University of South-Eastern Norway

Practical Information on Business Intelligence and Data Warehousing (BID3000)

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Language

- The course is taught in English
- The final exam questions must be answered in English
- Assignment must be answered in English
- Questions via email or Canvas can be sent in English
- Oral questions during the lectures can be asked in English

Forms of Assessment

- Final assessment
  - Project home exam in groups:
    - counting 40 % of total grade
    - 14 days
    - all support materials are allowed
  - Individual written school exam:
    - counting 60 % of total grade
    - duration 4 hours
    - NO support material in school exam

End

Any questions?

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Lecture 1: Introduction to Business Intelligence

Veralia Gabriela Sánchez

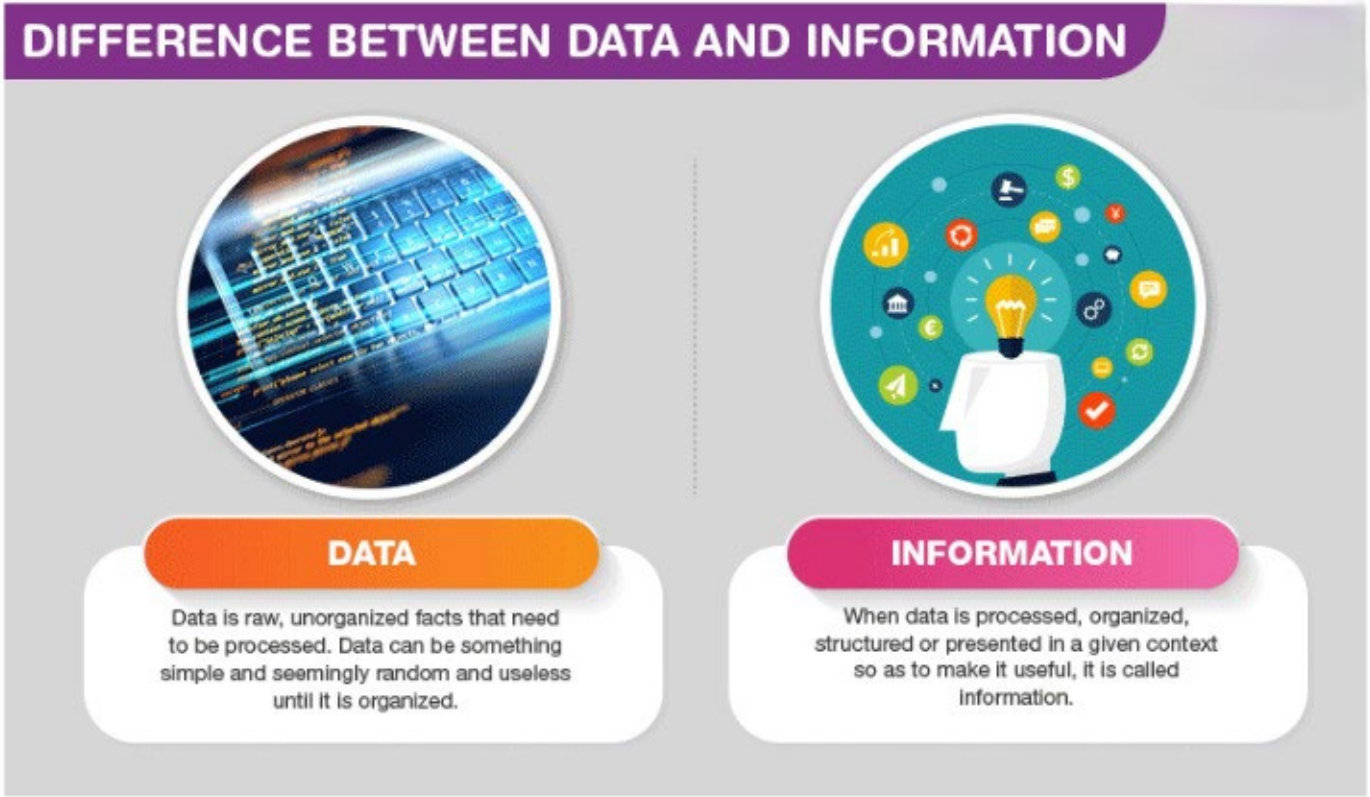
Course: Business Intelligence and Data Warehousing (BID3000)

Outline

- Basic Business Intelligence (BI) Concepts
- BI Examples
- BI Architecture
- Business Decisions Types

Basic Business Intelligence Concepts

What is Data & Information?

