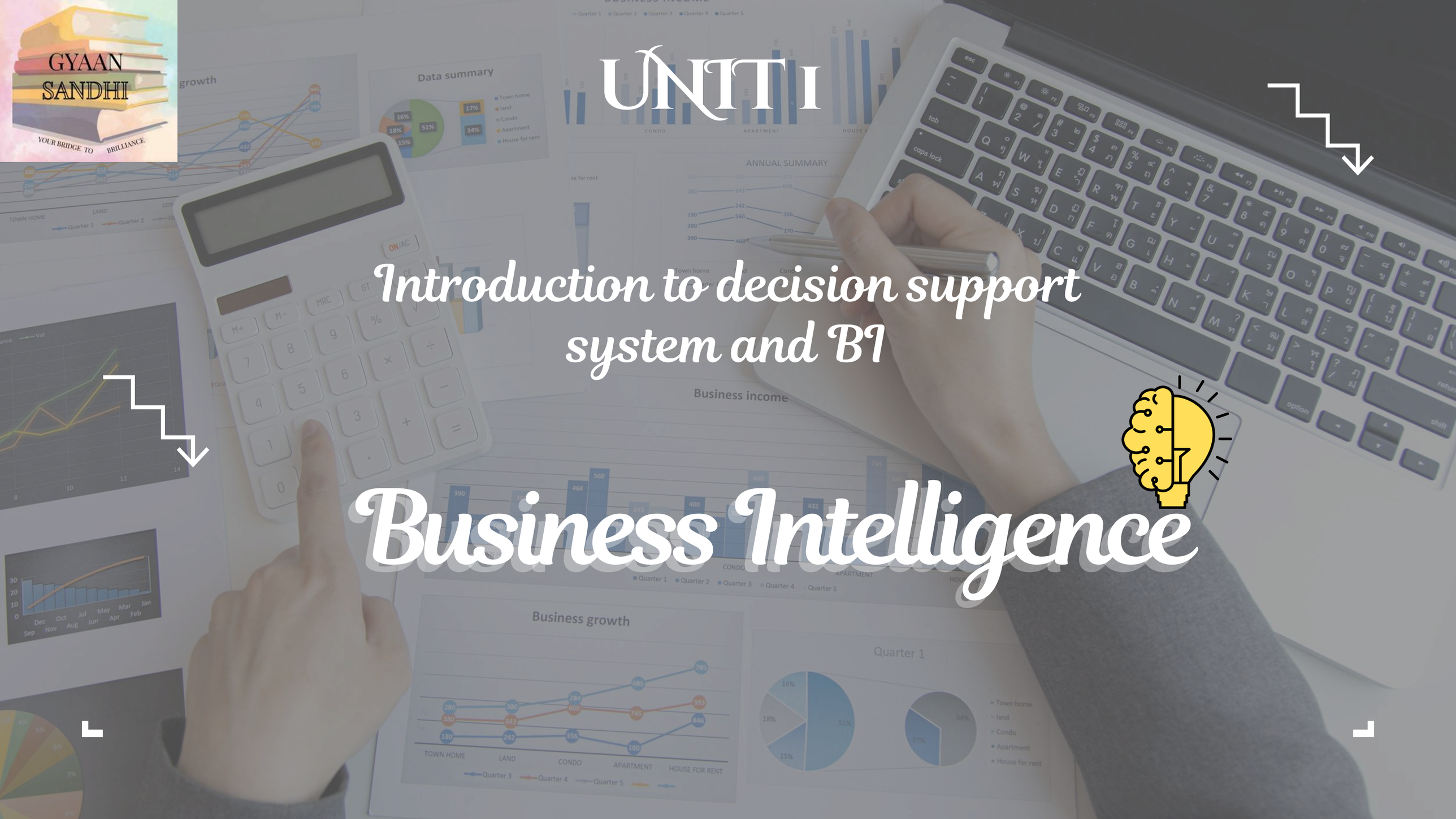


UNIT I

Introduction to decision support system and BI

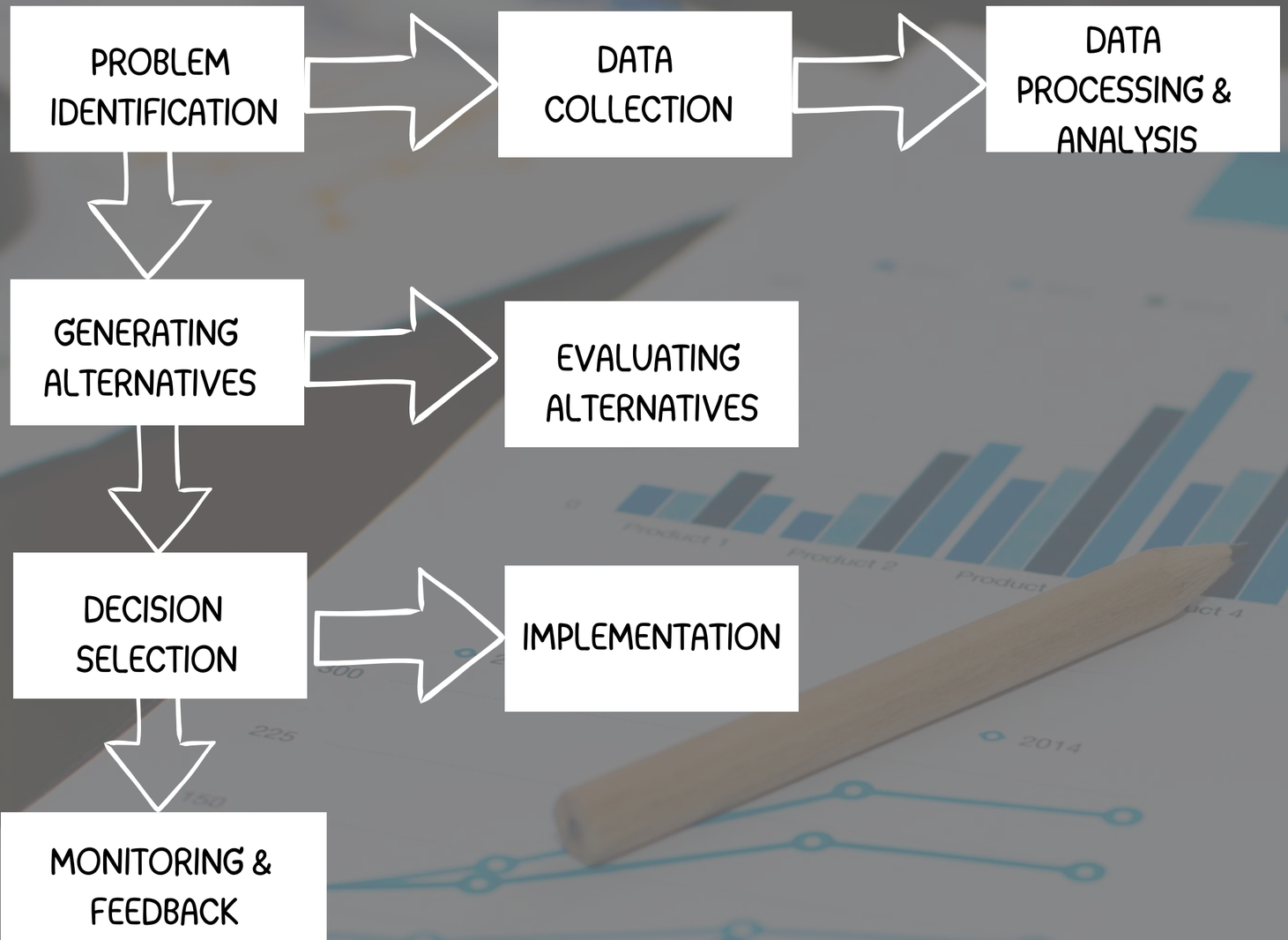
Business Intelligence

Decision-Making Process – Representation

- Decision-making is a structured method used to choose the most suitable action from several available options.
- It focuses on logical thinking and careful evaluation rather than random selection.
