

# Use of Business Intelligence in Knowledge Management

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**Abstract:** This paper tries to explore the usage of a Business Intelligence product for implementation of Knowledge Management in an organization. It highlights various issues of a Knowledge environment. It also describes a Business Intelligence product technology and the kind of features it provides. Through this discussion the paper tries to create a symbiotic relation between them. The study also implements a simple BI product for an education for an education sphere. This product integrates the basic-BI features depending on the hierarchy of the end user in the organization.

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## Introduction

This paper tries to analyze the usage of a Business Intelligence product for implementation of Knowledge Management in an organization. It highlights various issues of a Knowledge environment. It also describes a Business Intelligence product technology and the kind of feature it provides.

Through this discussion the paper tries to create a symbiotic relation between them. The study also implements a simple BI product for an education domain. This study also implements a simple BI product for an education domain.

## Getting started with Knowledge

Today the world is experiencing an era, which has been termed the “knowledge age” or the “knowledge economy”. The term knowledge has been loosely coined earlier but people have started feeling its importance at every place. Knowledge is supposed to be present in two forms namely Implicit and Explicit. Implicit Knowledge is defined as the knowledge lying in the unconscious part of our memory. Explicit Knowledge is defined as Tangible Knowledge shared in different forms like speech, presentation etc.

Within an organization, knowledge is hidden in many forms. Among all forms of knowledge available within, one, which is most valuable, are the Knowledge workers or in other words employees involved in the growth of an organization. In today’s world of multi national companies it is the toughest challenge for an organization to retain their employees. But, before we move on with our discussion it is really important to understand as to what exactly makes an employee so valuable. Knowledge has great economic value in current scenario. In an organization every employee has a separate set of job to be performed. With the length of tenure of his job he gains an insight in that work which makes him more comfortable with respect to someone else doing it for the first time. This type of implicit knowledge gained is popularly termed as “experience”. This is one of the things that an organization does not want to loose so as to keep their process smooth.

Another important thing, which an organization is always interested in, is the hidden details in the data of various processes. This knowledge is the key for any organization to identify its potential in its product, service, customer etc. it is always interesting to know as to what to do to increase their growth. Such type of knowledge, which comes out only on requirement.

## Knowledge Management

Knowledge Management practically has been defined as “ A systematic approach to enhance competitive or collaborative potential through creating new knowledge, sharing existing knowledge, using knowledge better in products and services.”

This is the most valued management process for an organization. Separate Knowledge officers are being employed to manage this issue for an organization. There are three sub systems of Knowledge Management

1. KM of organization
2. KM of People
3. KM of infrastructure and Process

## Knowledge Discovery in Database

One important process that is like the backbone of Knowledge Management is KDD process. KDD stands for Knowledge Discovery in Database. It is an umbrella term describing a variety of activities for making sense of data. It is used to describe the overall process of finding useful patterns in data, including not only the data mining step of running specific discovery algorithms but also pre and post processing and a host of other important activities. The various steps involved for KDD process are:

1. Understanding the domain and define problem
2. Collect and pre process data
3. Apply data mining
4. Interpret and evaluate discovered knowledge
5. Putting the results in practical use

### DIKW Hierarchy

DIKW Hierarchy is the crux of the complete knowledge management. DIKW stands for Data, Information, Knowledge and Wisdom. This is like a simple conversion chart of Data to Information to Knowledge to Wisdom. (Fig 1)

Data is something, which is available from the processing of organization. It is in form of Transaction record, daily maintenance record, reports presentations etc. This is like the initial input for the KDD process.

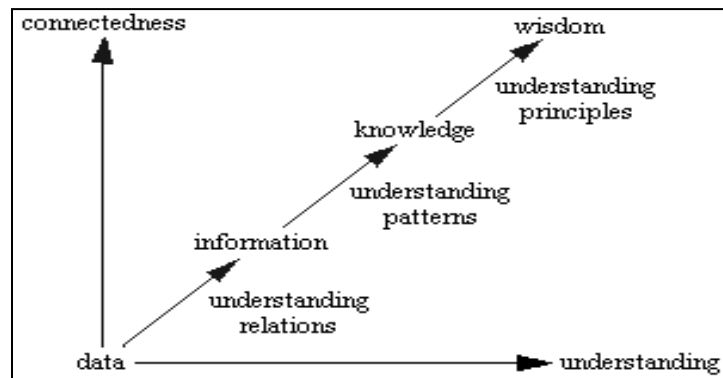


Figure 1: DIKW (Systems-thinking.org)

