Chapter 5
BI Definitions and Concepts

Content of this presentation has been taken from Book
"Fundamentals of Business Analytics"
RN Prasad and Seema Acharya
Published by Wiley India Pvt. Ltd.

BI Component Framework
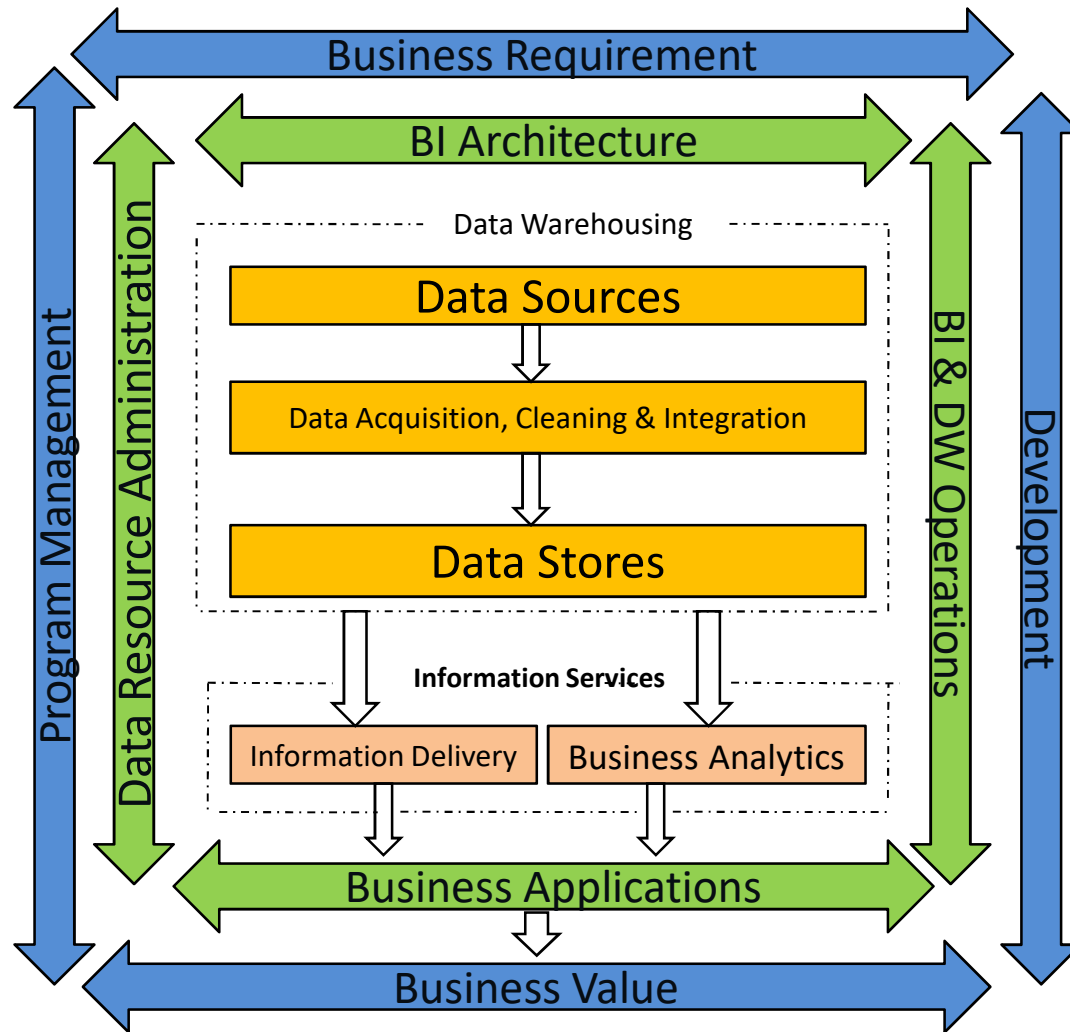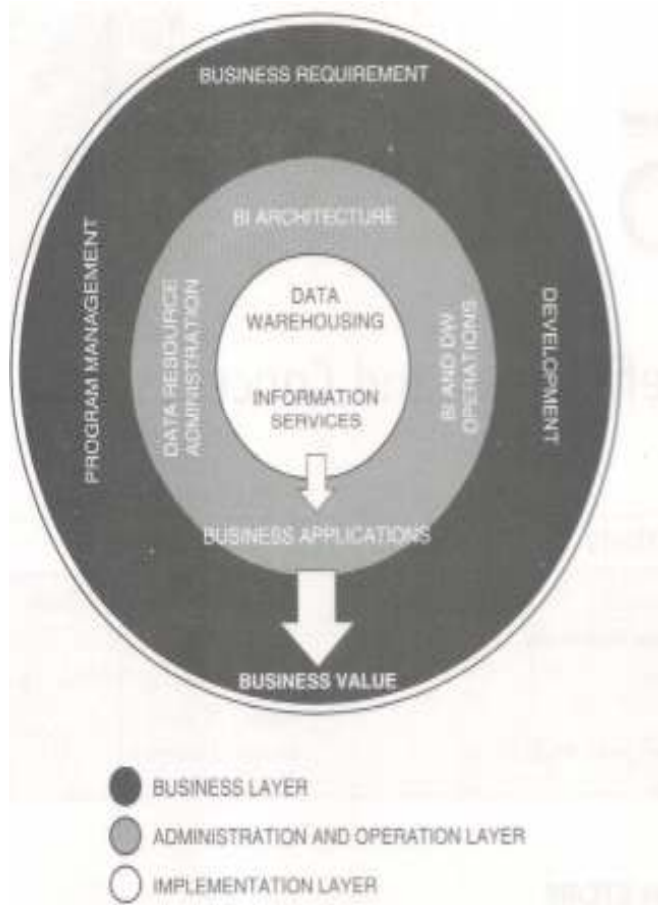
Business Layer