- The process begins with clearly recognizing the problem or situation that requires a decision.

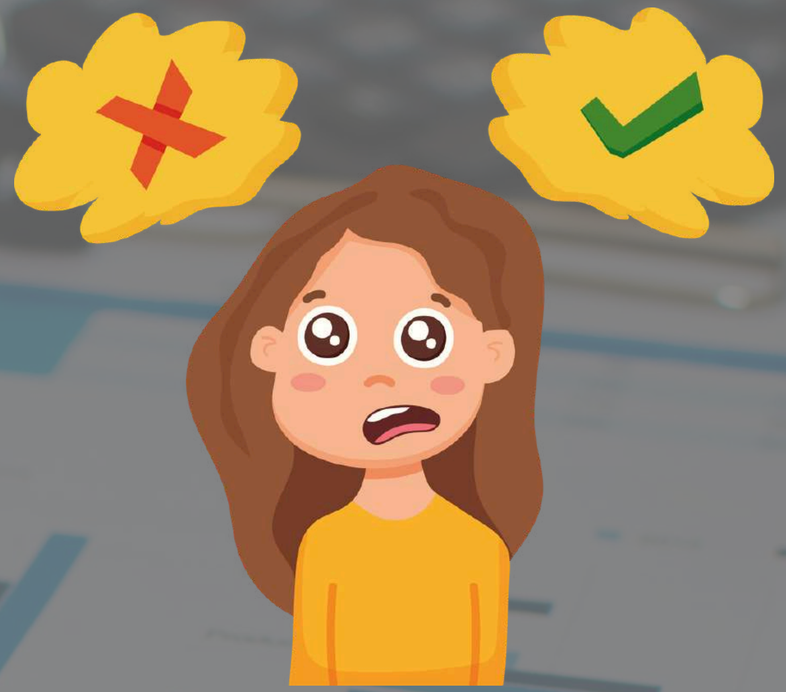
Decision-Making Process – Representation

- **Block Diagram**



Decision-Making Process – Representation

Steps in the Decision-Making Process



1. Problem Identification

- Understanding that a situation exists which requires a decision to be taken.

