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Intelligent Dashboard and Risk Management

Tunisian case Study

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***Abstract*— Nowadays companies face increased complexities and various risks covering several functional areas. Risk management is a crucial lever enhancing organizational Performance. To deal with the rapid changes in the environment and the emergence of various risks, companies try to ensure a performed management of risk by providing techniques and tools for monitoring. This research studies how can firm manage risk to improve performance using the dashboard. To answer the research issue a Tunisian case study will illustrates the incentive behind using a support system that allows the risk management from the data acquisition to the visualization of possible risk in a more realistic way. This case study consists on a design and an implementation of a communication tool with a standard data sources. This tool provides monitoring and reporting of data retrieved through a custom filter and a management-generated presentation. In this context, an open platform for risk management takes charge of the monitoring of the risks relates to the information technology and business risks (strategic, operational, financial, legal, and regulatory) in a transverse way and in real time. This platform supports a process of reporting data generated within it. The realization of this work necessitates a specification of functional and non-functional requirements as well as an identification of the physical and logical architecture of the system.**

***Keywords*— Risk Management, Monitoring, Reporting, Extraction, Filtering**

I. INTRODUCTION

Risk management and reporting issues are today significantly influencing theoretical and empirical debates on enterprise strategy and performance.

Our research falls under the framework of Business Intelligence (BI). This later can deliver relevant information to the managers at appropriate times to help them to make the right decisions [1]. The information technology (IT) reporting is one of the technical tools allowing the reduction of technological, financial and organizational risks as well as helping in the decision-making. Reports provide implementation guidelines on internal controls which help managers to control parameters to identify the appropriate levels of risk and finally to carry out enterprise activities [2]. The notions of risk management, and IT reporting, has extensively influenced, many aspects of managerial behaviours. Economic theorizing was from the outset a key element of risk discourse [3].

Our research aims at designing and developing a platform for real time monitoring of IT and business risks while focusing on the design and realization of an interface to interact with the data source.

In the first part, we will propose the study of risk reporting (Risk Disclosure and Reporting, and Risk Reporting Data Access Technologies). Theoretical study and international practice of risk reporting allow us to present the research issues. Then, we will move to a second empirical section presenting the design and realization of the interface to interact with the data source.

II. RISK REPORTING

Many companies totally rely on IT to realize success [4]. IT can be used for the organisation as a whole or for separate business units. This choice depend on the intensity with which information is used. Amrik, and al. (1996) had defined three categories of IT usage (high, medium and low tier), as follows [5]:

- High tier. In high tier industries, IT is the most important factor to influence the core business of a company: IT services, banking, and insurance;
- Medium tier where information is essential but it is not the only bloc :industry of consumer goods, health care;
- Low tier, building and construction, manufacturing and natural resources.

In high tier industries and precisely in It services, there is centralisation of IT decision. Senior level management or director level management are responsible for setting IT policies and strategy in companies [4]. The advantage of centralization is to establish a wide coherence in corporate information systems, data, computers, networks and operating software of the company [4]. One of the important axes in IT strategy, that we can cite, is the using of the Computer reporting which is a computer technique used to produce at any time from the extracted data, reports that could be humanly readable, viewable or printable and accurate [6]. These reports may involve activities, the results of a company,

a unit of work, intended to inform those responsible for internal or external overseeing, or just concerned with activities or results [6]. The advantage of having a computer report in a lower hierarchical level ensures that business units do have ownership of the systems they use, thus allowing decision to correspond more closely to the business [4]. In this instance the development of the reporting architecture for business units is the responsibility of the units themselves.

Reporting is concerned with one type of report that responds to the question "What has happened?" or in an operational context to the question "What's happening right now?" There are other types of reports to meet the analytical question "Why does this happen?" and the prognostic question "What will happen?" All these different reports are often produced out of a data warehouse in the form of a dashboard which is one of the most used tools for performance evaluation within companies [7-8].

In the early years, officials have opted for traditional progress, and the continuous increase in the access to the internet has led to a sharp progress in the use of the web as a means of reporting [9].

A. Risk Disclosure and Reporting

Recently the discipline of risk management has greatly evolved within many sectors [10]. More sophisticated ways of measuring risks have been developed, bringing about a greater understanding of risk and an increased ability to manage it [11-12].