This layer consists of four components –
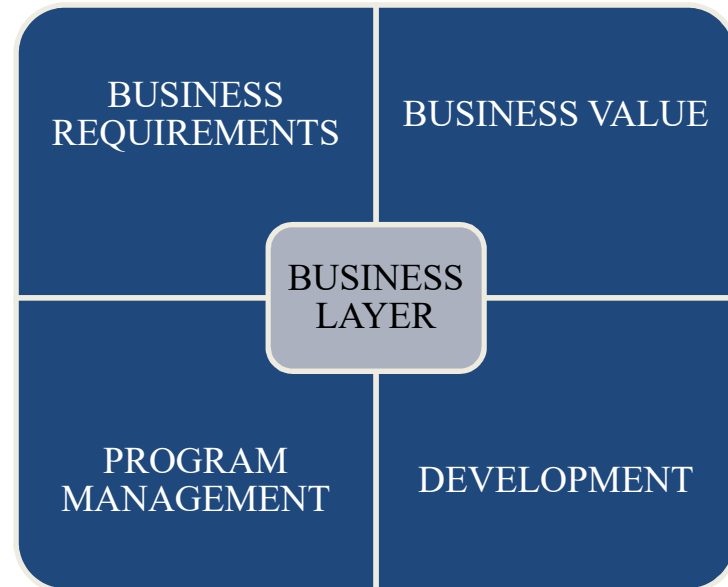
1. Business requirements
   - Business drivers
   - Business Goals
   - Business Strategies

2. Business Value
   - Return on Investment
   - Return on Assest
   - Total Cost of Ownership
   - Total Value of Ownership

3. Program Management

4. Development

BUSINESS REQUIREMENTS	BUSINESS VALUE
PROGRAM MANAGEMENT	DEVELOPMENT

BUSINESS LAYER

Business Layer – Business Requirements

Business requirements: The requirements are a product of three steps of a process that includes:

➢ *Business drivers* - the impulses that initiate the need to act.

Examples: changing workforce, changing labor laws, changing economy, changing technology, etc.

➢ *Business goals*- the targets to be achieved in response to the business drivers.

Examples: increased productivity, improved market share, improved profit margins, improved customer satisfaction, cost reduction, etc.

➢ *Business strategies*- the planned course of action that will help achieve the set goals.

Examples: outsourcing, global delivery model, partnerships, customer retention programs, employee retention programs, competitive pricing, etc.

Business Layer- Business Value

When a strategy is implemented against certain business goals, then certain costs (monetary, time, effort, information produced by data integration and analysis, application of knowledge from past experience, etc.) are involved.

However, the final output of the process should create such value for the business whose ratio to the costs involved should be a feasible ratio.

The business value can be measured in the terms of ROI (Return on Investment), ROA (Return on Assets), TCO (Total Cost of Ownership), TVO(Total Value of Ownership), etc. Let us understand these terms with the help of a few examples –

Return on Investment (ROI): We take the example of "Digicom", a digital electrocompany which has an online community platform that allows their prospective clients to engage with their users. "Digicom" has been using social media (mainly Twitter and Facebook) to help get new clients and to increase the number of prospects/leads. They attribute 10% of their daily revenue to social media. Now, that is an ROI from social media!

Return on Asset (ROA): Suppose a company, "Electronics Today", has a net income of $1 million and has total assets of $5 million. Then, its ROA is 20%. So, ROA is the earning from invested capital (assets).

Total Cost of Ownership (TCO): Let us understand TCO in the context of a vehicle. TCO defines the cost of owning a vehicle from the time of purchase by the owner, through its operation and maintenance to the time it leaves the possession of the owner.

Total Value of Ownership (TVO): TVO has replaced the simple concept of Owner's Equity in some companies. It could include a variety of subcategories such as stock, undistributed dividends, retained earnings or profit, or excess capital contributed.

In its simplest form, the basic accounting equation containing TVO as a component is

Assets = Liabilities + Owner's Equity, or if you like TVO

Business Layer- Program Management

This component of the business layer ensures that people, projects, and priorities work in a manner in which individual processes are compatible with each other so as to ensure seamless integration and smooth functioning of the entire program. It should attend to each of the following:

- Business priorities
- Mission and goals
- Strategies and risks
- Multiple projects
- Dependencies
- Cost and value
- Business rules
- Infrastructure

Business Layer- Development

The process of development consists of

- *database/data-warehouse development* (consisting of ETL, data profiling, data cleansing and database tools),

- *data integration system development* (consists of data integration tools and data quality tools)

- *business analytics development* (about processes and various technologies used).