Information can be better defined as Data presented in a relational or logical manner. A simple query result over datasets can be the best example of information. Knowledge is a much more refined thing than Information which has a complete concern in the current context. Wisdom is an abstract value which grows with the length of the time. It is the most suitable keyword that goes conglomerate with Experience. Whenever we talk about Bill Gates, Steve Richard, John McNealy It is their wisdom which make them different from others. Another important keyword is 4C. 4C stands for Connection, Communication, Conversation, Collaboration. It is similar to DIKW hierarchy and works well in an organization. This is a simpler and easier medium of Knowledge creation through socialization. It is popular because this technique is easily utilized within the employees form knowledge creation, sharing and acquisition.

### Business Intelligence

Business intelligence refers to a set of business processes for collecting and analyzing business information, the technology used in this process and the information obtained from these processes. Organizations gather information in order to access the business environment, and cover fields such as marketing research, industry or market research, and competitor analysis. Some observers regard BI as the process of enhancing data into information and then into Knowledge. Persons involved in business intelligence processes may use application software and other technologies to gather, store analyze, and provide access to data ( as known to business intelligence). The software aims to help people make “better” business decisions by making accurate, current, and relevant information available to them when they need it.

The business intelligence methodology is used in almost all-industrial, scientific and governmental organization. Business Intelligence has the following features included in it:

1. **Reporting** – this is the reporting service of a BI product which helps to generate reports in the required format. It involves the service of talking the data directly from the data source and convert them logically in the appropriate format.
2. **Dash Boarding** – this tool is to provide a customized space to individual user and maintaining them as well for efficient service.
3. **Data Mining** – this is the backbone of any BI product. It works on the data source and provides results to every type of query in an organization
4. **Analysis** – this is an advanced feature of a BI product which depends partially on data mining and partially on the implied logic of analysis of a result.

Depending on the requirement of a BI product some features are added to above list. But the basic idea behind the BI product remains the same.

“If you don’t have at least one business intelligence application saving you \$1 million year or more, you haven’t realized the potential of enterprise BI”

[*Gerald D. Cohen, President and CEO, Information Builders (Information Builders.com)*]

### **Business Intelligence and Knowledge**

Organizations typically gather information in order to assess the business environment, and cover fields such as marketing research, industry or market research, and competitor analysis. Competitive organizations accumulate business intelligence in order to gain sustainable competitive advantage. Business Intelligence provides a unified platform for effective data storage as well as to employ the needed process over them. BI products are used worldwide for streamlining the Business Processes.

It stores the data for all the business process, which may be used in the business decisions. It makes the data processing automated and customized as per the end user needs. It works well in financial and analytical domain. The best feature of this product is that it hides the complexity of the complete process from the user.

Above all of these issues the most important feature is the usage of this tool for Knowledge Management. It became vibrant when some observers regard BI as the process of enhancing data into information and then into knowledge. Indirectly it is using the KDD process which makes it a powerful tool for Knowledge Management.

### **Data Mining**

Data Mining is the main backbone of the complete Business Intelligence tool. It is used for extracting the analytical results. It derives out the hidden trends in the datasets through an algorithmic approach. The most commonly used algorithm is APRIORI. The generic nature of this algorithm allows it to work on all types of data. It generates a relation on the basis of factors. These factors are Support and Confidence. The predictive nature of the algorithm helps to analyze the hidden trend. Usually the data mining and analysis part of a BI tool is merged in each other. There are few open source products available like Pentaho BI suite, which provides a separate feature of Data Mining and Analysis.

On the basis of this discussion we can infer that data mining is one of the steps in Knowledge Creation. According to the DIKW hierarchy, it takes the complete data sets as the “data”, refines the item sets as “information” and finally uncovers the hidden trend within them as the “knowledge” which creates the “wisdom” for the user. In nut shell we can say that BI provides a unified knowledge environment for creation, sharing, acquisition and utilization.

### **Business Intelligence in Knowledge Management**

A knowledge environment can be created with the help of a BI platform. It provides an effective medium for knowledge creation, sharing, acquisition and utilization. A business intelligence platform provides a unified knowledge platform for an organization. The basic tool of a business intelligence product namely reporting, dash boarding, data mining and analysis prove to be the physical tool for knowledge management.