2. Information Gathering

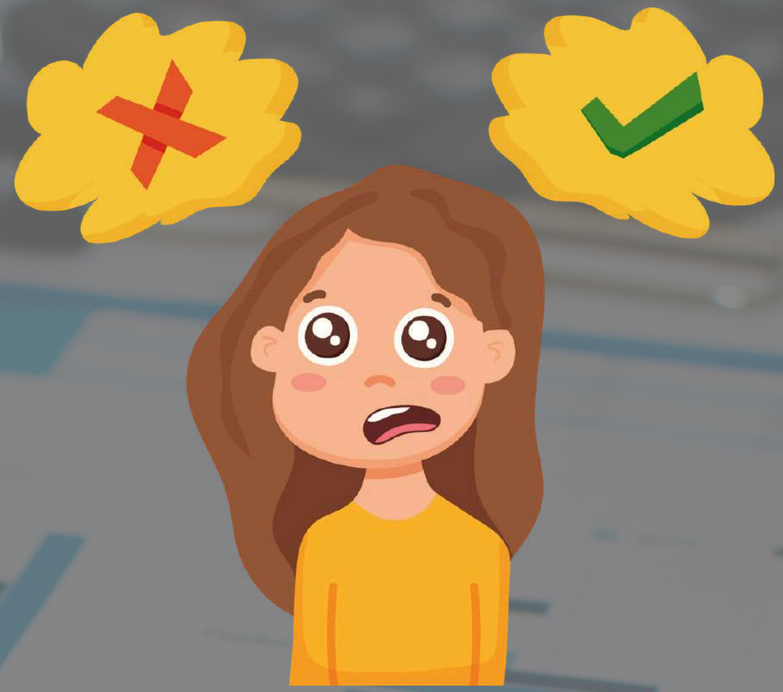
- Collecting accurate and useful data related to the problem for better clarity.

Decision-Making Process – Representation

3. Data Processing and Analysis
   - Organizing and examining the collected information to discover patterns and insights.

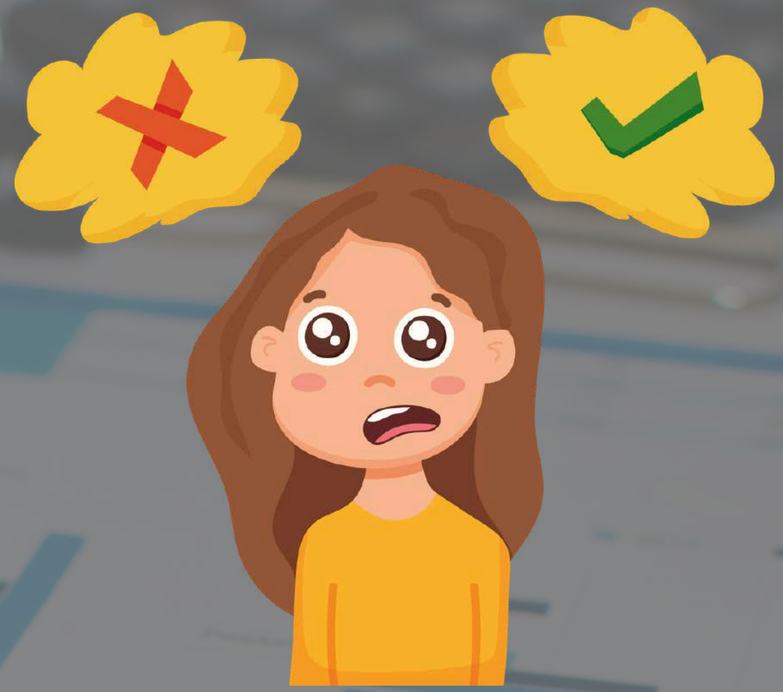
4. Developing Possible Options
   - Creating a list of feasible solutions or choices that can address the problem.

