Parul® University

DATA ANALYTICS AND DATA VISUALIZATION

Asst.Prof. Sachin Jaiswal,
Computer Science & Engineering

DATA ANALYTICS AND DATA VISUALIZATION

Parul® University

DIGITAL LEARNING CONTENT

CHAPTER-1

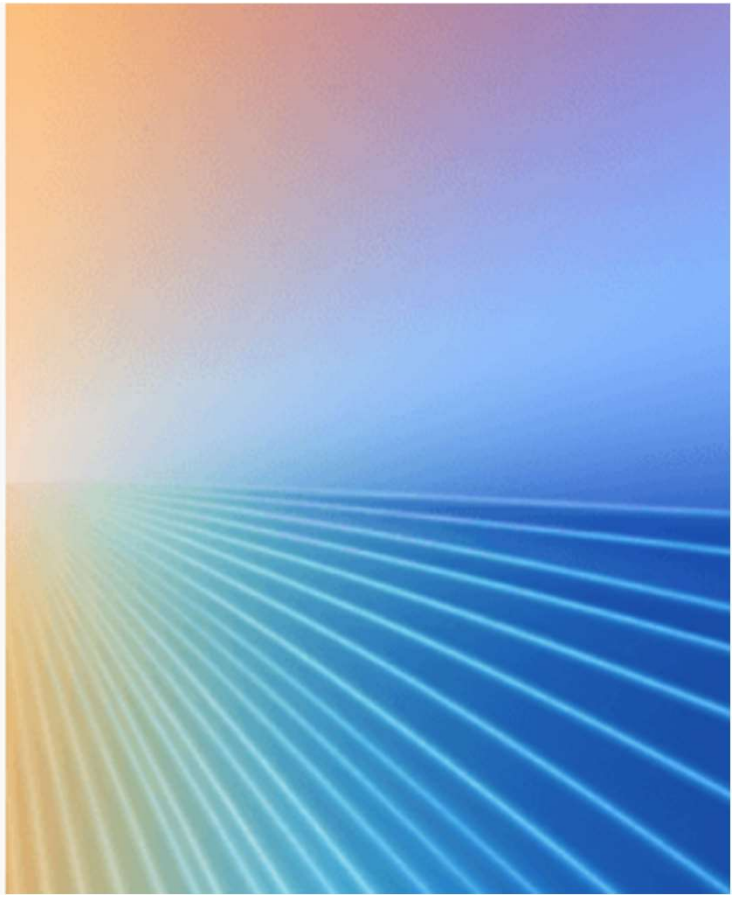
INTRODUCTION TO DATA ANALYTICS

Introduction to Data Analytics:

Introduction, Data and its importance, Data analytics and its types, Why data analytics is important, Data analysis Vs Data analytics, Classification of data analytics, Elements of Data analytics, Data analyst Vs. Data scientist