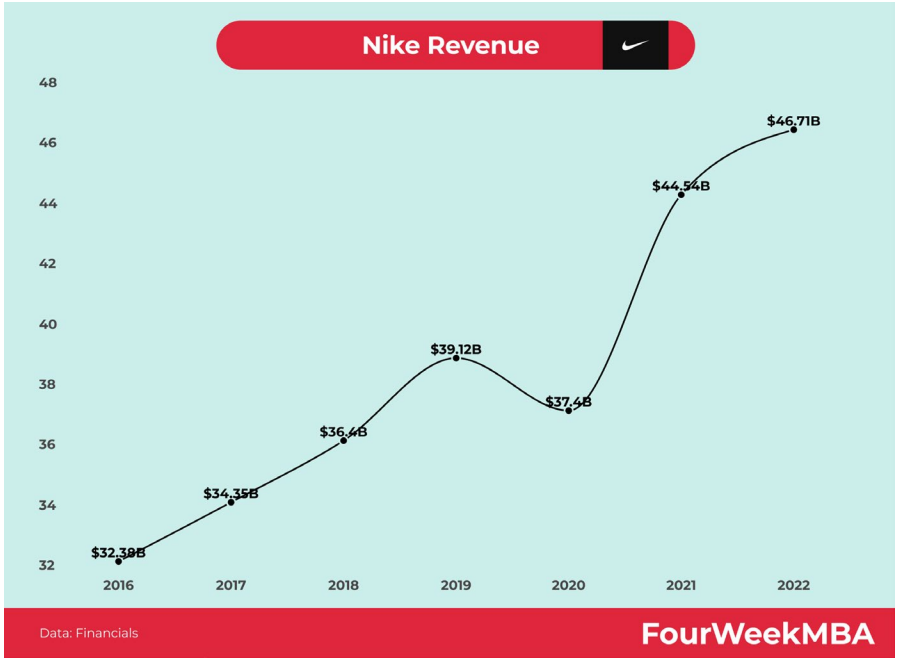


What is Data & Information?

- **Data (Revenue, Year)**
  - 32.38, 2016; 34.35, 2017; 36.4, 2018; 39.12, 2019; 37.4, 2020; 44.54, 2021; 46.71, 2022

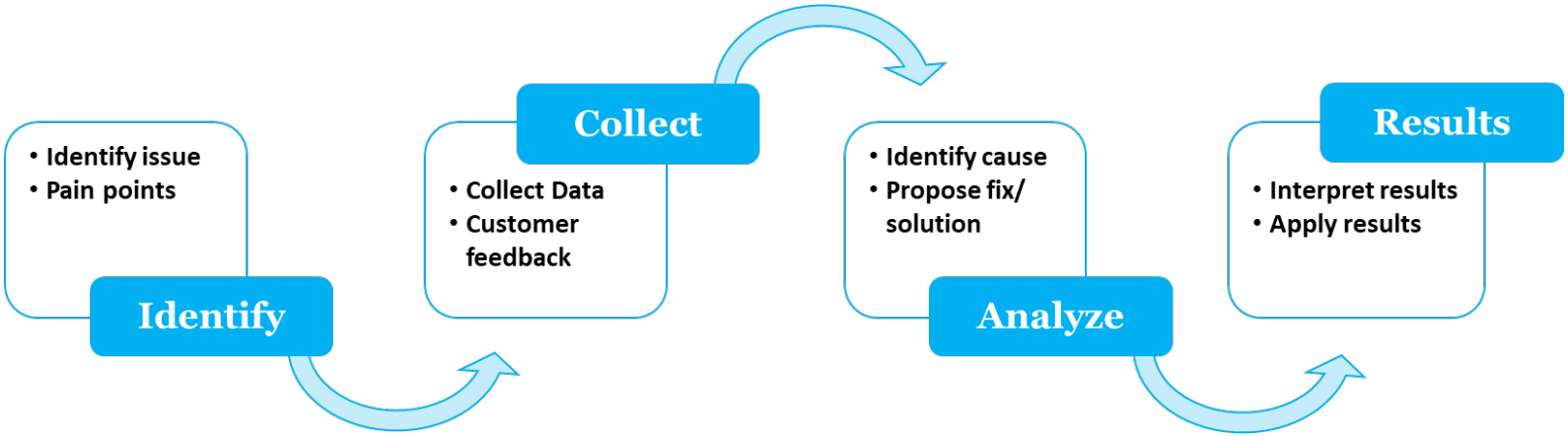
- **Information:**
  1. Revenue are growing
  2. From 2016 to 2019 the growth rate is around 7%
  3. The best revenue growth is realized in 2021 with a rate of 19%

