company structure and management. In order to complete these tasks, many changes had to be made. These changes affected company structure, business information and material flows and the way they were registered by accountability, management

and reporting hierarchy. It was also considered implementing the Logistics and Work over modules.

In this context, the BI project started when the financial module had already been implemented in the central quarters. In the beginning, the project seemed to be a classical one, and we followed the classical phases described in (Larissa T. Moss, Shaku Atre, 2003): Planning, Business analysis, Design, Construction and Deployment.

During project stages we took into account some specific in modeling BIS (Business Intelligence Systems), such as:

- BIS are oriented on business opportunities rather than transactional needs;
- BIS have to implement tactical and strategically decisions, not only departmental or operational decisions;
- BIS analysis is focused on business needs. This stage is the most important of the process;
- Development process is cyclical, focused on evaluation and improvement of successive versions, not only building and major delivering of a singular final version.

In order to respond to all business needs, the phases of the project were completed almost entirely twice: for the initial company structure and for the modified company structure. During this process, the BI team faced three important types of problems:

*1. Technical Problems* – the initially allocated resources were reduced, as the initial estimations of the data volume were overcome as soon as the BI module was implemented in the entire company. It was estimated that a virtual data warehouse would be sufficient, but the reporting and analysis needs were higher, so the performances of the initial solution had to be somehow improved.

*2. Communication Problems* – there was a lack of availability from the company personnel, as they were already overwhelmed by tasks related to the ERP implementation and by activities related to the consultancy companies' cooperation.

*3. Organization changes Problems* – the BI project was from the very beginning under the sign of change. Beside the changes due to technical aspects, drastic structure changes in the company negatively influenced the relevance of the initial business analysis, and often made some of the developed reports irrelevant or inapplicable.

The work was performed with gaps, as there was always some top management decision to make that affected the BI project. The initial plan was revised over and over, so it somehow lost its power as

management tool. The entire structure of incomes and outcomes categories and their corresponding accounts were changed in the middle of the project.

In the following sections we will focus on the technical and organizational structure aspects.

### 3 BIS'S DEVELOPMENT PHASES

The system described in this article includes the use of the following technologies: data warehouse realized with aggregate data and virtual model, OLAP technology, data mining facilities, analytic SQL functions. The interface is based on Oracle Business Intelligence Portal that integrates all these technologies and offers direct access to the system from anywhere, anytime.

#### First Phase

The cost factor was decisive when deciding which of two options to adopt:

- A traditional data warehouse, having aggregate data, involving an extended data volume, both elementary and aggregated.
- A virtual data warehouse, which worked directly with data from the ERP database, much easier to implement.

For this phase, we used Oracle Discoverer to build a virtual data warehouse over the database. Multi-dimension structures like dimensions and fact tables were transformed and mapped from relational sources. We started with low data volumes, generated by the use of the FI module at the central quarters. Oracle Discoverer Desktop was installed on the computers of the main decision makers that were going to use it. We developed reports for analyzing Cash Flows, Budgets, Costs, Expenses and Incomes only for the central head quarters. The number of rows involved in these reports was in average 100000/month, so we did not need a large amount of resources.

#### Second Phase

When the financial module was installed over the entire company, we faced the problem of having to go to each of the sectors to install the product and instruct the managers how to use it and some other IT persons how to ensure the maintenance and future development. In order to minimize the effort, we integrated Oracle Discoverer with Oracle Application Server Portal 10g Release 2, and the solution became available on-line, allowing everybody to access information according to their established privileges. But, this decision had a negative impact on performances: the working speed

decreased as the required memory space increased from 32 GB server shared as Discoverer needed, to 64 GB server shared as Oracle Portal needed.

We didn't manage to get a dedicated server for Oracle Application Server because of high hardware resource cost. In this phase, we had to develop reports for analyzing Cash Flows, Budgets, Costs, Expenses and Incomes for the central head quarters and ten sectors with different area of production. So, the number of rows involved in these reports was over 1, 5 million/month. Under the circumstances, with low allocated resources and a large amount of data per month we needed to find another solution to increase the speed and reduce the loading time for reports.

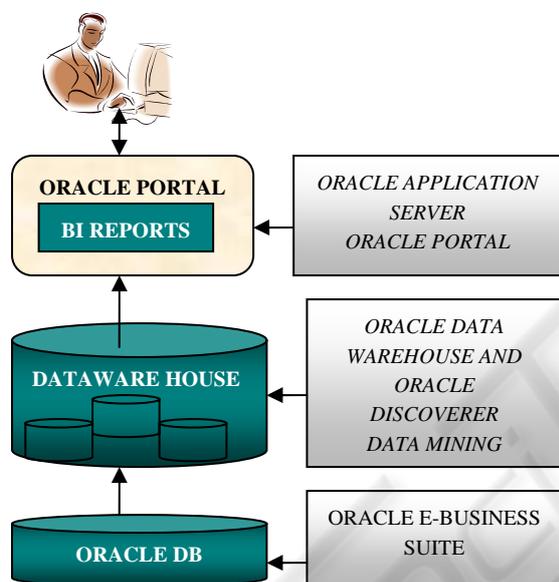


Figure 1: The system's architecture in the final phase.