CONTENT

Content



INTRODUCTION TO DATA ANALYTICS

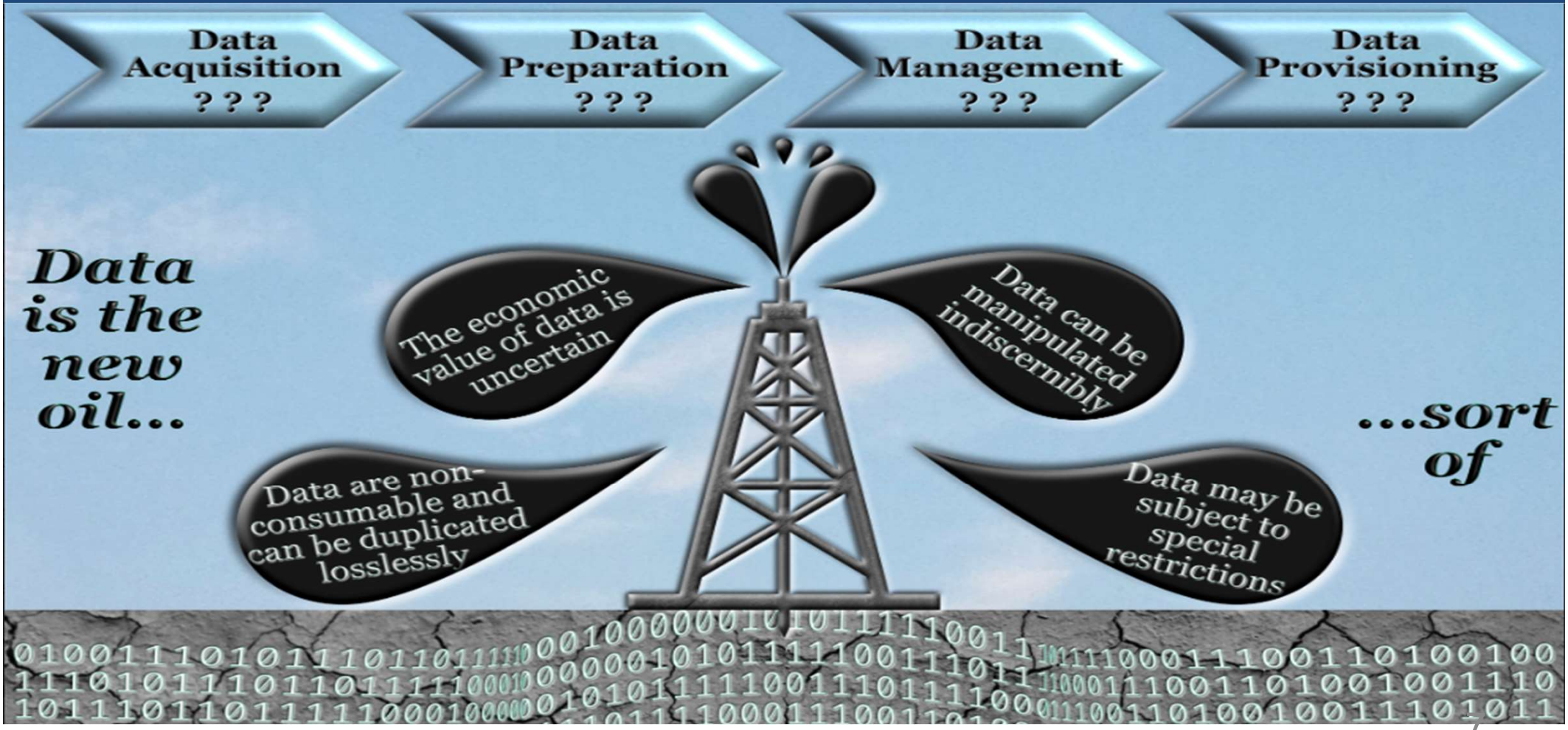
Section 1

Introduction to Data Analytics

Data - The New Oil

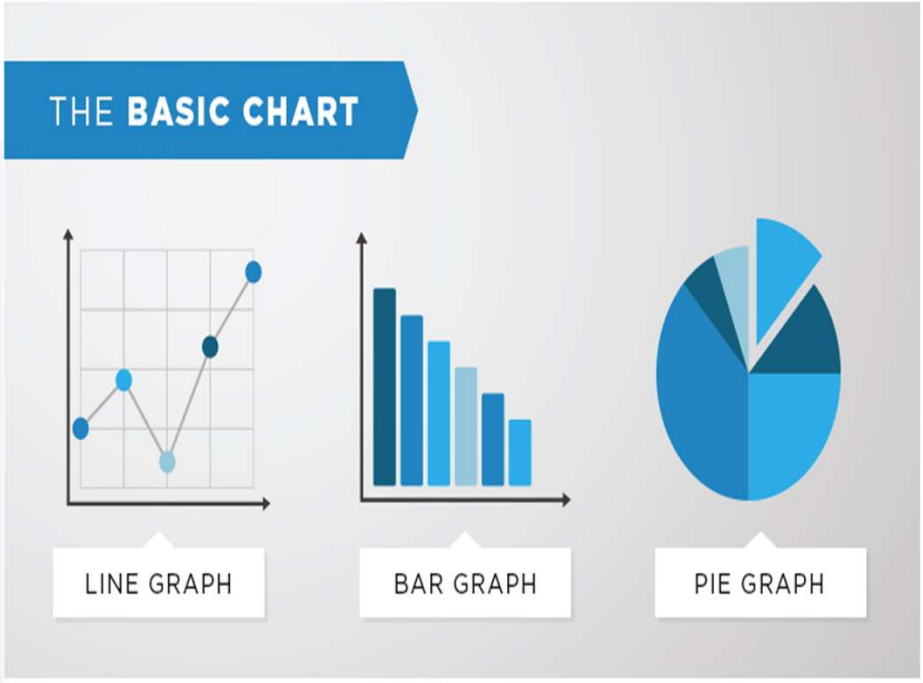
- Data is a crucial asset in today's digital age.
- It encompasses raw facts, statistics, and details collected for reference or analysis.
- Data generation sources: social media, IoT devices, online transactions.