5. Assessing the Alternatives
   - Comparing each option using factors such as cost, feasibility, risk, and impact.



Decision-Making Process – Representation

6. Choosing the Best Option
   - Selecting the most suitable alternative based on detailed evaluation.



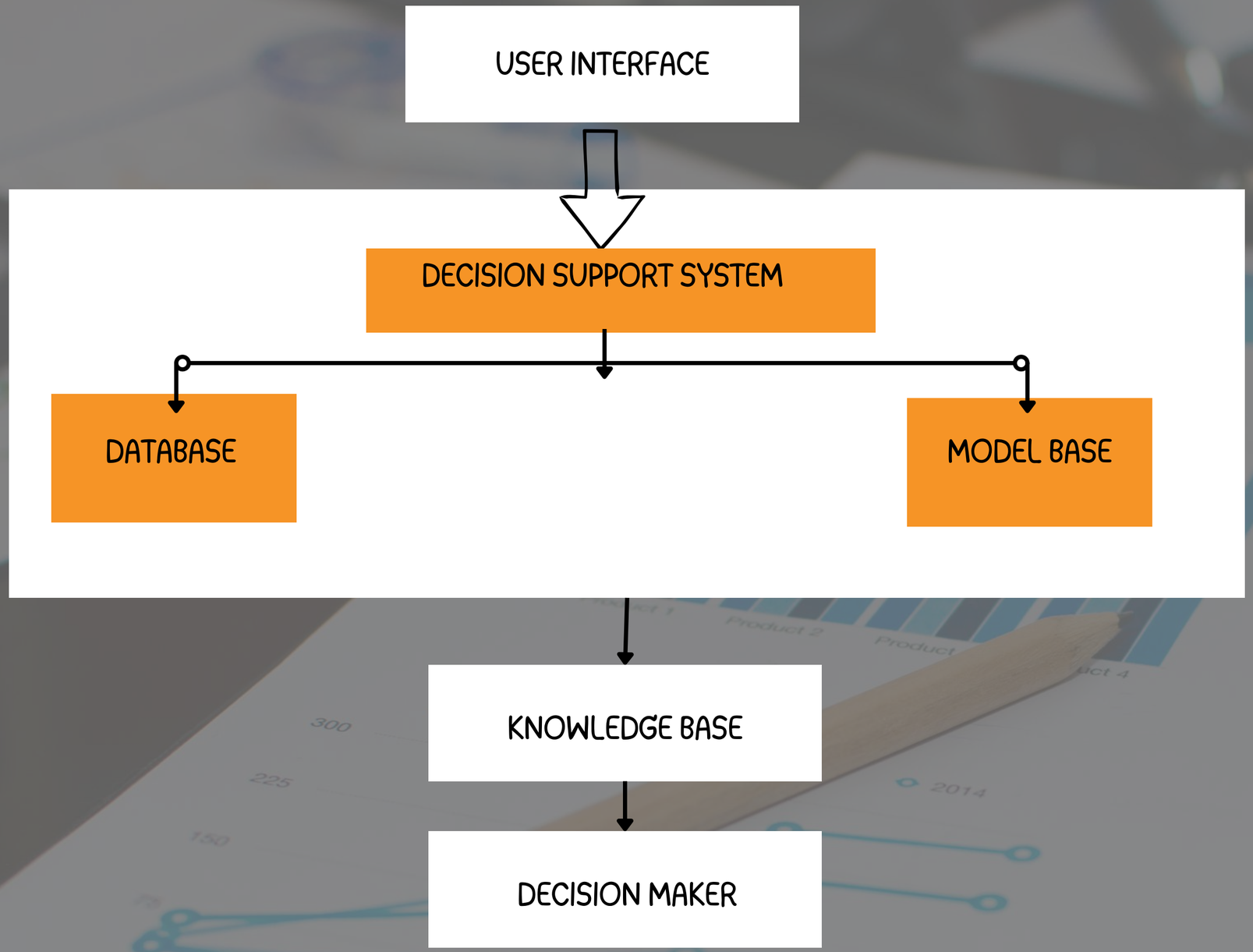
7. Executing the Decision
   - Putting the chosen solution into action in a planned manner.

8. Review and Feedback
   - Observing the results of the decision and making improvements if required.

Decision Support System (DSS)

- A Decision Support System is a computer-based tool designed to assist organizations in making better decisions.
- It helps users analyze large amounts of data and convert it into meaningful information.
- DSS supports complex decision-making by combining data, analytical models, and user inputs.
- The system provides insights, predictions, and suggestions rather than making decisions automatically.
- It improves decision quality, speed, and accuracy in business and management environments.

Components of a Decision Support System (DSS)



Components of a Decision Support System (DSS)

1. User Interface
   - Acts as the interaction point between the user and the system.
   - Includes dashboards, reports, charts, and visualization tools.

2. Decision Support Engine
   - Serves as the core processing unit of the system.
   - Applies analytical models and logic to process data.

3. Database (Data Source)
   - Stores structured and unstructured data required for analysis.

Components of a Decision Support System (DSS)

- Contains historical data as well as real-time information.

4. Model Base (Algorithms)

- Consists of mathematical, statistical, and machine learning models.
- Used to analyze data and simulate different decision scenarios.

5. Knowledge Base

- Holds expert knowledge, business rules, and decision guidelines.
- Enhances the intelligence and reliability of the system.