In fact, a large part of this interest has been arisen because many fields are now exposed to a more volatile and unpredictable environment where past certainties no longer hold. In order to achieve a consistent risk disclosure operation [13-14], many reporting requirements features are taken on consideration. Risk information can be quantitative or qualitative [14-15]. The second feature is that risk disclosure is partly mandatory and partly voluntary [16]. Mandatory disclosures include those specifically required under regulatory requirements of statutes, professional regulating standards. The third feature consists in that, in an environment where everything is equal and disclosure is made under the same regulatory requirements, field disclosure may be in full compliance, in partial compliance, or not completely in compliance with the regulatory requirements [16].

As a conclusion, the main objective is to analyse the risk management disclosure using the regulatory requirements and guidelines of the relevant bodies. Thus, risk disclosure is divided into two main elements: mandatory disclosure and voluntary disclosure. The manager had to learn from crises and exerted efforts to promote better transparency and risk reporting for future benefits.

All mentioned qualities just talking about have been implemented in our software considering Dashboard as the famous example exploited.

B. Risk Reporting Tools: the Dashboard

A dashboard consists in an instrument of action in which a small set of indicators (five to ten) are integrated to enable managers to learn about the systems evolution state that they drive and to identify tendencies that influence the horizons of their function [17]. Moreover, the dashboard is considered as a reporting instrument making easy the control of the realization of hierarchical levels [18]. Bescos (2004) had presented the dashboard as a dynamic information-based tool [19]. In this context, the presented information should make perspectives in the obtained results. This type of dashboard assures the control of decentralized units detected in the over system. It allows following performance indicators [20] such as execution plans, budgets, investment and staff. The dashboard presents an instrument of information transfer between the business units in the company. Kim and al. (2012) emphasize the importance of information transfer between business units in organization to ensure a suitable combination [21].

The dashboard mitigates uncertainty and reduces transactional risks such as information asymmetry, loss of control of a valuable resource. Indeed, it improves coordination, interest relief, thereby facilitating inter-business unit information transfer in a "preferred direction" [22-27].

In addition, the dashboard helps to master the flow of unwanted information by governing the distribution, acquisition and use [22, 28].

The construction of the dashboard is a rich and complex process [7] . In fact, the design gait is based on a secured handling of databases access and on integrating equations and formulas processing. The structure and content of the dashboard can widely differ from one business unit to another in order to satisfy data presentation. Among the presentations we include text documents (letters, books, reports, newsletters brochures), spreadsheets loaded with advanced analysis functions, graphs and decision support and exportable to other formats (PDF or HTML), multimedia formats with special effects , animation, drawing tools from simple diagrams to the chart(graphs, histogram, bars) to three-dimensional drawing.

C. Risk Reporting Data Access Technologies

Access to data sources is a crucial step in the process of generating of reports of risk management. Indeed, access includes the steps of extraction, simulation and reformulation of data. These operations are carried out thanks to the driver containing communication interfaces that are exposed to these sources (MSDN, 2013). P rogramming interface is a set of functions, procedures or classes put on display by the application in order to realize a communication bridge with other external programs.

Several functions are fully insured by the application programming interfaces (API) including synchronous/asynchronous, communication, the connection to data sources (directories, SGBD …), transaction management,

the XML serialization by the simplification of access to other APIs.

In our context, we are interested in APIs used for access to the data sources. These APIs are usually presented by different technologies. We find the data access object (DAO), the remote access object RDO, the Microsoft open data base connectivity (ODBC) and the Object Linking and Embedding Data Base (OLEDB).

The study of these tools in international practice and literature serves as the basis for a good selection of data management tool. This step is considered as critical in the reporting process.

III. RESEARCH ISSUES AND RESULTS

The study of literature, as well as the international practice enables us to identify the common characteristics that can be present in the moment of reporting platform design for the risk management.

The study of the existent has led us to put emphasis on the insufficiencies of functional solutions already existing. In fact, the consoles of supervision are satisfactory for the visualization and structuring of data, however, they remain insufficient in order to meet the user's needs aiming at manipulating the displayed information. Actually, the functionalities supplied by the consoles of supervision are restricted to the generation of graphs and to the adjustment of their display. This reveals the lack of processing functions performed on the data as well as on the personalization of choice to be displayed. Besides, the data displayed are generally difficult to manipulate. In fact, the visualization is only authorized by the console of supervision. Several data loading problems can also appear when the console is deployed within the server. All these insufficiencies compel us to design a platform of reporting presenting the effective solutions, fitting the user's needs and enriching the existing functionalities.

We propose to design a model in an open platform of cross-functional monitoring on time of IT risks (technological) and the business risks (strategic, operational, financial, legal, regulator). This model controls the company systems permanently, and the network applications. Additionally, we propose the implementation of an extraction solution of data of performances measurements taking into account the update and the self-loading of data changes as well as the statistics functionalities.