Information



Data Analytics

- Process of examining data sets in order to find trends and draw conclusions about the information they contain.
- Data analytics technologies and techniques are widely used in commercial industries to enable organizations to make more-informed business decisions.



What is BI?

- Business Intelligence (BI) is the set of tools used to collect **raw data** and transform it into **useful insights**.
- BI allows you to collect data from different sources (multiple databases, excel files, etc.), organize it, and then perform the **analytics**.
- BI provides companies with the most balanced view of the business.
- **Definition:**
  - BI is a combination of tools, technologies, applications, and practices that help businesses in collecting, integrating, analyzing, and presenting raw data into insightful and actionable business information.

What is BI?

- The Data Warehousing Institute defines BI as the processes, technologies, and tools needed to turn data into information, information into knowledge, and knowledge into plans that drives profitable business action.
- BI is an umbrella term that encompasses data warehousing, analytical tools, and applications.
  - These are leveraged to create business intelligence.
  - The BI process is based on the transformation of the data, to information, then to decisions, and finally to action.
  - BI is the outcome from this blending process.

How are BI Systems Implemented?

- **Step 1)** Raw Data from corporate databases is extracted. The data could be spread across multiple systems heterogeneous systems.
- **Step 2)** The data is cleaned and transformed into the data warehouse. The table can be linked, and data cubes are formed.
- **Step 3)** Using BI system the user can ask queries, request ad-hoc reports or conduct any other analysis.

What is the Purpose of BI?

- The major purpose that Business Intelligence serves for a business is helping the corporate executives (CEO, CTO, business managers and other operational heads) take better **data-driven business decisions**.

- Many companies are using BI for cost-cutting, identifying better business opportunities, and spotting inefficient business processes.

What are the Benefits of Using of BI?

- The major benefits of business intelligence are the following:
  - Accelerating decision-making process
  - Optimizing internal business processes
  - Increasing the operational efficiency
  - Increasing revenues
  - Gaining competitive advantages
  - Identifying the market trends
  - Spotting addressable business problems

BI Examples

Example 1

- A hotel manager uses BI analytical applications to gather statistical information regarding average occupancy and room rate.
- It helps to find aggregate revenue generated per room.
- It also collects statistics on market share and data from customer surveys from each hotel to decides its competitive position in various markets.
- By analyzing these trends year by year, month by month and day by day, the manger can choose the best strategy for offering discounts on room rentals.

