

Introduction to Business Intelligence and Analytics

Introduction to Business Intelligence (BI) & Analytics
Key concepts, components, and practical takeaways

1. What Is Business Intelligence?

Aspect	Description
Definition	The process of collecting, integrating, analyzing, and presenting business data to support better decision-making.
Goal	Turn raw data into actionable insights that improve performance, reduce risk, and create competitive advantage.
Scope	Includes data warehousing, reporting, dashboards, data visualization, and performance monitoring.
Audience	Executives, managers, analysts, and operational staff who need data-driven answers.

2. What Is Business Analytics?

Dimension	Explanation
Descriptive Analytics	“What happened?” – Summarizes past events (e.g., sales totals, churn rates).
Diagnostic Analytics	“Why did it happen?” – Explores root causes using drill-downs, correlation analysis, and statistical tests.
Predictive Analytics	“What will happen?” – Uses statistical models, machine learning, and forecasting to estimate future outcomes.
Prescriptive Analytics	“What should we do?” – Recommends actions through optimization, simulation, and decision-support algorithms.

Business Intelligence mainly covers descriptive and diagnostic analytics, while *Business Analytics* extends into predictive and prescriptive techniques.

3. Core Components of a BI System

Introduction to Business Intelligence and Analytics

1. Data Sources

- Transactional systems (ERP, CRM, POS)
- External feeds (social media, market data)
- Log files, IoT sensors

2. Data Integration / ETL

- **Extract** data from source systems.
- **Transform** (cleanse, standardize, enrich).
- **Load** into a centralized repository.

3. Data Storage

- **Data Warehouse** – Structured, subject-oriented, historical data.
- **Data Lake** – Raw, semi-structured or unstructured data for advanced analytics.
- **Data Mart** – Department-specific subsets for faster access.

4. Data Modeling

- Star schema, snowflake schema, dimensional modeling.
- Fact tables (measures) + dimension tables (attributes).

5. Analytics & Reporting Layer

- OLAP cubes, ad-hoc query tools, statistical packages.

6. Visualization & Presentation

- Dashboards, scorecards, interactive charts, storytelling visualizations.

7. Governance & Security

- Data quality rules, metadata management, access controls, compliance (GDPR, CCPA).

4. Typical BI Workflow

Introduction to Business Intelligence and Analytics

Data Sources ? ETL ? Data Warehouse/Lake ? Data Modeling ?

?? Reporting (static reports, scheduled PDFs)

?? Analytics (dashboards, self-service queries, advanced models)
?

Decision Support ? Action ? Feedback loop ? Data Sources

5. Key Technologies & Tools

Category	Popular Solutions
Data Integration	Talend, Informatica, Microsoft SSIS, Apache NiFi
Data Warehousing	Snowflake, Amazon Redshift, Google BigQuery, Microsoft Azure Synapse
Data Lakes	Hadoop HDFS, Amazon S3 + AWS Lake Formation, Azure Data Lake
Reporting & Dashboards	Tableau, Power BI, Qlik Sense, Looker
Advanced Analytics	Python (pandas, scikit)