BI Component Framework

Business Requirement

BI Architecture

Program Management

Data Resource Administration

BI & DW Operations

Development

Data Warehousing

Data Sources

Data Acquisition, Cleaning & Integration

Data Stores

Information Services

Information Delivery

Business Analytics

Business Applications

Business Value
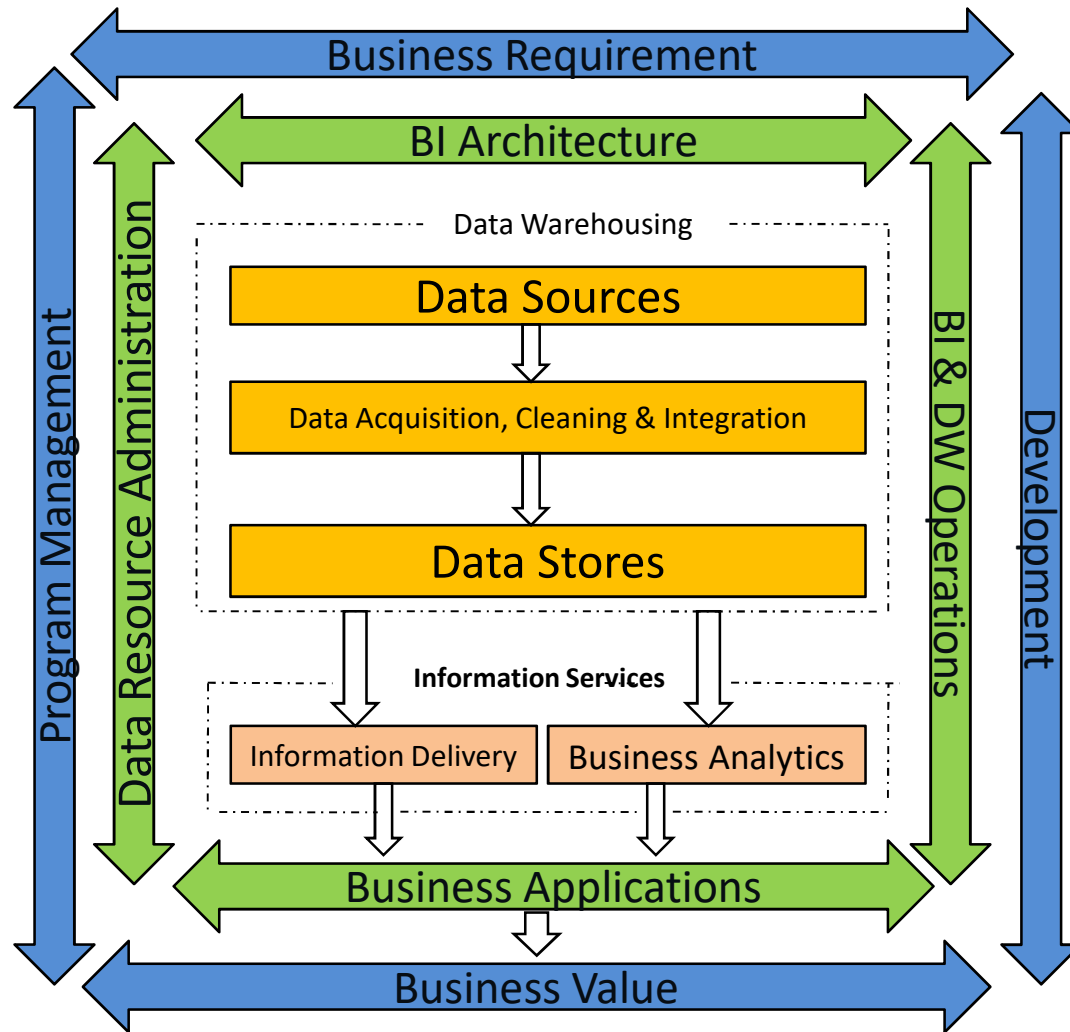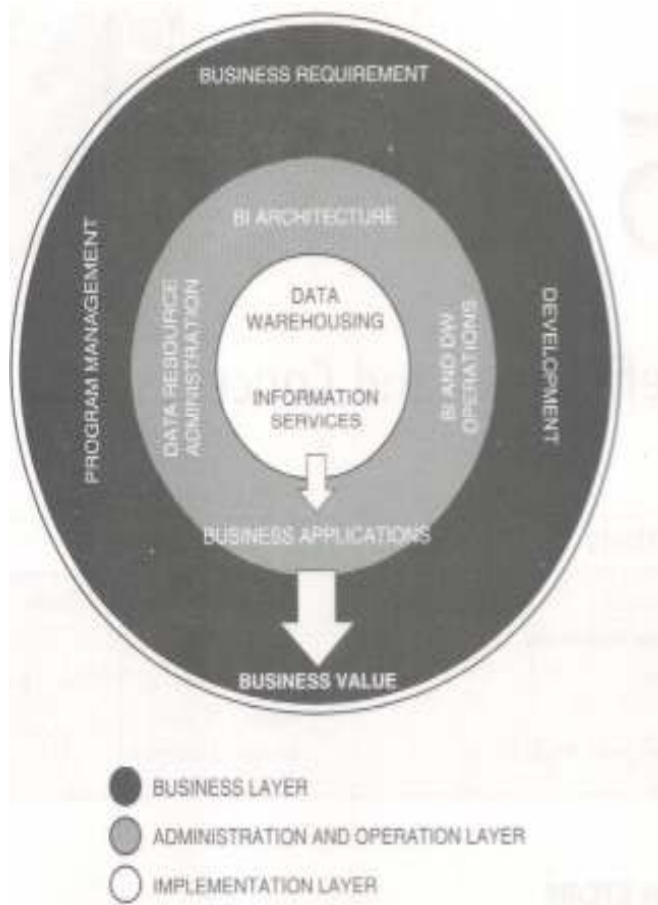
BI Component - Administration and Operation Layer