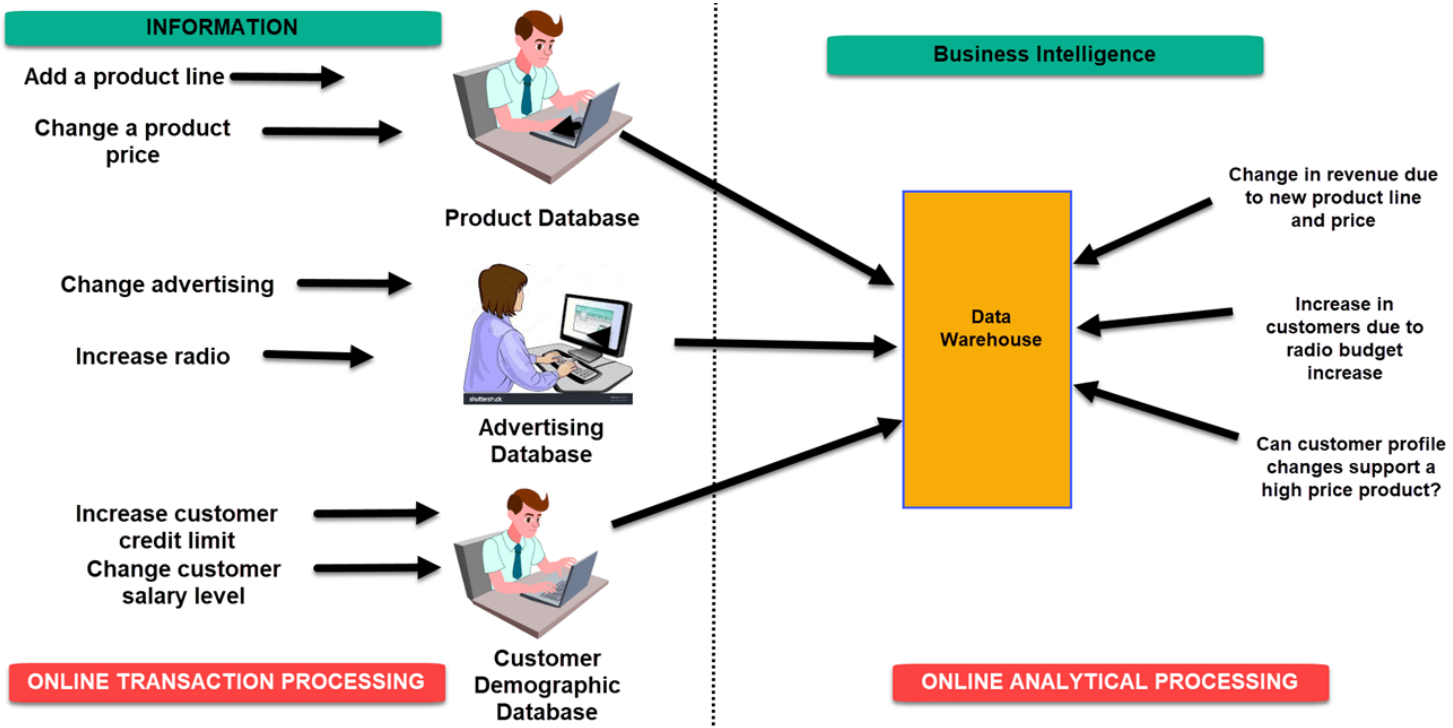
Example 2

- A bank gives branch managers access to BI applications.
- It helps branch manager to determine who are the most profitable customers and which customers they should work on.
- The use of BI tools frees information technology staff from the task of generating analytical reports for the departments.
- The use of BI tools gives department personnel access to a richer data source.

Example 3

- In an Online Transaction Processing (OLTP) system information that could be fed into product database could be
  - add a product line
  - change a product price
- Correspondingly, in a Business Intelligence system the query that would be executed would be how much revenues increased due to
  - the addition of new product line
  - and/or the change in products prices