Data - The New Oil



The Importance of Data (Informed Decision-Making)

- Businesses use data analytics to understand market trends, customer behavior, and operational efficiency.
- Strategic decisions based on data enhance performance and competitiveness.



The Importance of Data (Innovation and Development)

- Data fuels innovation by providing insights that lead to new products, services, and technologies.
- In healthcare, data from patient records, clinical trials, and genomic research drives advancements in personalized medicine.
- Big data analytics can improve healthcare outcomes by predicting disease outbreaks and personalizing treatment plans.

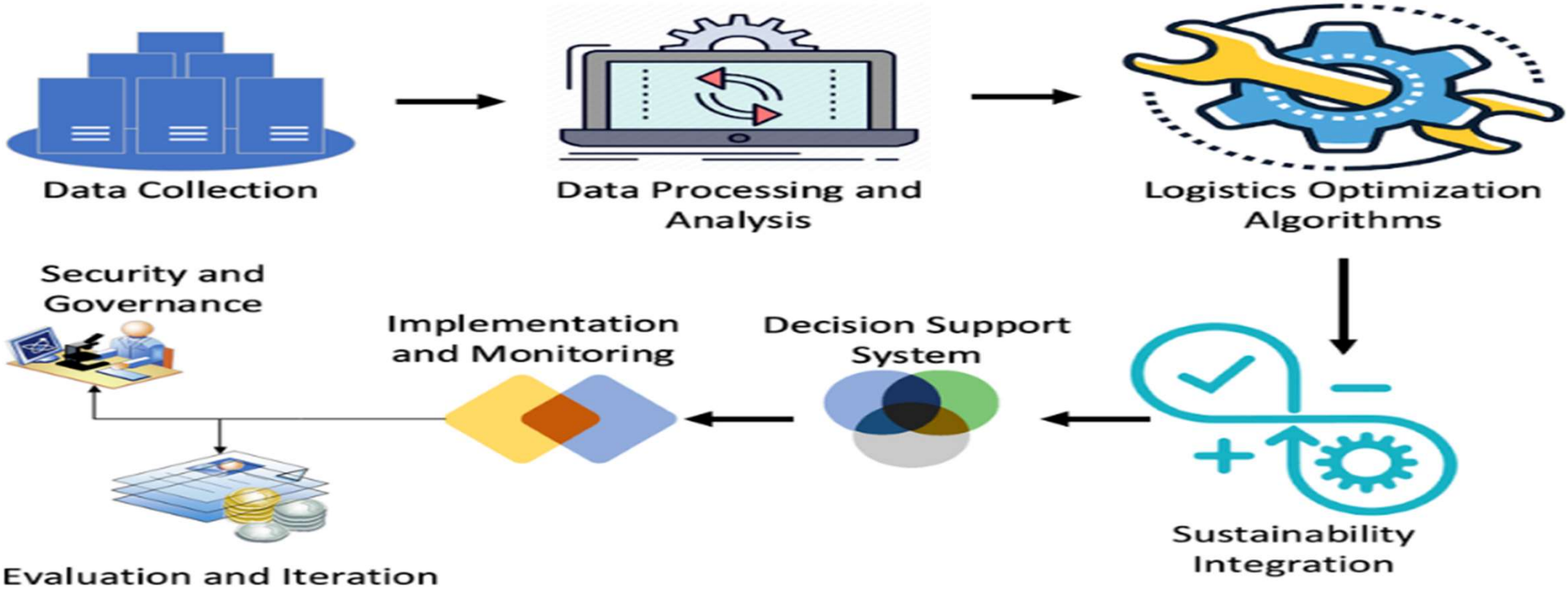
Illustration of data in healthcare (e.g., patient data, research data)

The Importance of Data - Efficiency and Optimization

Organizations leverage data to streamline processes and optimize operations.