This layer consists of four components-

1. BI Architecture
   a. Data
   b. Integration
   c. Information
   d. Technology
   e. Organization
2. BI and DW Operations
   a. Backup and restore
   b. Security
   c. Configuration and Management
   d. Database Management
3. Data Resource Management
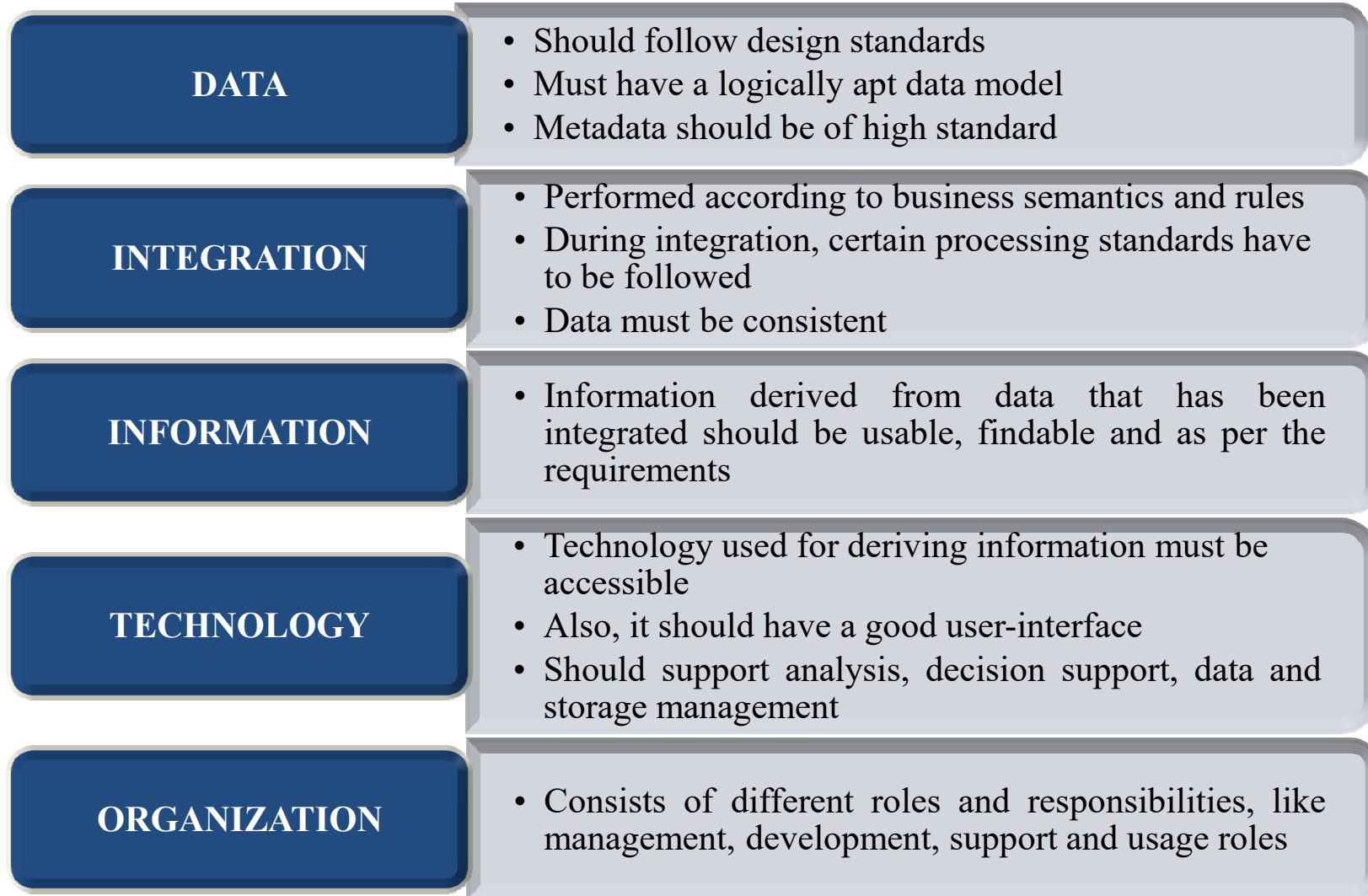   a. Data Governance
   b. Metadata management
4. Business Applications
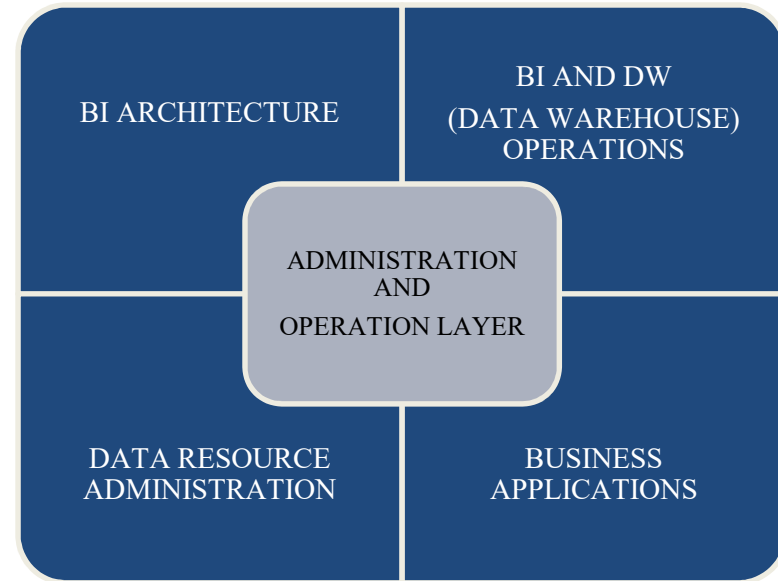
BI Component - Administration and Operations Layer - BI Architecture

DATA	• Should follow design standards • Must have a logically apt data model • Metadata should be of high standard
INTEGRATION	• Performed according to business semantics and rules • During integration, certain processing standards have to be followed • Data must be consistent
INFORMATION	• Information derived from data that has been integrated should be usable, findable and as per the requirements
TECHNOLOGY	• Technology used for deriving information must be accessible • Also, it should have a good user-interface • Should support analysis, decision support, data and storage management
ORGANIZATION	• Consists of different roles and responsibilities, like management, development, support and usage roles

BI Component - Administration and Operations Layer – BI and DW Operations

Data Warehouse (DW) administration requires the usage of various tools to monitor the performance and usage of the warehouse, and perform administrative tasks on it. Some of these tools would be:

- Backup and restore
- Security
- Configuration management
- Database management

Data resource administration: Involves *data governance* and *metadata management*.