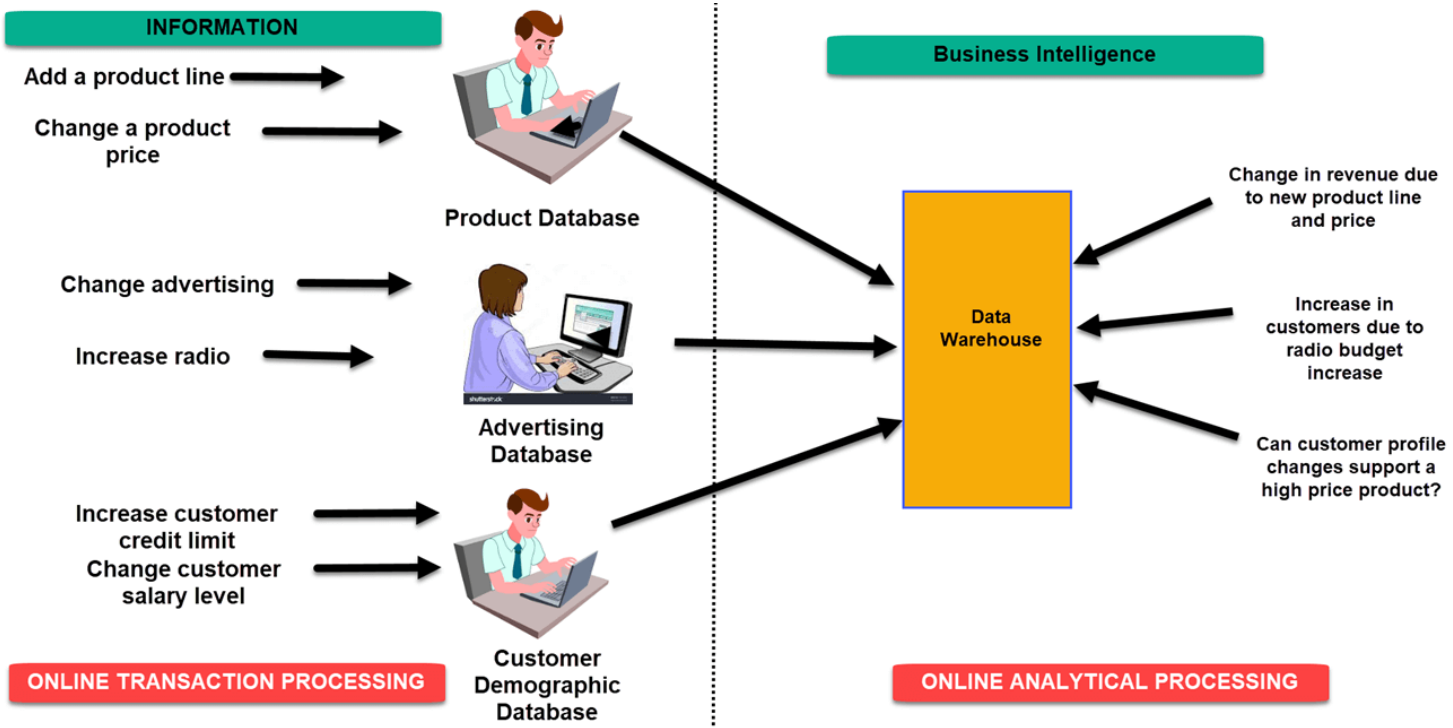
Example 3


INFORMATION
Add a product line
Change a product price
Product Database
Change advertising
Increase radio
Advertising Database
Increase customer credit limit
Change customer salary level
Customer Demographic Database
ONLINE TRANSACTION PROCESSING
Business Intelligence
Data Warehouse
Change in revenue due to new product line and price
Increase in customers due to radio budget increase
Can customer profile changes support a high price product?
ONLINE ANALYTICAL PROCESSING

Example 3

- In an advertising database of OLTP system query that could be executed
  - Change in advertisement options
  - Increase of radio budget
- Correspondingly, in BI system the query that could be executed would be:
  - How many new clients were added due to change in radio budget?

Example 3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ONLINE ANALYTICAL PROCESSING

Example 3

- In OLTP system dealing with customer demographic databases, the data that could be fed would be
  - increase customer credit limit
  - change in customer salary level
- Correspondingly in the OLAP system query that could be executed would be:
  - Can customer profile changes support higher product price?