- By analyzing data, companies can identify bottlenecks, reduce waste, and improve resource allocation.
- Particularly evident in supply chain management, where data helps predict demand, manage inventory, and reduce costs.
- **Deloitte Research:** Companies using data analytics to drive their supply chains can achieve 10% higher efficiency.

Diagram showing data-driven supply chain optimization



Architecture of big data-driven sustainable logistics optimization methodology

The Importance of Data (Personalization and Customer Experience)

Data enables businesses to offer personalized experiences to their customers.

- By analyzing customer data, companies can tailor products, services, and marketing efforts to individual preferences and behaviors.
- Enhances customer satisfaction and loyalty.
- **Accenture Survey:** 91% of consumers are more likely to shop with brands that provide relevant offers and recommendations.

- Infographic showing personalized customer experience.

Data Analytics:

- Data analytics is the process of converting raw data into actionable insights.
- It involves a range of tools, technologies, and processes.
- The goal is to find trends and solve problems by leveraging data.
- Data analytics has the potential to shape business processes.
- It can also improve decision-making within organizations.
- Ultimately, data analytics contributes to business growth.

Data Analytics of Stock Market

Why is data analytics important?

- Data analytics is essential in today's digital age.
- It transforms how businesses operate, make decisions, and interact with customers.
- Applications span across multiple domains, driving efficiency, innovation, and competitive advantage.

Visibility and Understanding

- Data analytics enables companies to gain deeper visibility into their processes and services.
- Provides a comprehensive understanding of operations and performance.
- Helps identify areas of improvement and potential issues before they escalate.

Insights into Customer Experience

- Companies obtain detailed insights into the customer experience through data analytics.
- Identifies potential customer problems and areas for improvement. - Enhances customer satisfaction by addressing issues proactively.

- -

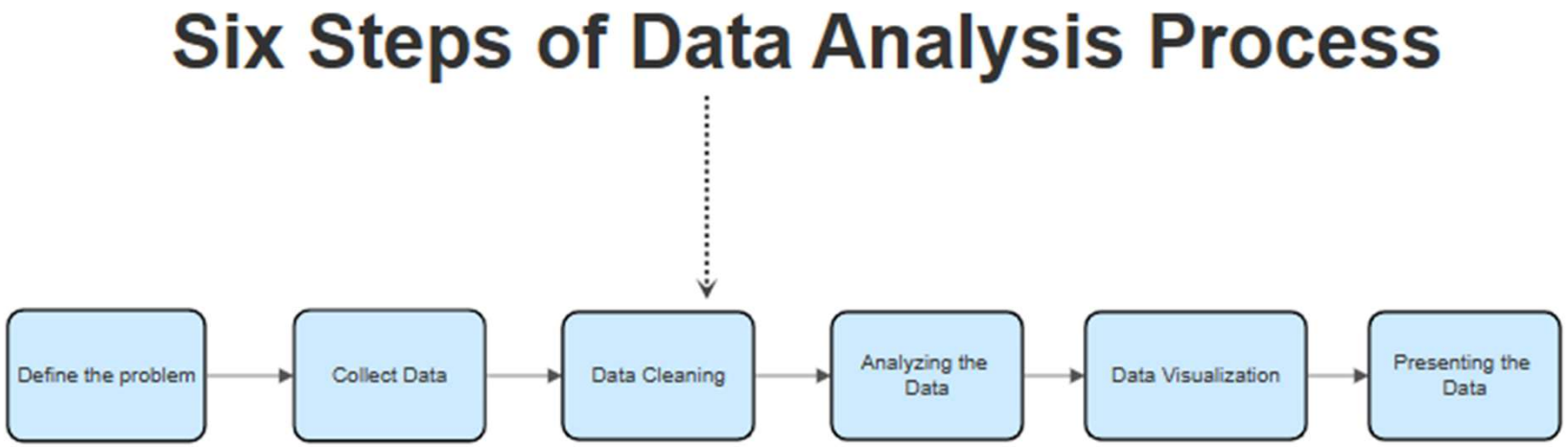
Infographic showing customer insights

- Infographic showing customer insights and experience improvement.