Data governance is a technique for controlling data quality, which is used to assess, improve, manage and maintain information. It helps to define standards that are required to maintain data quality. The distribution of roles for governance of data is as follows:

- Data ownership
- Data stewardship
- Data custodianship

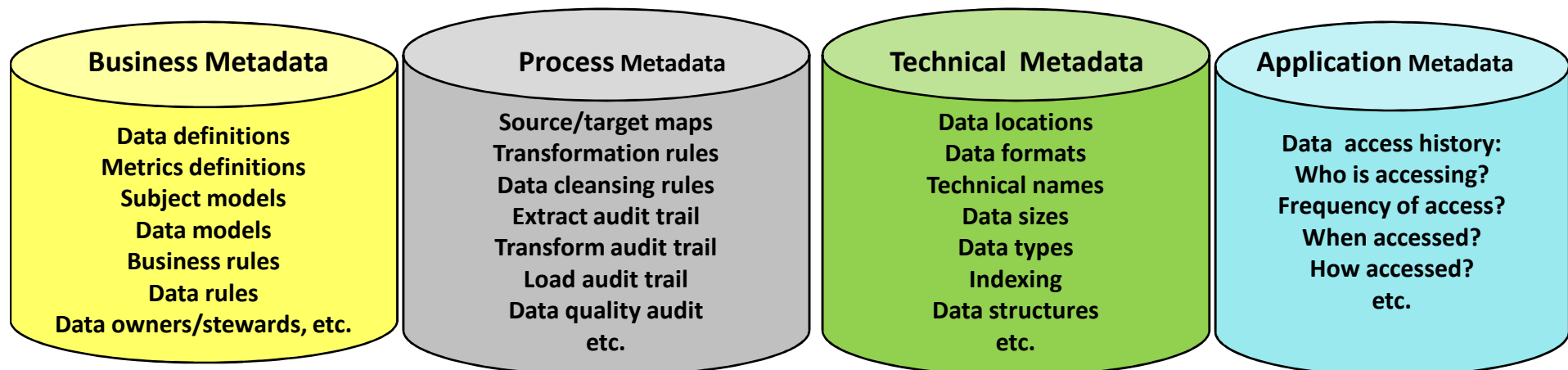# BI Component - Administration and Operations Layer– BI and DW Operations

Metadata management: Metadata is data about data.

Consider CD/DVD of music. There is the date of recording, the name of the artist, the genre of music, the songs in the album, copyright information, etc. All this information constitutes the metadata for the CD/DVD of music. In the context of a camera, the data is the photographic image. The metadata then is the date and time when the was taken. In simple words, metadata is data about data. When used in the context of a data warehouse, it is the data that defines the warehouse objects. Few examples of metadata are timestamp at which the data was extracted, the data sources from where metadata has been extracted, and the missing fields/columns that have been added by data cleaning or integration processes. Metadata management involves tracking, assessment, and maintenance of metadata.

Metadata can be divided into four groups:

- Business metadata
- Process metadata
- Technical metadata
- Application metadata

Business Metadata	Process Metadata	Technical Metadata	Application Metadata
Data definitions Metrics definitions Subject models Data models Business rules Data rules Data owners/stewards, etc.	Source/target maps Transformation rules Data cleansing rules Extract audit trail Transform audit trail Load audit trail Data quality audit etc.	Data locations Data formats Technical names Data sizes Data types Indexing Data structures etc.	Data access history: Who is accessing? Frequency of access? When accessed? How accessed? etc.

BI Component - Administration and Operations Layer – Business Applications

The application of technology to produce value for the business refers to the generation of information or intelligence from data assets like data warehouses/data marts. Using BI tools, we can generate strategic, financial, customer, or risk intelligence. This information can be obtained through various BI applications, such as DSS (decision support system), EIS (executive information system), OLAP(On-line analytical processing), data mining and discovery, etc.

