Using UML Diagrams for Business Intelligence in Telecommunication Industry

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Abstract
Business intelligence can be defined as having the right access to the right data or information needed to make the right business decisions at the right time. Today, no conceptual models exist that make the relationship between the Business Intelligence and the Telecommunication Industry. In this paper, we using UML diagram which allows making this relationship explicit.

1. Introduction
Business intelligence is extremely important to gauge the organizations current state of business, as well as all parts that constitute the whole of the business together to see where funds are needed, what part of a business is weak and what parts of the business is strong. Business Intelligence enables the comprehension, understanding and profit from experience. Business data and information is the soil that grows Business Intelligence, which provides the capability to reason, plan, solve problems, think abstractly, comprehend ideas and language, and learn from business data and information. Business intelligence is fueled from the utilization of information aligned with business performance. Business intelligence is constructed on the identification and modeling of focused business information. Asking the right questions is the precursor to making intelligent decisions [1]. Telecommunications companies have some of the largest data warehouses known. Their data volume is driven by the need to store call detail records, especially when analyzing network elements and events. Although many early telecommunications data warehousing projects focused on quality of service and time for repairs, more recent projects are focused on gaining and retaining the customer. Telecommunications companies are adding more services to traditional local, long distance, and cellular offerings. New offerings often include cable television and high-speed Internet. Of particular interest in these companies is the use of business intelligence to analyze the effectiveness of cross selling and to up selling these new services through targeted packaging and marketing. Other areas of increased interest include determining the lifetime value of customers and determining the likelihood of customer churn in response to promotions [2]. Surprisingly, this knowledge – how telecommunication industry interact with the BI and how the BI is being used in everyday Telecommunication Industry life – is not
made explicit in existing models. There is a need for an integrated model of telecommunication industry and BI to make the relationship between the BI and the telecommunication industry more transparent. To bridge this gap, we use the UML diagrams with the ability to create models that show:

- Where and how Telecommunication Industry use a BI, and
- Which parts of the Telecommunication Industry depend on which parts of the BI.

2. Elements of Business Intelligence
Business intelligence (BI) uses Knowledge Management, data warehouse, data mining and business analysis to identify, track and improve key business processes and data, as well as identify and monitor trends in corporate, competitor and market performance [3,4,5].

3. Functional Models
Functional models describe business processes and the interaction of an information system with its environment. In object-oriented systems, two types of models are used to describe the functionality of an information system: activity diagrams and use cases. Activity diagrams support the logical modeling of business processes and workflows. Use cases are used to describe the current as-is system and the to-be system being developed [6].

3.1 Activity Diagram for Business Intelligence
Figure 1 shows the activity diagram of business intelligence.

![Figure 1 Activity Diagram for Business Intelligence](image-url)
a. Use Case Diagram of Knowledge Management

Figure 2 shows Use-Case diagram of knowledge management

![Figure 2 Use-Case diagram of Knowledge Management](image)

b. Use Case Diagram of Data Warehouse

Figure 3 shows Use-Case diagram of data warehouse

![Figure 3 Use-Case Diagram of Data Warehouse](image)
c. OLAP Cube Use-Case Diagram

Figure 4 shows Use-Case diagram of OLAP cube

![Figure 4 Use-Case Diagram of OLAP cube](image)

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d. Use Case Diagram of Data Mining

Figure 5 shows Use-Case diagram of data mining

![Figure 5 Use-Case Diagram of Data Mining](image)
3.3 Structural Model

A structural, or conceptual, model describes the structure of the data that support the business process in an organization. During analysis, the structural model presents the logical organization of data without indicating how the data are stored, created, or manipulated so that analysts can focus on the business, without being distracted by technical details. One of the primary purposes of the structural model is to create a vocabulary that can be used by the analyst and the users. Structural models represent the things, ideas, or concepts—that is, the objects—contained in the domain problem. They also allow the representation of the relationships between the things, ideas, or concepts. By creating a structural model of the problem domain, the analyst creates the vocabulary necessary for the analyst and users to communicate effectively. Class diagrams are used to create the structural model [6, 7].

a. Class Diagram of Knowledge Management

Figure 6 shows Class diagram of knowledge management.
b. Class Diagram of Data Warehouse

Figure 7 shows Class diagram of data warehouse
c. Class Diagram of OLAP Cube

Figure 8 shows Class diagram of OLAP cube

![Class Diagram of OLAP cube](image)

**Figure 8** Class Diagram of OLAP cube

d. Class Diagram of Data Mining

Figure 9 shows Class diagram of data mining

![Class Diagram of Data Mining](image)

**Figure 9** Class Diagram of Data Mining
3.4 Behavioral Model

Behavioral models describe the internal dynamic aspects of an information system that supports the business processes in an organization. During analysis, behavioral models describe what the internal logic of the processes is without specifying how the processes are to be implemented [6, 7].

a. Sequence Diagram of Knowledge Management

Figure 10 shows Sequence diagram of knowledge management

![Sequence Diagram of Knowledge Management](image)

Figure 10 Sequence Diagram of Knowledge Management

b. Sequence Diagram of Data Warehouse

Figure 11 shows Sequence diagram of data warehouse
c. Sequence Diagram of OLAP Cube

Figure 12 shows Sequence diagram of OLAP cube
d. Sequence Diagram of Data Mining

![Sequence Diagram of Data Mining](image)

**Figure 13 Sequence Diagram of Data Mining**

**Conclusions**

1. There is an interaction between BI and telecommunication industry, which let the companies analyze the effectiveness of cross selling, determining the life time value of customers, and the likelihood of customers churn in response to promotions.

2. The relationship between BI and telecommunication industry, make a need for an integrated model, that let this relationship more transparency, to bridge this gap, we use UML diagrams to create this model.

**References**