Connecting Insights with Action

Beyond just analyzing data, companies can connect insights to actionable steps.

- Enables the creation of personalized experiences for customers.
- Drives the development of relevant digital products and services.
- Leads to operational efficiency and boosts employee productivity.



Applications of Data Analytics

Healthcare
Finance
E-commerce
Cybersecurity
Supply Chain Management
Banking
Logistics
Retail
Internet Searching
Risk Management

Data Analytics Applications

Data Analytics Applications

TYPES OF DATA ANALYTICS

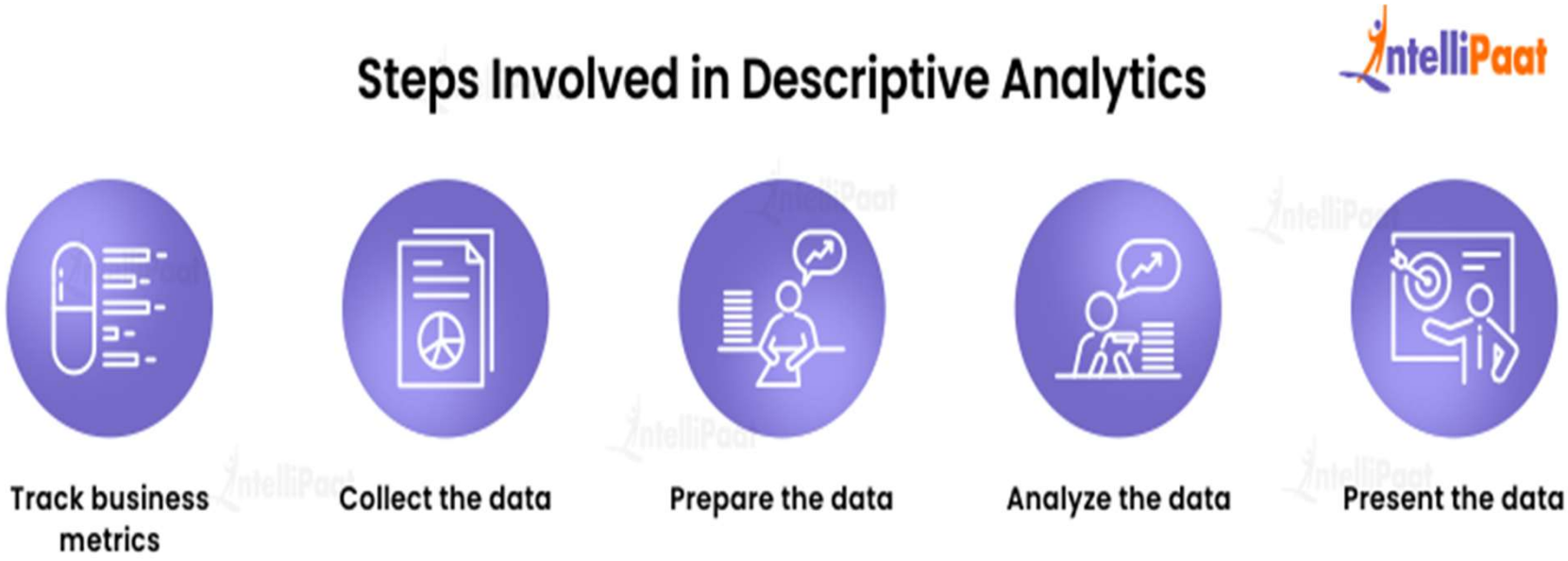
- **Descriptive Analytics:** Summarizes past data (e.g., monthly sales reports).

- **Diagnostic Analytics:** Explains reasons behind past outcomes (e.g., sales decline analysis).

- **Predictive Analytics:** Forecasts future events (e.g., sales forecasting).

- **Prescriptive Analytics:** Recommends actions to achieve specific outcomes
- (e.g., supply chain optimization).