BI Component Framework
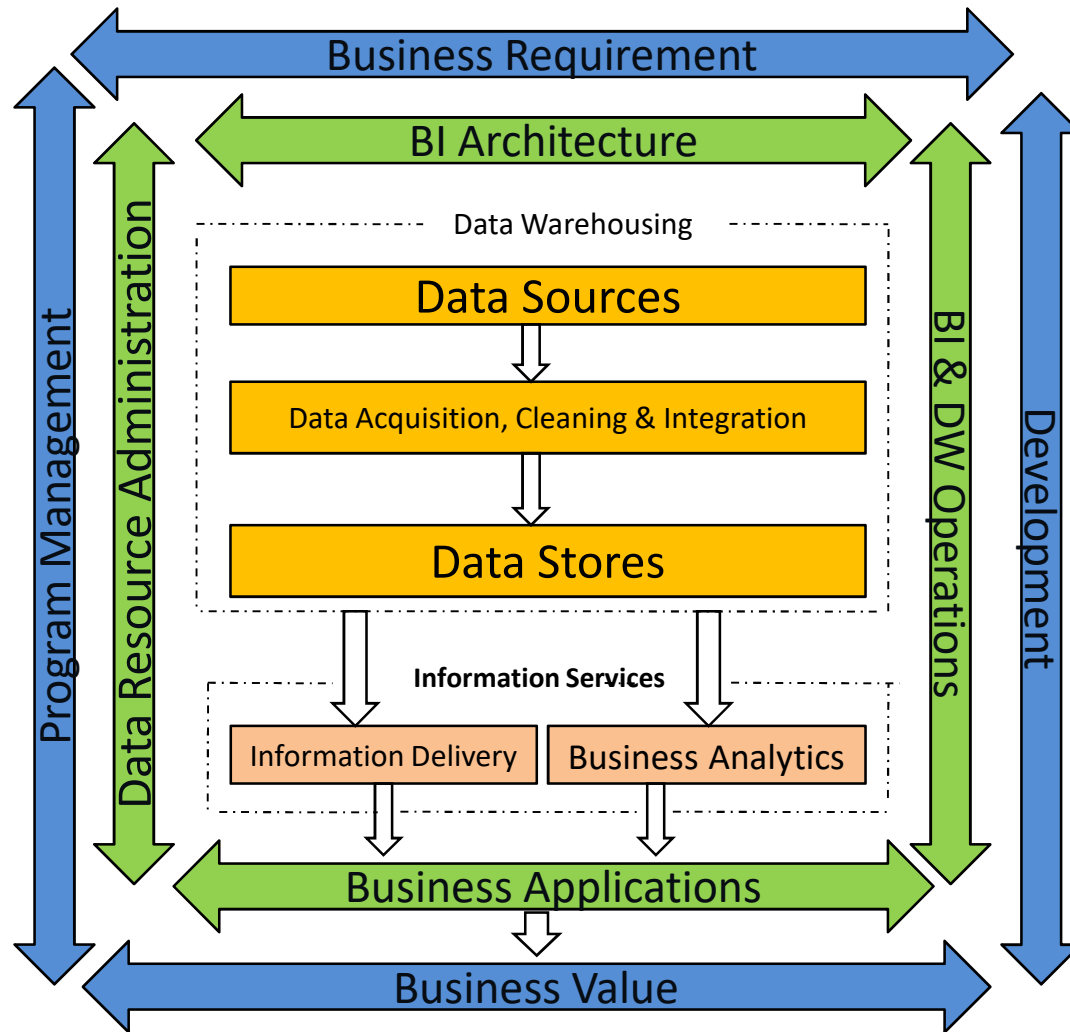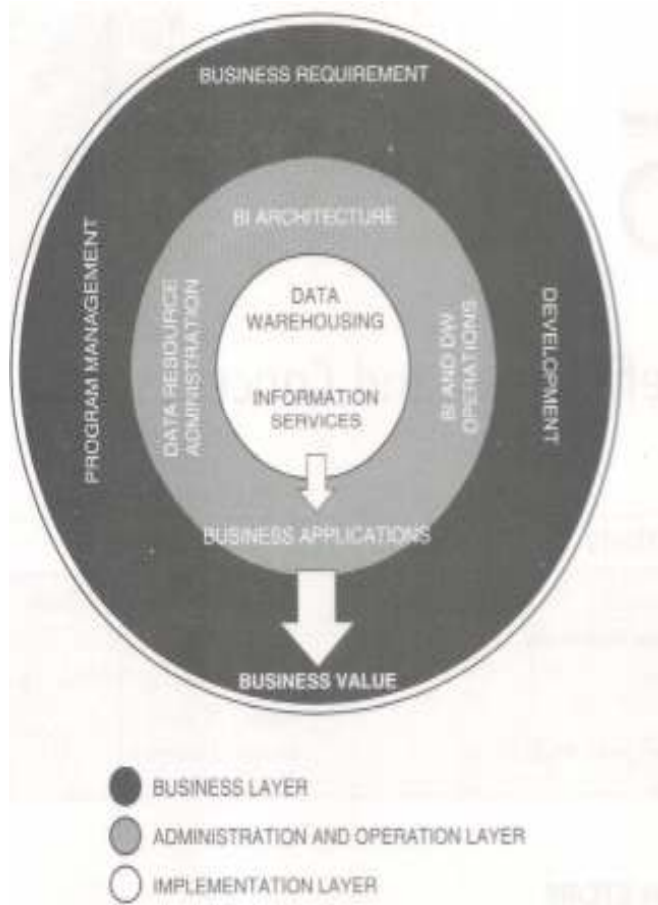
BI Component – Implementation Layer

The implementation layer of the BI component framework consists of technical components that are required for data capture, transformation and cleaning, data into information, and finally delivering that information to leverage business goals and produce value for the organization.

1. Data Warehousing
    1. Data Sources
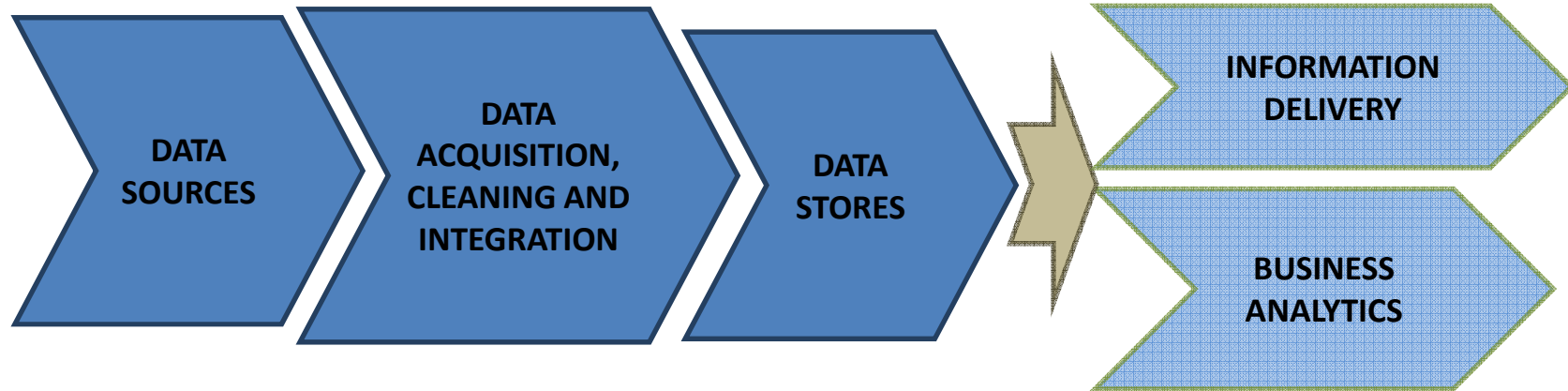   2. Data Acquisition, Cleaning, and Integration
    3. Data Stores

2. Information Services
    1. Information Delivery
    2. Business Analytics

BI Component - Implementation Layer

DATA WAREHOUSING

INFORMATION SERVICES

```
DATA
SOURCES
```
→
```
DATA
ACQUISITION,
CLEANING AND
INTEGRATION
```
→
```
DATA
STORES
```
→
```
INFORMATION
DELIVERY
```

```
BUSINESS
ANALYTICS
```

BI Component – Implementation Layer – Data Warehousing

It is the process which prepares the basic repository of data (called data warehouse) that becomes the data source where we extract information from.

Date Warehouse: A data warehouse is a data store. It is structured on the dimensional model schema, which is optimized for data retrieval rather than update.