### Third Phase

When the other ERP modules started to be implemented, we were facing serious problems. We decided to construct an enterprise data warehouse integrating Oracle Data Warehouse Builder and Oracle Data Mining into Oracle Portal. Unlike Oracle Discoverer, in Warehouse Builder data are physically stored into a special repository, build on the database. The role of Oracle Data Mining was to supply additional analysis power.

This solution was a success as data were aggregated in the central data warehouse, the ETL (Extract, Transform and Load) process was built off-line, not affecting the reporting analytical time. We built new types of reports related to production (costs and allocated resources), work over, purchasing orders, transactions per account, etc. We

designed one central data warehouse with sub-data marts for financial, production, purchasing orders and order entry modules. The final solution is described Figure 1. The number of rows involved was now over 3 millions/month, and the performances were finally satisfying.

## 4 EVALUATION OF THE FINAL SOLUTION

### 4.1 Organization Changes Impact

Major business reorganization is one reason BI project typically get hosed (Mitchell A. Ocampo, 2007). In this project we faced an important business restructuring. More, the initial scope estimation proved to be inexact, and it had to be re-evaluated, so the project gained new dimensions.

Most of the analysis results had to be re-evaluated, and database design and repository design had to be revised and seriously extended, having an important impact over technical and human resource requirements. The BI team had to be enlarged and it was itself a problem, as there were no other BI specialists available, and other two new persons had to be employed and integrated.

Many of the reports developed in the first phase were inapplicable, generating important time loss and inefficiency; it often happened that after getting complete specifications, data gathering, and completing of the report design, during the validation meeting we were communicated the whole perspective was changed. This had impact not only directly upon efficiency, but our team members got to be confused or demoralized.

But, there was a bright side in all those changes. As the consultancy company progressed in elaborating the new business view, they inevitably brought out the reporting needs. Our team was invited for discussions, and we had the chance of proving the great advantages of BI over the existing reports. A demonstration based on the customized reports had a relevant impact.

There was also a change in the attitude of end-users, previously reluctant to changing their old tools (Microsoft Excel and other Office applications) and to learning how to use a new one. They were now eager and motivated as the old reports were no longer valid. And the truth is that they come to love it in very short time, as the new reports were very flexible and easy to use and they interfaced directly with the ERP application and other data sources.

The end-user involvement is a very important factor in developing functional BI solutions. As project requirements and scope are set by users, they know exactly the data they need and they will test and use the result of the project. There are voices claiming there was a shift of authority and ownership in BI projects, from IT to business side (Larissa T. Moss, Shaku Atre, 2003).

## 4.2 Criteria for Evaluating Business Intelligence systems

Deploying BIS involves many risks: system design, data quality, and technology obsolescence. Large budgets and strategic information are at stake in deploying BIS systems, a good reason to establish rigorous criteria for evaluating this type of system. These criteria are discussed below.

### 1. Decisions based on Business Process

BIS should not be viewed only as a data repository or a large set of data. Instead, system's implementation should be concerned with conceptualizing new data models, processes, and indicators that form the content of the BIS.

### 2. Performance

It reports to the response time the system provides to its users, depending on the complexity of the database and the queries being requested. Most responses should range from few seconds to a maximum of 30 seconds for routine queries.

### 3. Flexibility and Scalability

Flexibility determines whether a BIS solution can adapt to changing business conditions after the system's delivery. BIS should be able to accommodate changes in any type of business processes and functions, as well as in new laws and regulations, requiring the capture of different types of data. BIS should be expandable to accommodate data growth and changes in organizational structure, without a slowdown in performance.

### 4. Integration

Integration involves two types of issues: *data integration* and *system integration*. BIS will be particularly effective if it can overcome the challenge of information fragmentation, allowing managers to measure features of business processes that involve information from inside and outside of the organization. System integration involves two aspects: the ability to extend the BIS software with new capabilities and modules and the system's ability to coexist with other enterprise solutions.

### 5. Friendly user Interface

BIS should be designed to provide managers a fast, easy, and understandable way to navigate into data and identify trends and patterns. BIS should allow the user interface to accommodate different degrees of technical knowledge.

We notice these criteria are related not only to technical aspects, but also to business aspects, as managers offer the most important feedback to the quality of business intelligence systems.

## 5 CONCLUSIONS

The most important conclusion of this real project experience is that, more than technical reasons, organizational and infrastructure dysfunction endanger the success of a project. When there are no supporting business decisions, the BI project is paralyzed. So, the main factor in conducting such a project is business rather than IT. Following this direction, after our project implementation was ready, the maintenance and further development of BI reports were entrusted to some end-users, specially trained (non IT).

Only combining BI technologies on the top of an Enterprise Resource Planning system will never provide a viable response to the changing management needs. A competitive advantage can be obtained only by adding business-oriented personalization so that the information provided can fulfill the particular needs of end-users and empower dynamic analysis and decisions.

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