Descriptive Analytics



Diagnostic Analytics

Predictive Analytics

Prescriptive Analytics


What happened
What will happen
How can we make it happen
Descriptive Analytics
Predictive Analytics
Prescriptive Analytics

Difference between Data Analytics and Data Analysis

Data Analytics	Data Analysis
It is described as a traditional form or generic form of analytics.	It is described as a particularized form of analytics.
It includes several stages like the collection of data and then the inspection of business data is done.	To process data, firstly raw data is defined in a meaningful manner, then data cleaning and conversion are done to get meaningful information from raw data.
It supports decision making by analyzing enterprise data.	It analyzes the data by focusing on insights into business data.
It uses various tools to process data such as Tableau, Python, Excel, etc.	It uses different tools to analyze data such as Rapid Miner, Open Refine, Node XL, KNIME, etc.
Descriptive analysis cannot be performed on this.	A Descriptive analysis can be performed on this.
One can find anonymous relations with the help of this.	One cannot find anonymous relations with the help of this.
It does not deal with inferential analysis.	It supports inferential analysis.

DATA ANONYMIZATION

- Data anonymization is the process of preserving private or confidential information by deleting or encoding identifiers that link individuals and the stored data.
- Data anonymization policies ensure that a company understands and enforces its duty to secure sensitive, personal, and confidential data.
- Gathering anonymous data and removing identities from the database would restrict the ability to extract private information from the results.

Inferential statistics is the practice of using sampled data to draw conclusions or make predictions about a larger sample data sample or population.

DIFFERENCE BETWEEN DATA SCIENTISTS AND ANALYSTS

•**Data Scientists** are generally focused on building advanced models and algorithms to predict future trends and derive actionable insights from complex data. They require strong programming skills and a deep understanding of machine Learning and statistics.

•**Data Analysts** primarily work on interpreting and reporting existing data to aid business decisions. Their role is more focused on data cleaning, visualization, and descriptive analytics, requiring proficiency in tools like SQL and Excel.