BI maintains the data repositories, which act as the storage for KM over which various functions are applied for further knowledge creation. BI keeps the data backend in non-relational form which removes the constraint of normalization of data to be stored. Since the data stored is complete in nature the end result taken is equivalent to Knowledge. Reporting and Dash Boarding provides the perfect solution for effective knowledge sharing within an organization. BI provides reporting in almost all forms of user-friendly formats such as PDF, email, Office Document etc. Dash boarding is yet another feature which provides a customized environment to every individual knowledge worker. These two features enable an efficient knowledge environment with proper care for knowledge sharing. Data Mining creates a next step of Knowledge in the organization from the DIKW hierarchy. Analysis is also a similar feature which works along with data mining. All these features if gets bundles together forms a complete BI product while the functionalities if merged together performs “Knowledge Management”.

### **Biz Wizard**

During the study of business intelligence products we have chosen various leading BI products available in the market. These products were Oracle, SAS and Hyperion. Biz wizard brought two proposals for improvement in the regular business intelligence product. The first change brought upon was to reduce the complexity of the system. We found that the analysis or data mining part was the backbone of this product. So, there needs to be something which further enhances it. We proposed to develop an alternative selective analytical algorithm. This will help to reduce the space as well as time complexity of the process. Depending on whether minimal or maximum accuracy is required we will be using the subset of the transaction datasets.

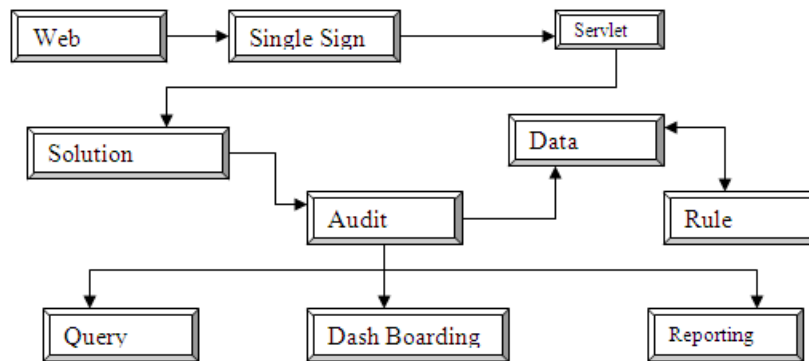


Figure 2: Architectural Diagram of Biz Wizard

The second proposal brings an added security feature to it on the basis of organizational hierarchy. Nowadays the issue is not more of process but the data. So, when an employee at a junior level tries to analyze the trends over the complete transaction data sets, it may possibly be a threat to the organization. We proposed to restrict the access rights of an employee in a BI environment depending on his hierarchy. This feature will enable the network administrator to maintain a better control over the backend. We have chosen a scenario of a university for reference. We are designing a sample ad-hoc database for a university over which we will be applying our techniques for trend analysis. To introduce the concept of organizational hierarchy we are also introducing a login screen which will be used to determine the hierarchical status of the user and the type of functionalities to be provided by the software. A working prototype of this product was also designed for realization (fig 2). We developed the complete system in web based architecture on JAVA platform. The complete backend was kept as MS Excel which was converted to MS Access format using HSSF API. The connection between the backend and product has been made using JDBC-ODBC bridge.

**Web Browser** → This is the front end interface for the system. Since this product has to run over a network of the organization

**Single Sign On** → for all the selective feature of the product we need to have some authorized authentication technique. Through sign on service, which is usually maintained in a networked organization such a type of functionality can easily be provided.

**Servlet** → Servlets are the back end of the running system. It is easy to use this feature due to its platform agnostic nature.

**Solution Engine** → This should be better called as the Brain of the system. It sets all the criteria for the logged in user to its available facilities in the system.

**Audit Engine** → This is like the switching operator of the system. It connects the user to the chosen BI service according to the user criteria.

**Query** → It is an added feature provided by the system. It is a simple SQL query function which runs over the corresponding database as per the set criteria for the user.

**Dash Boarding** → this feature enables personalized screen for the user. We have used the technique of cookies for this function.

### Conclusion

On the basis of our complete study of knowledge management and business intelligence we have tried to sketch a simple mapping between these two emerging domains to show a relation, which proves that BI product is a way to implement Knowledge Management. In the next part of this area research we will propose an idea of a BI product with a new idea in data mining to improve upon the issues of complexity, security and efficiency.

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