Regarding the platform design, we can regroup the data of these systems into three consoles of supervision which type of each is identified by the amount of information to be reported, whether it is the consoles of alerts, the events and indicators of performance of the system's entire state.

The console of alerts manages the display of alerts detected due to the supervised risks. It is made up of two graphical panels, the first presents the indicators of alerts and the second shows evolution compared to time. The second console of supervision is that of events. It ensures a representation of information over events defined by the user of the platform and their behaviours faced with the risks encountered. The third console of the platform is that of the entire state of the system's performance indicators. It presents two types of panels. The first presents the indicators and it is made up of a table of data covering the name of every indicator, its measurement, the date of the last measurement and a text box which provides a detailed description of every indicator selected. The second panel is that of graphs that can include nine graphs maximum.

Concerning the extraction solution of data, we propose that the tool serving the process functioning of data Reporting generated by the monitoring platform on time of IT and business risks, would be integrated within the Microsoft Office Excel editor. We will need to personalize the data extraction from their source as well as their structuring and presentation, from which arises the interest to design and realize an interface of interaction coupled with the data source. This interface enables the user of the Office Excel editor to use the extracted data in accordance with their needs. In this interface, the extracted data will be filtered and structured according to specific forms and exposed to the user.

Our solution consists in extracting data of the source in a secure way, choosing the appropriate models for the structuring of extracted data before exposing them to the user, then implementing a reliable integrated interface within Office Excel permitting the user to manipulate and use the data appropriately according to his needs.

As a conclusion, the solution has to offer the Excel user essentially the functionalities of authentication, basis data loading, results graphic presentation management, data refreshment.

A. Physical architecture of the solution

Our application consists in realizing a system of access to data composed of a first module serving the extraction of data using an API OLE DB, supposed a supplier of data. Moreover, the system is made up of a second module that receives the data of the supplier and treats them, considered as a consumer of the API OLE DB that finally generates the results in the processing pages of Excel.

This decomposition reflects the software architecture in layers. Thus, it is about two layers. One layer of persistence is presented by the database of the company and another is considered as an applicative layer assuring the management of extracted data.

The applicative layer is composed of two modules. The first is the "Manipulator" module serving the extraction of data, their filtering and structuring. The second is the "consumer" module assuring the management of the supplier received data.

The following Fig. 1 summarizes the physical architecture already described.