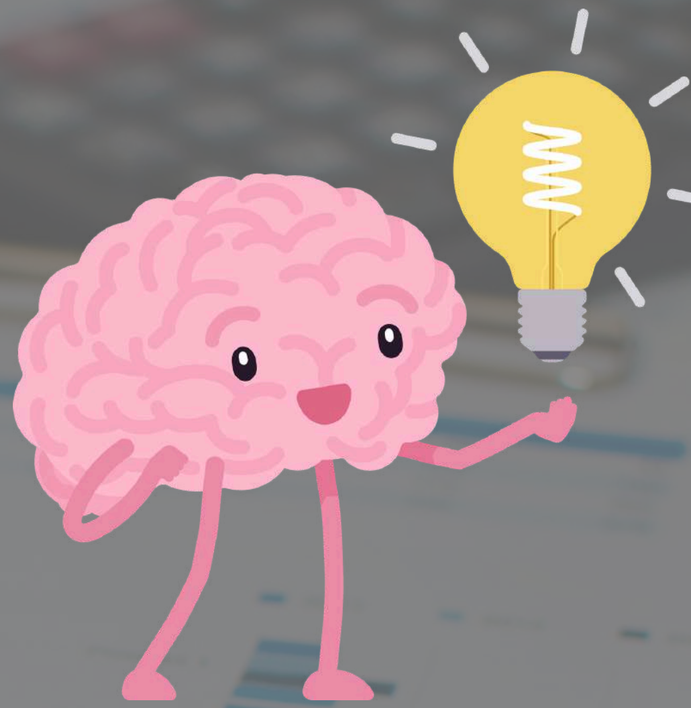
Components of a Decision Support System (DSS)

6. Decision Maker

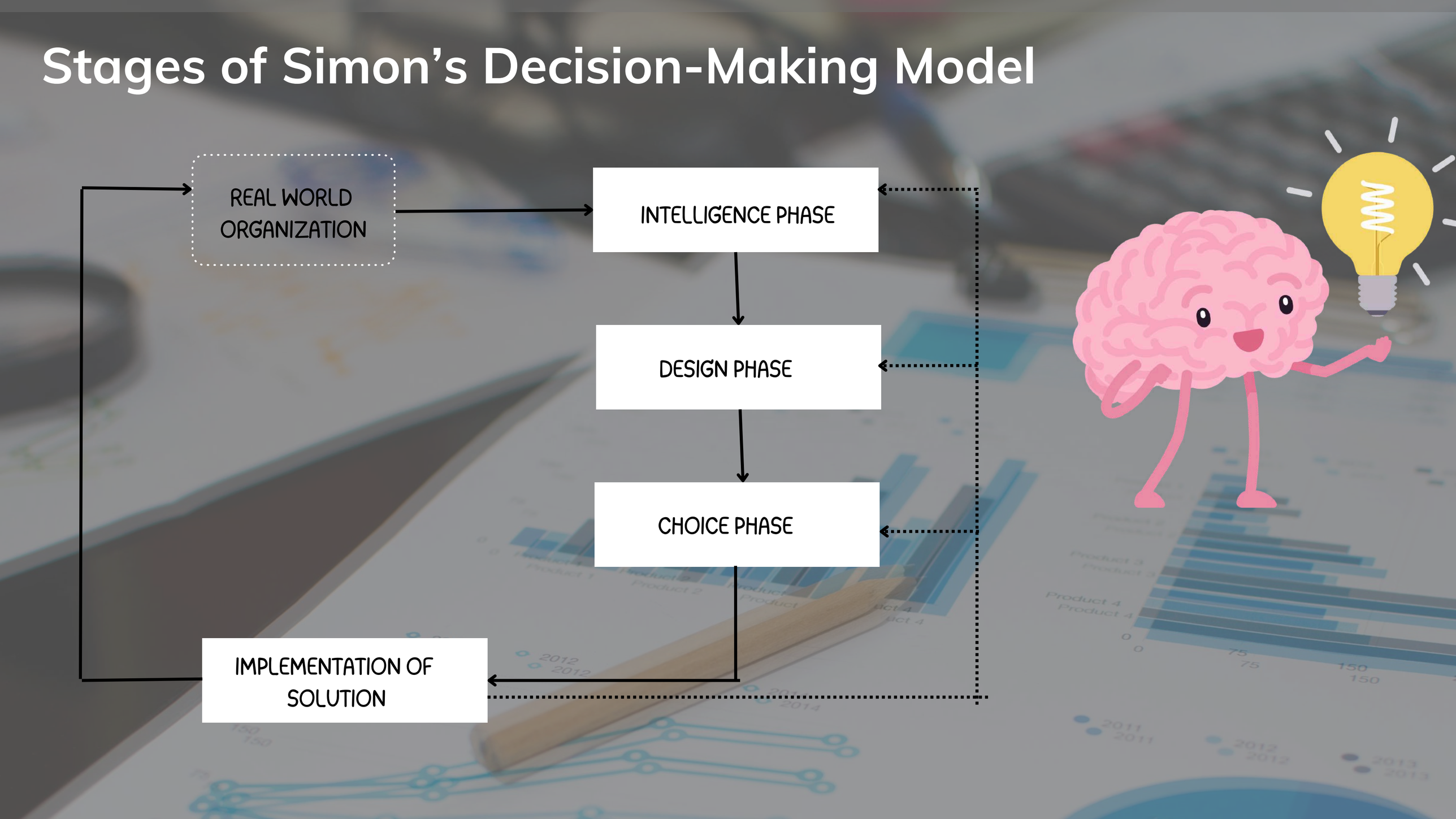
- The human user who reviews system outputs.
- Makes the final decision using insights and recommendations from DSS.