Types of BI users

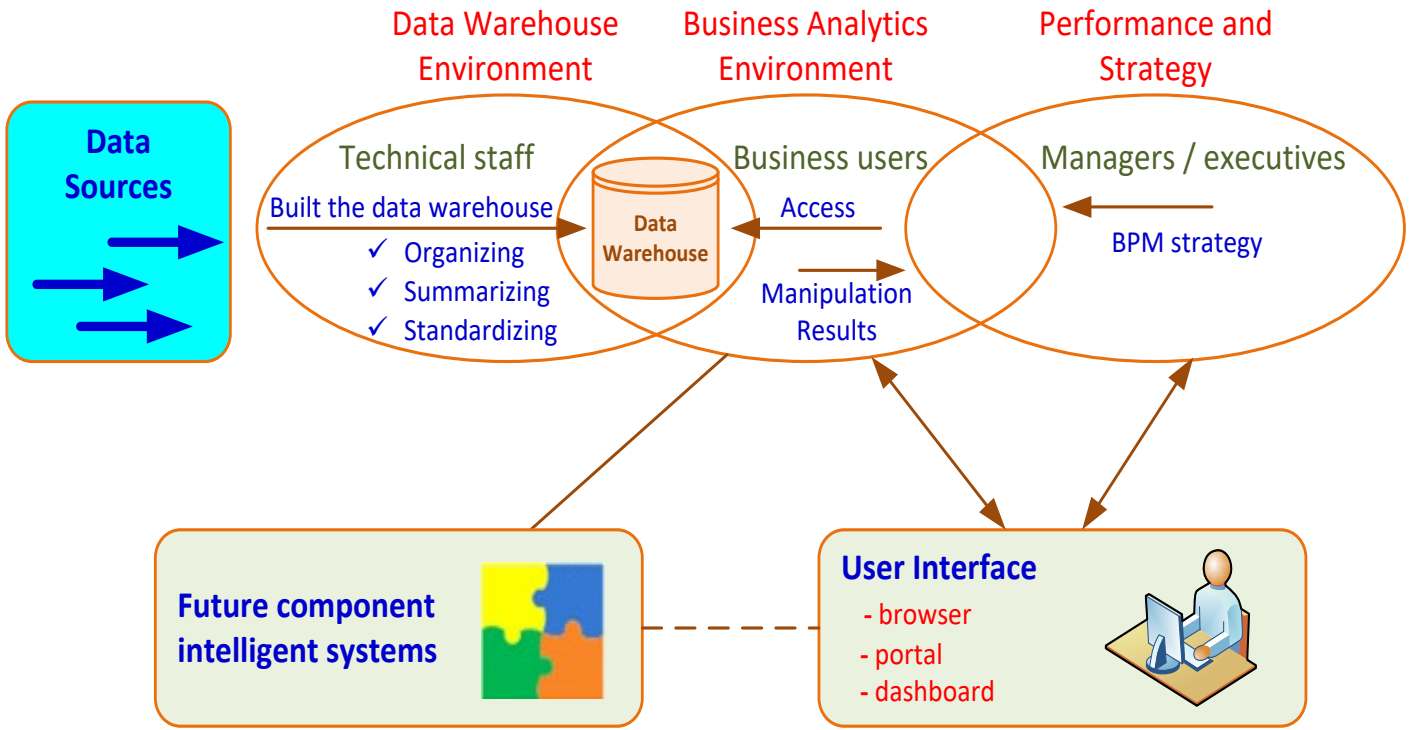
- There are four key players who use the Business Intelligence System:
- **1. The Professional Data Analyst:**
  - The data analyst is a statistician who always needs to drill deep down into data.
  - BI system helps them to get fresh insights to develop unique business strategies.
- **2. The IT users:**
  - The IT user also plays a dominant role in maintaining the BI infrastructure.

Types of BI users

- **3. The head of the company:**
  - CEO can increase the profit of their business by improving operational efficiency in their business.
- **4. The Business Users:**
  - Business intelligence users can be found across the organization.