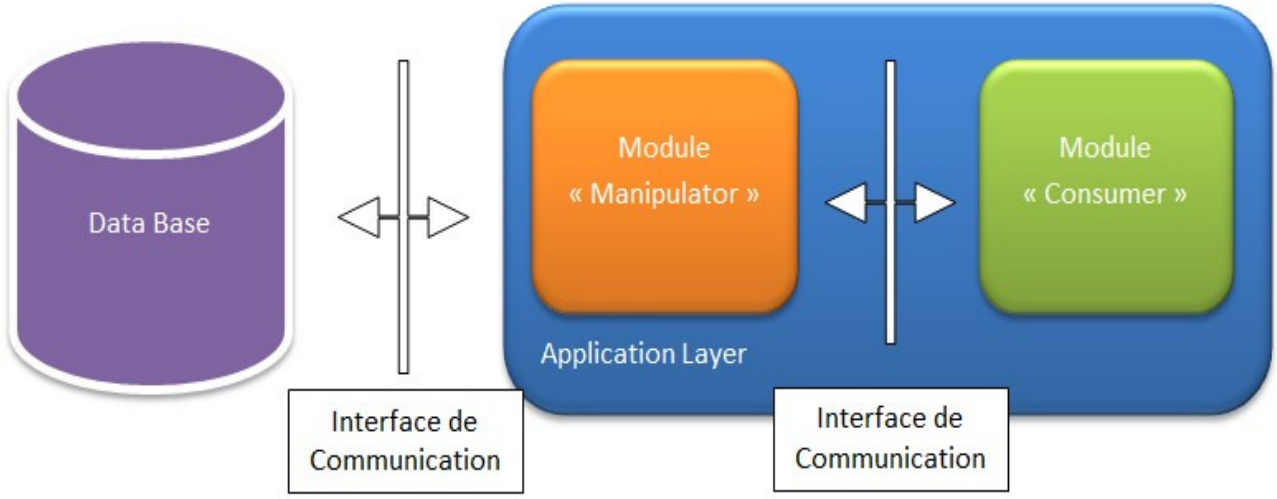

Fig. 1 Physical architecture of the application

B. Logical architecture of application layer

The application layer contains mainly two modules, supposed as the "Manipulator" and the "Consumer" module. The interaction between them defines the functionalities of the solution. The extraction of data from their sources (SQL database, indexed sequential files, Excel pages, and mail files), the modelling of these data into well-specific formats (tables,) as well as the exposition of these structures to consumption by the customers, are considered as operations assured by the two modules: "Manipulator" module based on four components ("Data Source" for authentication, "Session" for transactional operations during connection, "Command" for users' orders execution and the "Rowset" for structuring results) and a "Consumer" module again based on four components ("Browser" for human- computer interaction, "Connector" for manipulator module connection, "Name Selector" for data table selection and "Loader" for loading data in excel sheets). We simulate the modules relations in a deployment diagram as it is presented below in the Fig. 2.

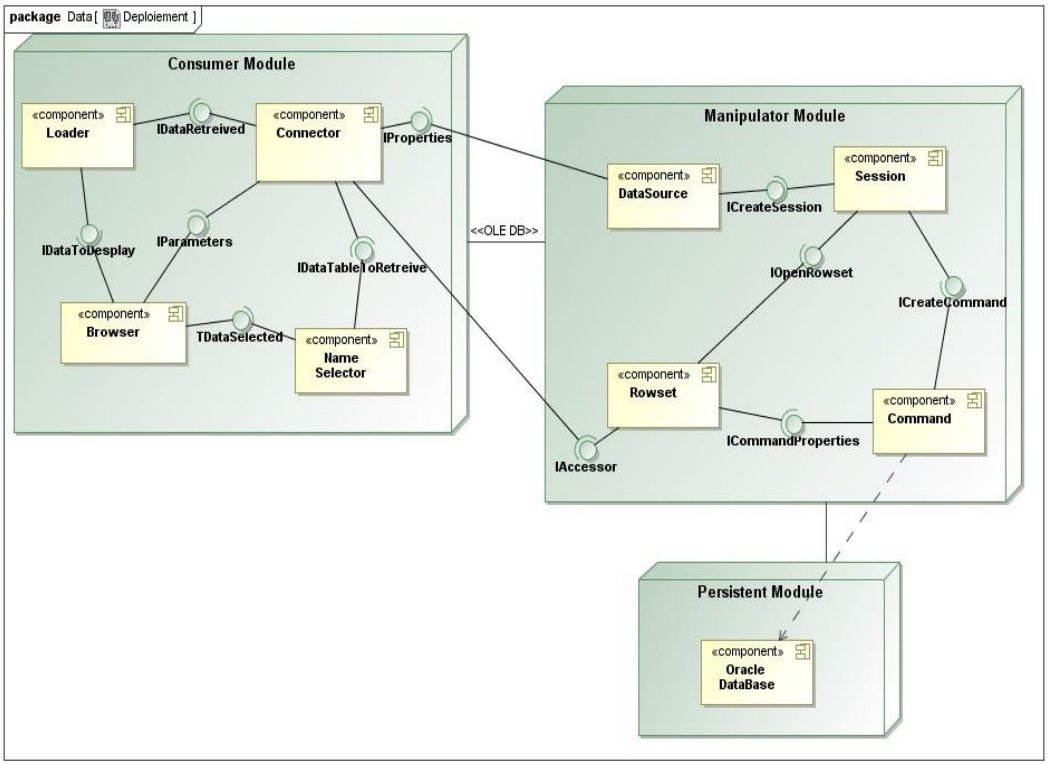

Fig. 2 Deployment Diagram of the application

The diagram of deployment presents the way in which the system components are distributed as well as their relations between themselves. In fact, the opposite figure demonstrates that the components of every module communicate by means of interfaces ensuring each of the specific services to their functioning. Besides, communication between the two modules is based on the OLE DB technology. Taking the example of data loading from base, the necessary parameters entered and selected by the user with the assistance of the component "Browser" are passed to the component "Connector" that performs the connection to the OLE DB supplier. This supplier performs the necessary information operations to be returned to the user himself.

Fig. 3 shows a generated report executed by the implemented driver.