Data warehousing must play the following five distinct roles:

- Intake
- Integration
- Distribution
- Delivery
- Access

Implementation Layer

Data Source in New York

Data Source in Washington

Data Source in Philadelphia

Data Source in Chicago

Extract
Clean
Transform
Load
Refresh

Data Warehouse

Query/
Report/
Analysis
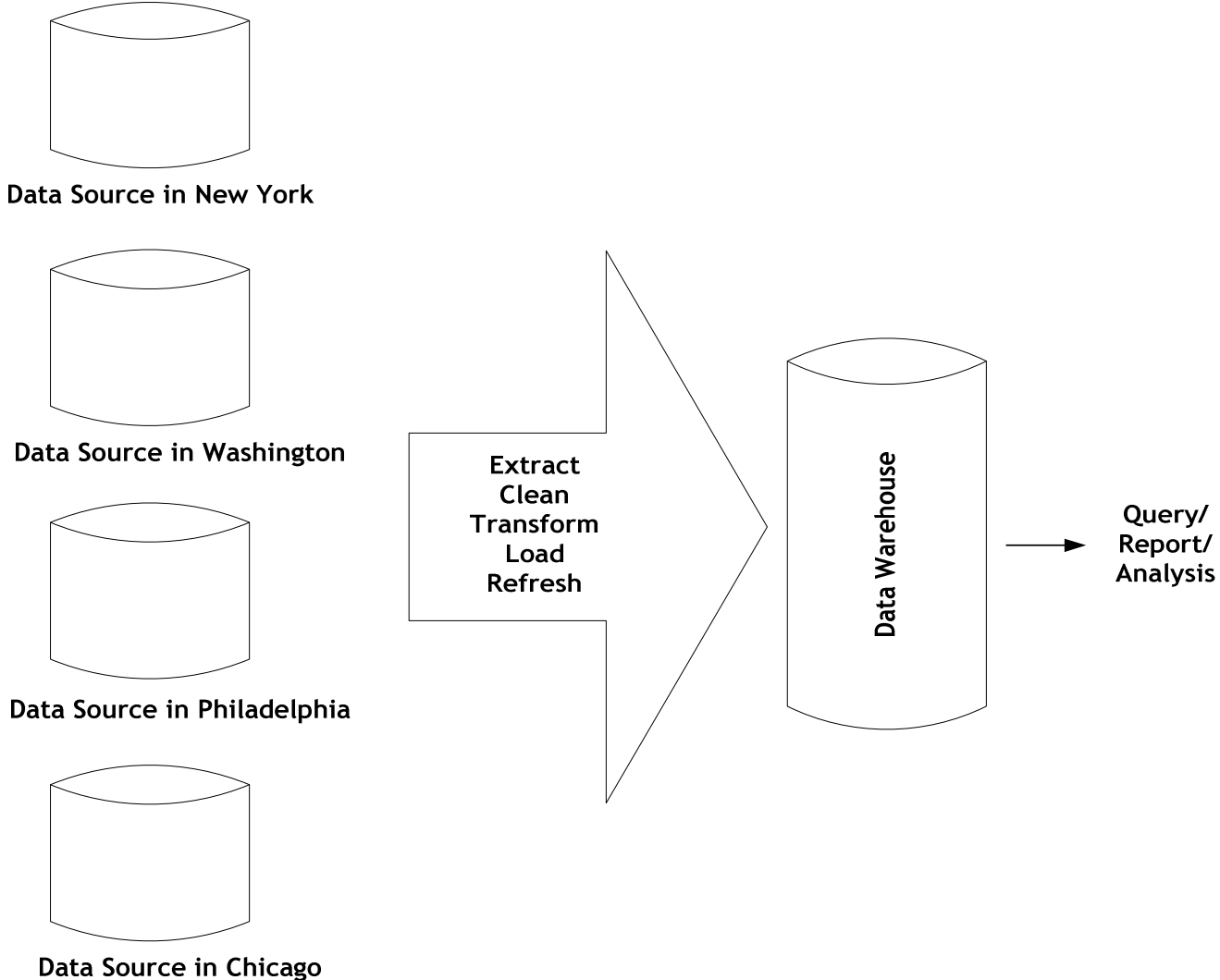
BI Component – Implementation Layer – Information Services

- It is not only the process of producing information; rather, it involves ensuring that the information produced is aligned with business requirements and can be acted upon to produce value for the company.

- Information is delivered in the form of KPI's, reports, charts, dashboards or scorecards, etc., or in the form of analytics.

- Data mining is a practice used to increase the body of knowledge.

- Applied analytics is generally used to drive action and produce outcomes.

Answer a Quick Question

Is BI only for managers?

Who is BI for?