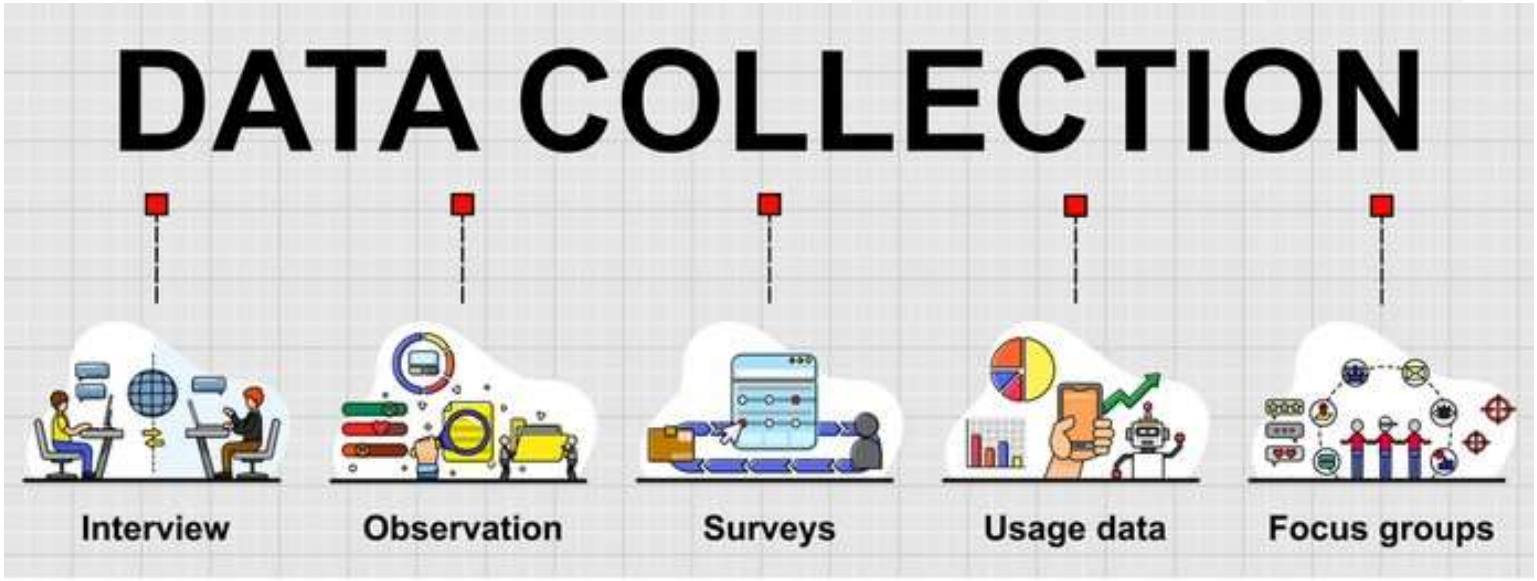
DIFFERENCE BETWEEN DATA SCIENTISTS AND ANALYSTS

5 Key Differences Between Data Science & Data Analytics

	DATA SCIENTISTS	DATA ANALYSTS
1	"Explore" data	"Cleanse" data
2	Focus on the future	Focus on what's happening now
3	Utilize machine learning & algorithms	Utilize coding languages (SQL, R, or Python)
4	Look for connections in information	Look for hypothesis validation in information
5	Lean on predictive modeling and analytics	Use broad statistical patterns and analysis