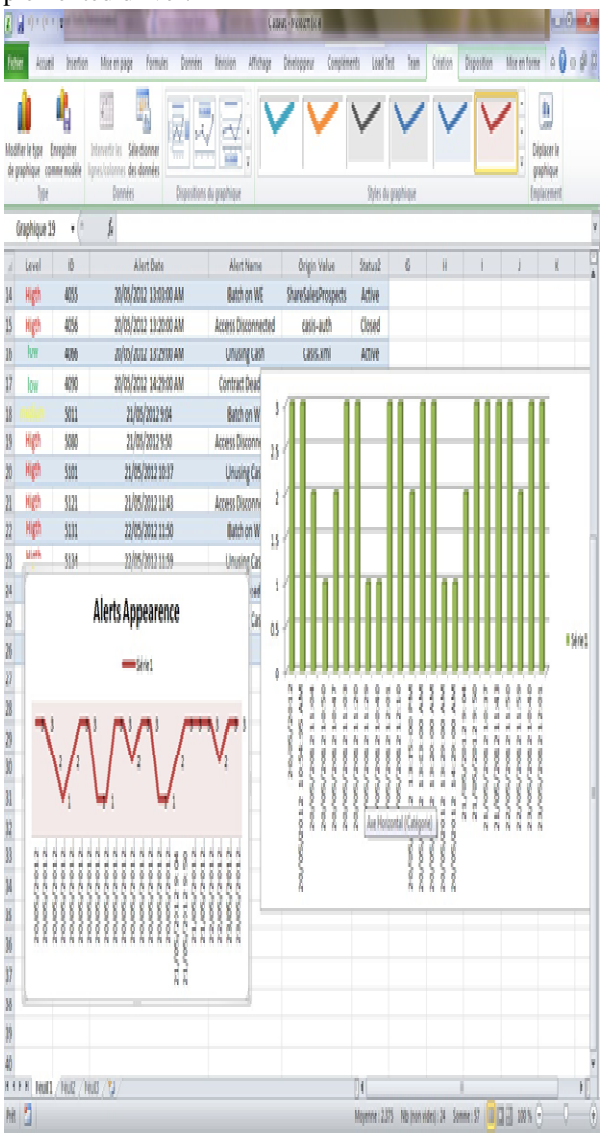

Fig. 3 Loading alerts specifications in an excel sheet from data base.

IV. Conclusion

The risk management represents a crucial importance at the level of corporations. Several techniques and tools assist managers at the decision-making level so as to face different risks. Reporting is one of these tools permitting to confront business risks as well as technological ones.

The process of "Reporting" takes place mainly in three phases. Authentication is the first step through which the user makes the introduction of these identities (login and password) within the console. The extraction of data generated by the platform of the system's database constitutes the second phase. The third one is that of visualization of information using the console of supervision (Dashboard).

However, the last step presents as many imperfections as we have to relieve via flexible and even simple solutions, which has represented the approach of this study. In fact, having a simple, robust, and clear presentation appears to be a requirement that needs to be satisfied and especially in the field of business risks as well as the financial risks in a manner that information would be reported in the best way. This objective requires using the technologies of connection to the databases which assure the least of its demanded criteria. Our choice has been fixed on the OLEDB thanks to the services it assures. We state its rapidity and flexibility in use and its openness to all languages.

Nevertheless, the development of an OLE DB pilot remains a difficult task. In fact, it has led to some problems in relationship to the realization of specific tasks. These problems are mainly related to the implementation of API as well as its communication with the OLE DB consumer.

Our Solution concerning reporting platform design for the risk management present a contribution to the company. In fact the solution provides a centralized Risk Management Structure which avoid duplication of effort. We apply Data Integration and Data Standardization through the Use of a common data model and a common data definitions. This standardization drives to common risk management processes. The Standardization is key to success through scales' economies and minimization of costs, besides it insures the organizational coherence following an enterprise-wide design supporting data integration.

Indeed, our solution strengthens internal Expertise by supporting the decision maker or the manager for controlling and accomplishing the business unit goals and aligning these with the strategic goals of the company. In deed implementing a risk management platform strengthens Business" Analysts by providing analysts with both "business" and technology knowledge. Besides, it reinforce user training in reporting applications.

Another contribution of the solution is avoiding customization and presenting effective communications (what happened and what is happening). It emphasizes Reporting

through including financial, customer report Development and using of report generators.

As a design risk Management Process, our solution fit The Software to the technology adopted in the company.

In addition, the design and implementation of the application within the company facilitates meeting the business process requirements. This is not always the case when the company bought a ready solution.

The design and implementation of our solution in the company improve training and skilling of the team in software design and methodology.

However, we can improve the final product thanks to the diversity of services in the domain of "information security". We can state firstly the improving of the customer communication security with the database through the driver as well as the authentication. Secondly, we state alleviating the operations of extraction as well as the improvement of selections performed over the data. Finally, we can enrich the OLE DB customer by the shortcuts over the functionalities provided by Office Excel.

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