Simon’s Decision-Making Process of a (DSS)

- Herbert A. Simon, a famous economist and computer scientist, introduced a structured model to explain how decisions are taken in organizations.
- He described decision-making as a step-by-step process rather than a single action.
- This model helps organizations handle complex and real-world problems systematically.
- The process consists of four main stages: Intelligence, Design, Choice, and Implementation.



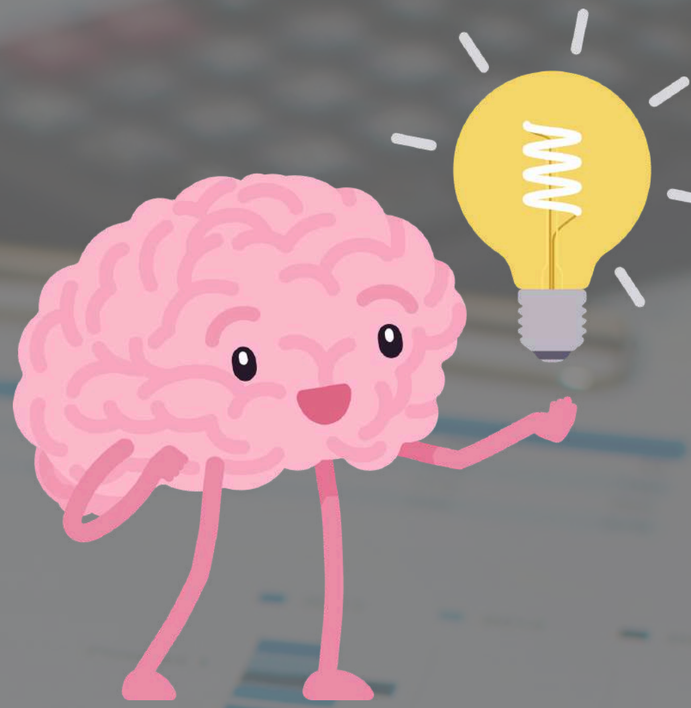
Stages of Simon’s Decision-Making Model



Stages of Simon’s Decision-Making Model

1. Intelligence Phase
   - Identify the problem or opportunity.
   - Collect and analyze relevant data.
   - Decide whether action is needed.

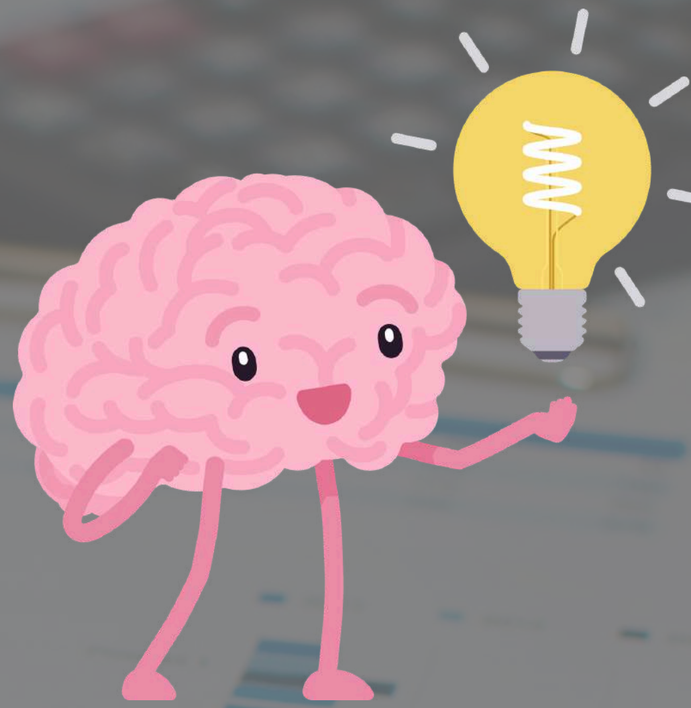
2. Design Phase
   - Develop possible solutions.
   - Create different alternatives and strategies.
   - Evaluate feasibility of options.



Stages of Simon’s Decision-Making Model

3. Choice Phase
   - Compare available alternatives.
   - Select the best possible solution.

4. Implementation & Monitoring
   - Execute the selected solution.
   - Monitor results and make improvements.



Business Intelligence (BI)

- Business Intelligence is a technology-driven approach used to support better business decisions.
- It enables organizations to collect, process, analyze, and interpret large volumes of data.
- BI converts raw data into meaningful insights using reports, dashboards, and visual tools.
- Data is gathered from multiple sources and transformed into useful business information.
- BI helps improve efficiency, performance, and strategic planning.