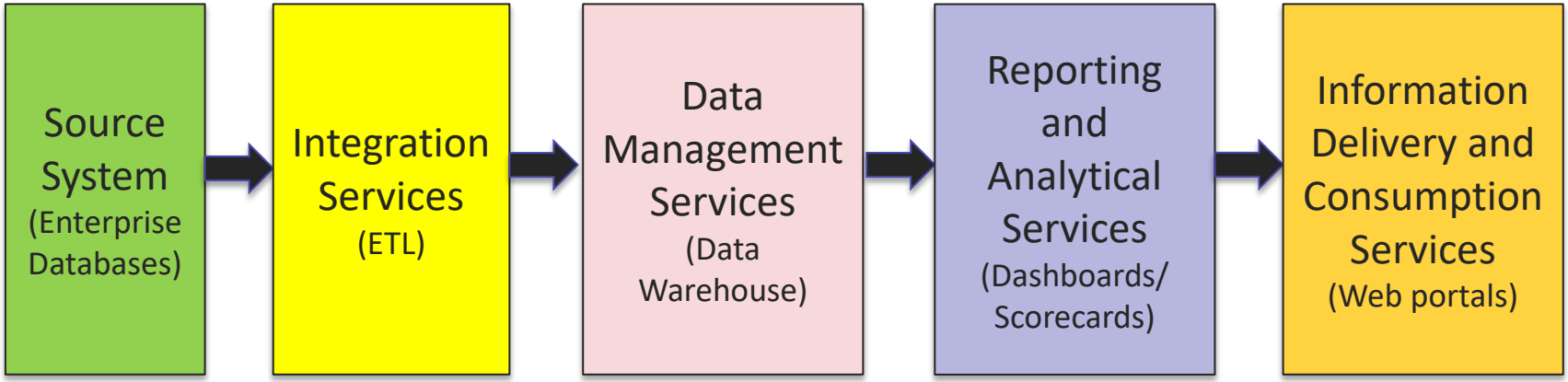
BI Architecture

A High-Level BI Architecture

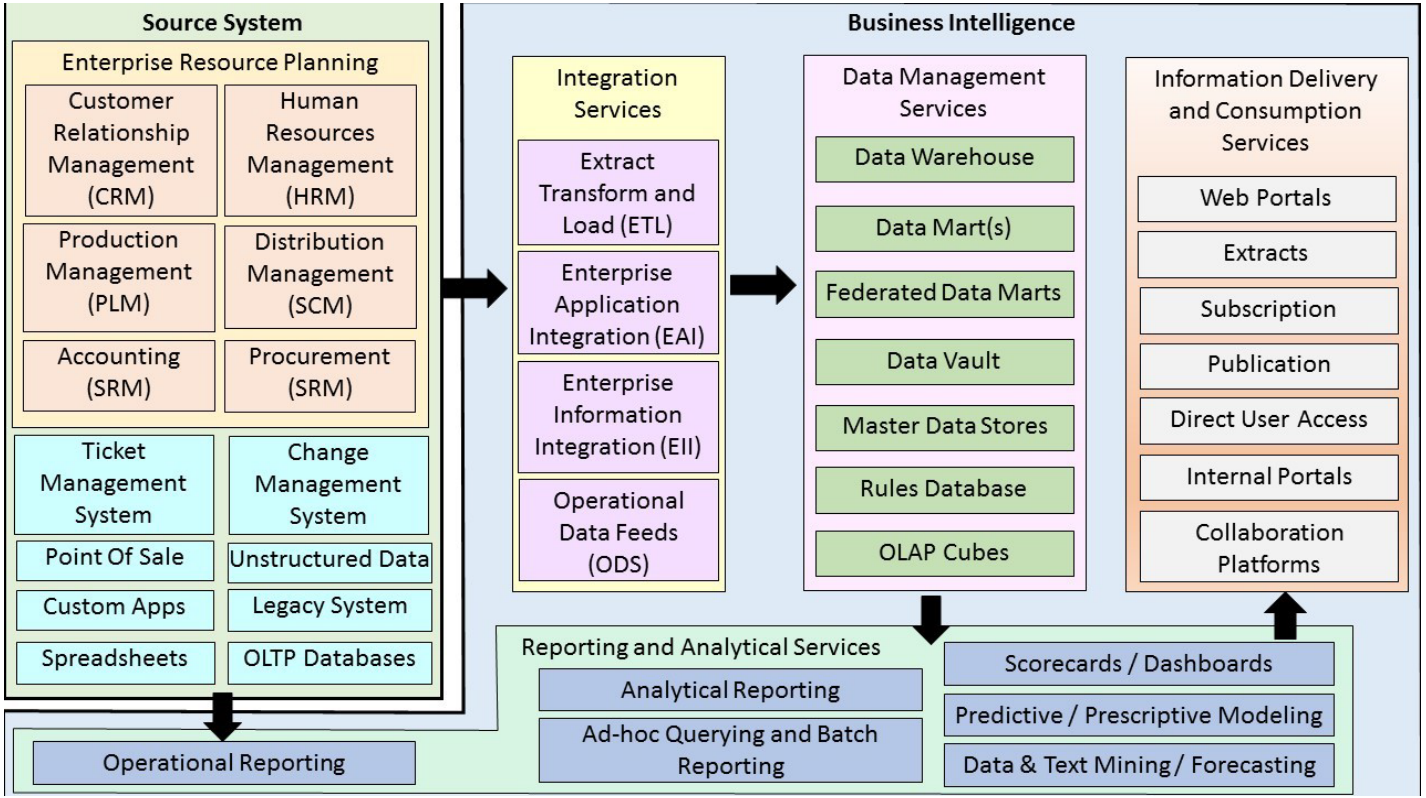


BI Architecture

- BI architecture varies in each enterprise but there are some common components of BI architecture, which are found in all BI solutions.
- The component of a BI architecture is driven by the goals and requirements of your enterprise.



Detailed level BI Architecture



Source Systems

- There are **many** possible **data sources** – (Enterprise Resource Planning (ERP), Ticket management system, Change management system, point of sale, legacy system, unstructured data, etc.)
- The data can be generated by **many platforms** – IBM, Oracle, Microsoft, Sybase, SAS
- The data can have **many formats** – Relational, Hierarchical, Multi-dimensional, Big data MapReduce Databases, Unstructured text data

BI Services Components

- ***Integration Services*** (ETL, Operational Data Feeds, Enterprise Application Integration, Enterprise Information Integration)
- ***Data Management Services*** (data warehouse, data marts, federated data marts, OLAP cubes, etc.)
- ***Reporting and Analytical Services*** (Analytical Reporting, ad-hoc query and batch reporting, dashboards/scorecards, predictive and prescriptive modeling, data & text mining/forecasting)
- ***Information Delivery and Consumption Services*** (Web portals, subscription, direct user access, internal portals, etc.)

Business Decision Types

Business Decision Types

- Business intelligence systems are used for decision making.
- Business decisions can be categorized into three main types:
  - Strategic Decisions
  - Tactical Decisions
  - Operational Decisions

Strategic Decisions

- Strategic decisions are major choices of actions and influence whole or a major part of business enterprise.
- They contribute directly to the achievement of common goals of the enterprise.
- They have long-term implications on the business enterprise.
- They may involve major departures from practices and procedures being followed earlier.