Elements of data analytics

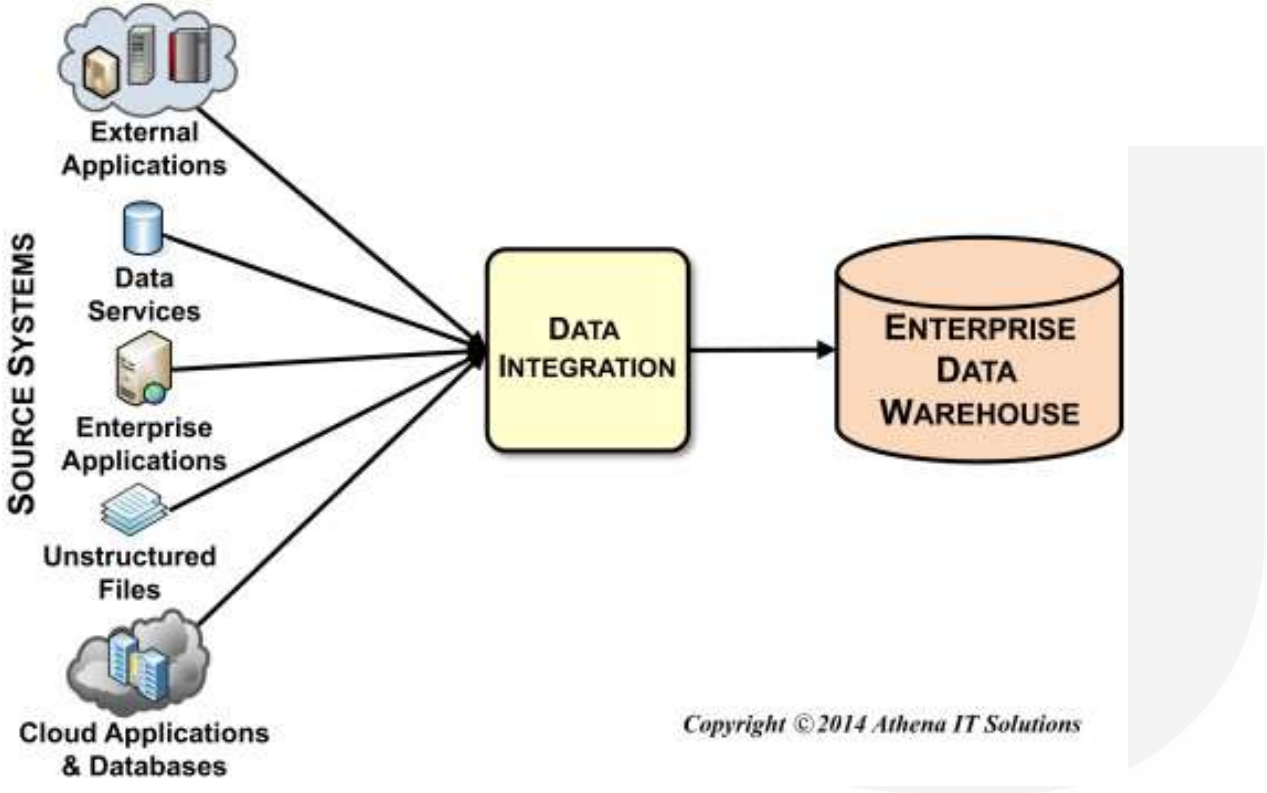
1. Data Collection



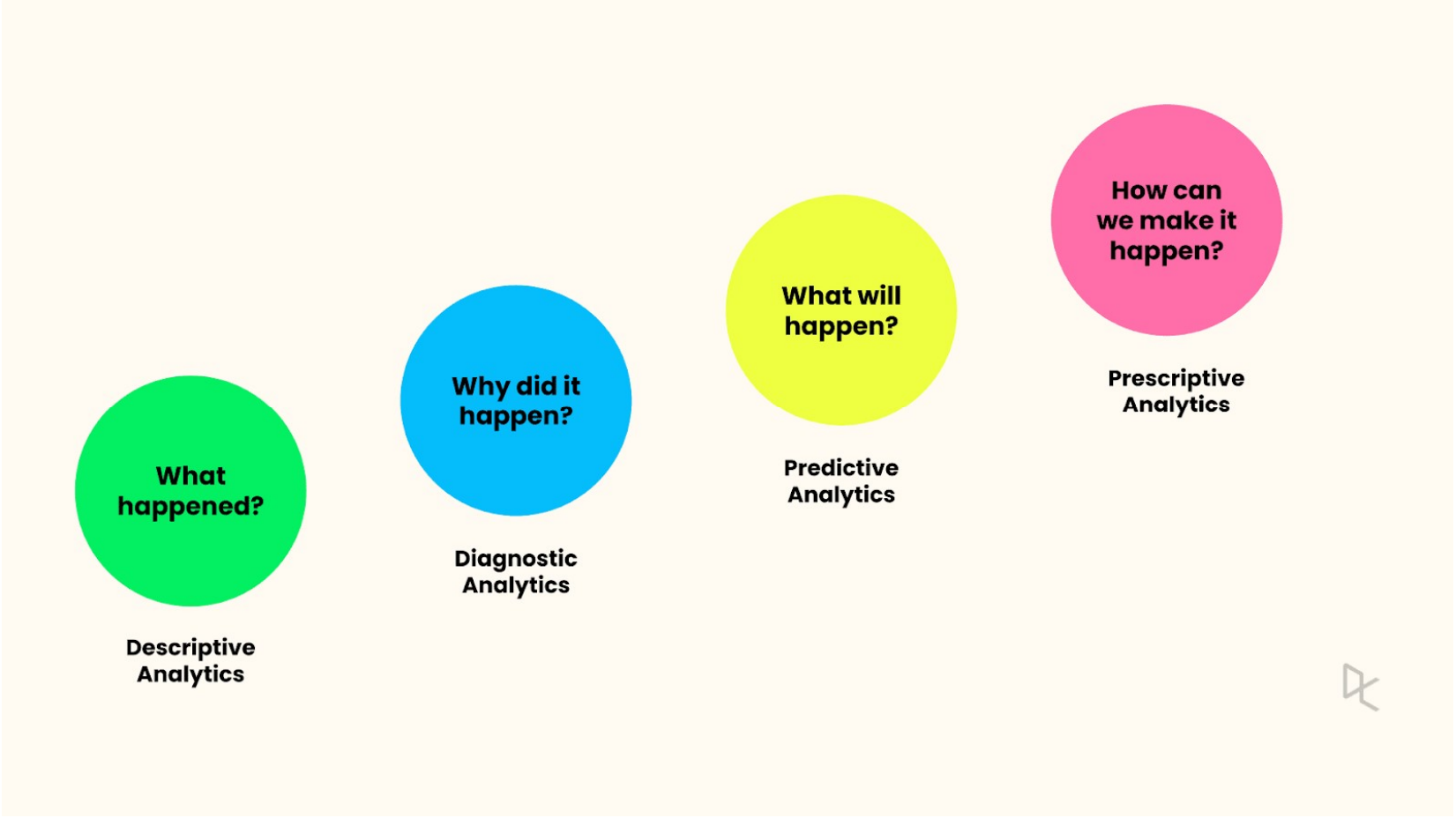
2. Data Cleaning

3. Data Transformation

4.DATA INTEGRATION



5. Data Analysis



6. Data Visualization

7.DATA INTERPRETATION

8. Data Governance and Security

THANK YOU