Architecture / Stages of Business Intelligence

1. Data Sources Layer

- Collects data from various internal and external sources.
- Sources include databases, spreadsheets, cloud platforms, and APIs.
- Handles both structured data (tables) and unstructured data (text, images).

2. Data Integration Layer (ETL)

- Extracts data from different sources.
- Transforms data into a consistent and usable format.
- Loads clean data into a central storage system.

Architecture / Stages of Business Intelligence

3. Data Storage Layer
   - Stores processed data in a centralized repository.
   - Uses data warehouses for structured data.
   - Uses data lakes for both structured and unstructured data.
4. Data Analysis and Processing Layer
   - Applies analytical tools, statistical techniques, and AI/ML models.
   - Processes stored data to identify patterns and trends.
   - Generates insights to support business evaluation.

Architecture / Stages of Business Intelligence

5. Data Presentation and Visualization Layer

- Acts as the user-facing layer of the BI system.
- Displays insights using dashboards, charts, graphs, and reports.
- Makes complex data easy to understand and interpret.

6. Business Decision-Making Layer

- Managers and decision-makers use BI insights for action.
- Supports strategic, tactical, and operational decisions.
- Helps improve business performance and outcomes.

Architecture / Stages of Business Intelligence

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Benefits of Business Intelligence

1. Smarter Decision-Making
   - BI delivers timely and reliable insights.
   - Helps organizations make data-driven and strategic choices.

2. Higher Operational Efficiency
   - Automates data collection and analysis processes.
   - Reduces manual effort and saves time and resources.

3. Better Understanding of Market Trends
   - Analyzes customer behavior and purchasing patterns.
   - Identifies emerging trends and business opportunities.

Benefits of Business Intelligence

4. Cost Optimization

- Examines financial and operational data to detect inefficiencies.
- Supports better cost control and resource utilization.

5. Improved Customer Experience

- Enables personalized interactions based on customer data.
- Helps enhance products, services, and overall customer satisfaction.

Data, Information, and Knowledge

1. Data

- Data refers to raw facts and figures collected from different sources.
- By itself, data does not explain anything or support decisions.
- It can exist in many forms such as numbers, text, images, or symbols.
- Data requires processing before it becomes useful.

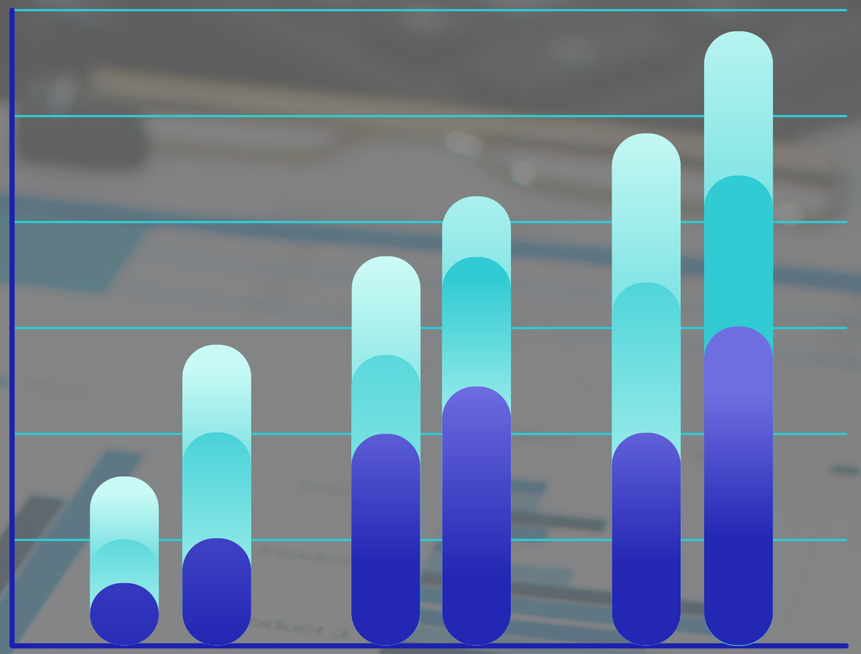
Example:

- Daily sales values like 100, 150, 200, and 250 are only numbers without interpretation.

Data, Information, and Knowledge

2. Information

- Information is created when data is processed and placed in a meaningful context.
- It helps in identifying patterns, trends, and relationships.
- Organized and analyzed data turns into valuable information.
- Information supports understanding and analysis.



Example:

- After analysis, observing that sales increase during weekends gives meaningful insight.