It is a misnomer to believe that BI is only for managers or the executive class. True, it is used more often by them. But does that mean that BI can be used only for management and control? Thus, the answer is: NO!
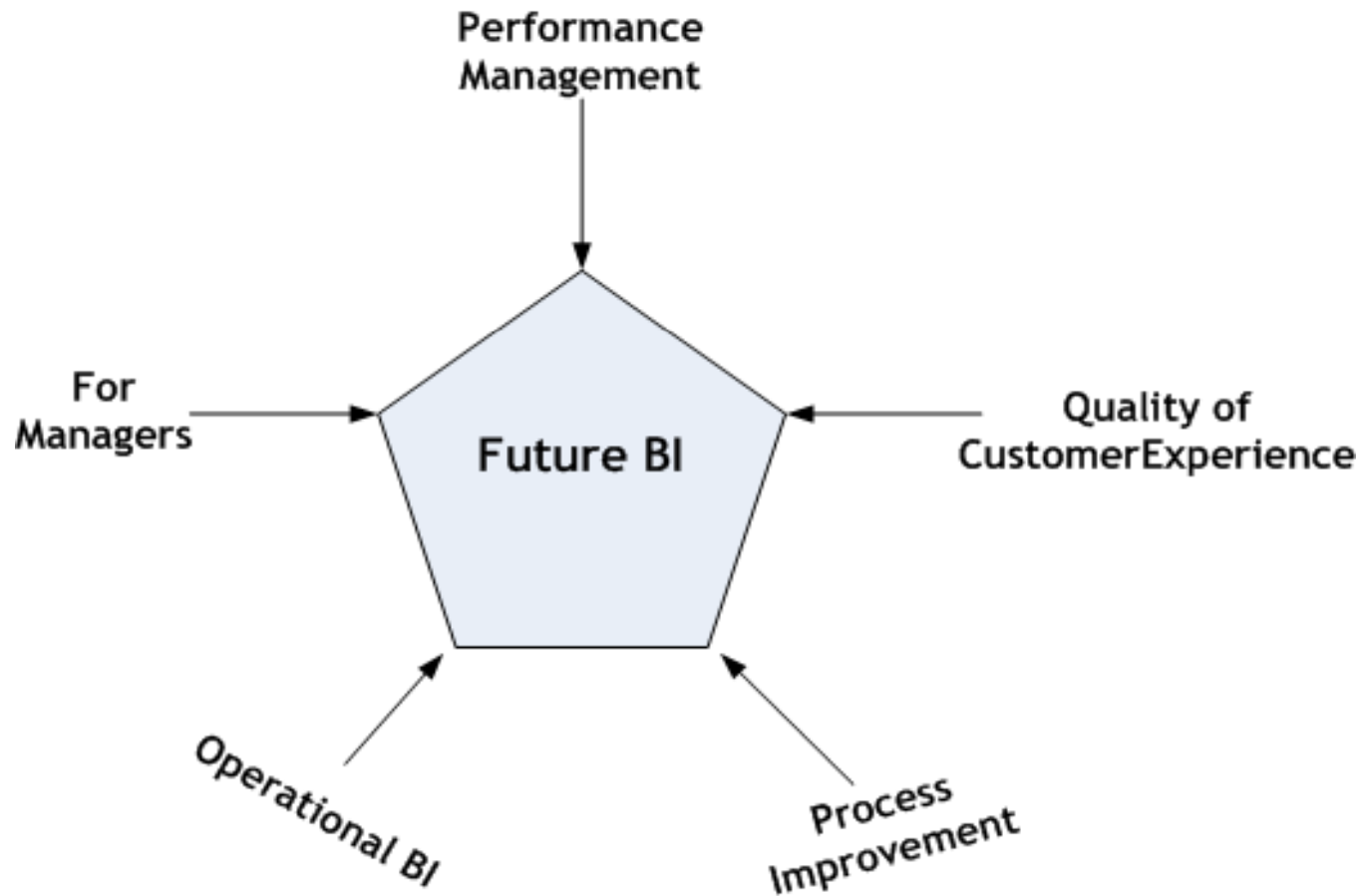
Types of BI Users

Type of user	Casual users/ Information consumers	Power users/Information producers
Example of such users	Executives, managers, customers, suppliers, field/operation workers, etc.	SAS, SPSS developers, administrators, business analysts, analytical modelers, IT professionals, etc.
Usage	Information consumers	Information producers
Data Access	Tailor made to suit the needs of their respective role	Ad hoc/exploratory
Tools	Pre-defined reports/dashboards	Advanced Analytical/ Authoring tools
Sources	Data warehouse/Data Marts	Data Warehouse/Data Marts (both internal and external)

BI Applications

BI applications can be divided into:

- **Technology solutions**
    - DSS
    - EIS
    - OLAP
    - Managed Query and Reporting
    - Data Mining
- **Business Solutions**
    - Performance Analysis
    - Customer Analysis
    - Market Place Analysis
    - Productivity Analysis
    - Sales Channel Analysis
    - Behavioral Analysis
    - Supply Chain Analysis

BI Roles and Responsibilities

Program Roles	Project Roles
	Business Manager
BI Program Manager	BI Business Specialist
BI Data Architect	BI Project Manager
BI ETL Architect	Business Requirements Analyst
BI Technical Architect	Decision Support Analyst
Metadata Manager	BI Designer
BI Administrator	ETL Specialist
	Data Administrator

BI DW Best Practices

The list of best practices is adapted from an article TDWI's FlashPoint e-newsletter of April 10, 2003.

- Practice "User First" Design
- Create New Value
- Attend to Human Impacts
- Focus on Information and Analytics
- Practice Active Data Stewardship
- Manage BI as a long term investment
- Reach out with BI/DW solutions
- Make BI a business Initiative
- Measure Results
- Attend to strategic Positioning

Do It exercise

Visit **www.tdwi.org** to read more about BI DW best practices

Open Source BI Tools

RDBMS	MySQL, Firebird
ETL Tools	Pentaho Data Integration (formerly called Kettle), SpagoBI
Analysis Tools	Weka, RapidMiner, SpagoBI
Reporting Tools/Ad Hoc Querying/Visualization	Pentaho, BIRT, Actuate, Jaspersoft

Popular BI Tools

	AB INITIO 3.0.2			SPOTFIRE (TIBCO) 3.2.x
	INFORMATICA 9			SAS 9.2
NCR TERADATA 13		MICROSTRATEGY 9		

MICROSOFT				
SQL SERVER 2008	SSIS 2008	SSRS 2008		SSAS 2008

SAP		SAP		
SYBASE IQ		BUSINESS OBJECTS 5.x		

ORACLE				
ORACLE 11G R2	ORACLE WAREHOUSE BUILDER	SIEBEL 8.1		HYPERION 11.1.3

IBM				
NETEZZA 4.6, DB2	DATASTAGE 8.5	COGNOS v10		SPSS 9

	BIRT			
	PENTAHO			RAPIDMINER
MYSQL				WEKA

DBMS	ETL, DATA INTEGRATION	OLAP, DATA WAREHOUSING	REPORTING, AD HOC QUERYING	ANALYSIS	ANALYTICS, VISUALIZATION, MINING
Back End	BI Functions			Front End	