- Generally, strategic decision is unstructured and thus, a manager must apply his business judgement, evaluation and intuition into the definition of the problem.

Strategic Decisions

- Strategic decisions are based on partial knowledge of the environmental factors which are uncertain and dynamic.
- Strategic decisions are taken at the higher level of management.
- **Example of strategic decision:**
  - Identify new markets
  - choose store locations.

Tactical Decisions

- Tactical decisions relate to the implementation of strategic decisions.
- Focus on analyzing short-term initiatives within specific line-of-business domains, such as marketing, sales, purchasing or customer service.
- Tactical decisions are directed towards
  - developing divisional plans,
  - structuring workflows,
  - establishing distribution channels,
  - acquisition of resources such as employees, materials and money.

Tactical Decisions

- These decisions are taken at the middle level of management.
- Progress is measured against a preset goal, such as a budget or a certain target.
- **Example of tactical decision:**
  - Choose suppliers,
  - forecast sales.

Operational Decisions

- Operational decisions relate to day-to-day operations of the enterprise.
- They have a short-term horizon as they are taken repetitively.
- These decisions are based on facts regarding the events and do not require much of business judgement.
- Operational decisions are taken at lower levels of management.
- **Example of operational decision:**
  - Resolve order delays,
  - schedule employees.

BI Business Value

- BI can add value to:
  - Management Processes:
    - Planning budgeting, performance monitoring/assessment, process improvement, cost analysis, optimization, etc.
  - Revenue Generating Processes:
    - Customer segmentation, campaign management, channel management, sales management, etc.
  - Resource Consumption Processes:
    - Product/service development, order management, manufacturing/operations, supply chain, purchasing, etc.