Data, Information, and Knowledge

3. Knowledge

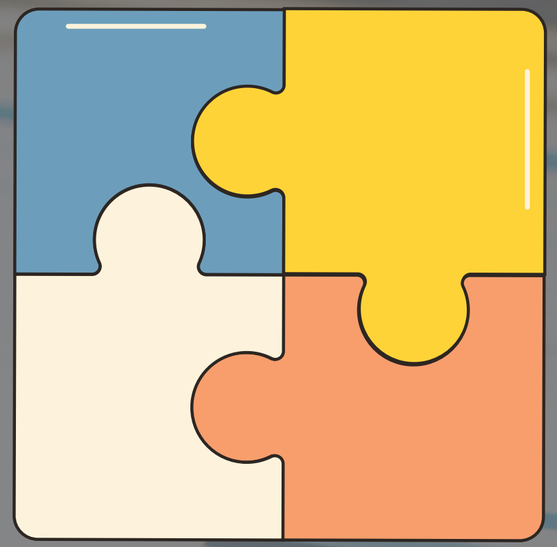
- Knowledge is the practical use of information to take action.
- It is developed through experience, understanding, and evaluation.
- Knowledge supports prediction, planning, and strategic decision-making.

Example:

- A store manager increases inventory on weekends based on observed sales trends.

Role of Mathematical Models in Business Intelligence

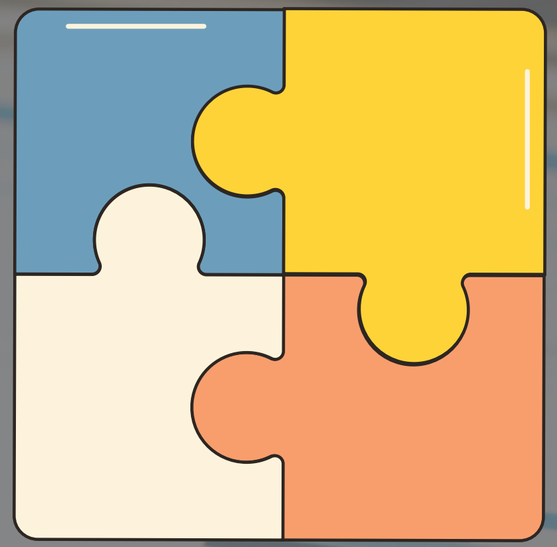
- Mathematical models play an important role in Business Intelligence by transforming data into actionable insights.
- They help organizations study large datasets, recognize patterns, and support objective decision-making.
- These models apply mathematical equations, statistical methods, and algorithms to analyze information effectively.
- Businesses use these models to improve planning, efficiency, and problem-solving.



Applications of Mathematical Models

Forecasting:

- Models such as regression are used to estimate future sales and demand based on historical data.



Customer Analysis:

- Clustering techniques help in grouping customers according to behavior and purchasing habits.

Optimization:

- Optimization models assist in resource allocation, cost reduction, and performance improvement.

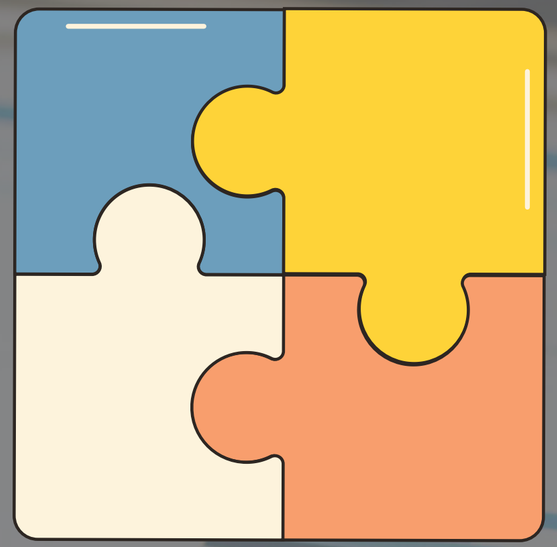
Applications of Mathematical Models

Risk and Fraud Analysis:

- Mathematical techniques are applied to detect unusual patterns and identify fraudulent transactions.

Recommendation Systems:

- E-commerce platforms use models to suggest products based on customer preferences and past activity.



Ethics Required in Business Intelligence

- Business Intelligence involves gathering, analyzing, and applying data to support decisions.
- To maintain trust, fairness, and accountability, ethical standards must be strictly followed.
- Ethical BI ensures responsible use of data and protects the interests of individuals and organizations.

Key Ethical Principles in BI

1. Data Privacy and Protection

- BI systems handle large volumes of sensitive information.

Ethics Required in Business Intelligence

- Organizations must comply with data protection regulations and privacy policies.
- Personal and confidential data should be safeguarded from misuse.

2. Accuracy and Transparency

- BI outputs should be correct, unbiased, and clearly explained.
- Data manipulation or misleading analysis is unethical and harmful.
- Transparent reporting builds trust among users and stakeholders.

Ethics Required in Business Intelligence

3. Fairness and Non-Discrimination

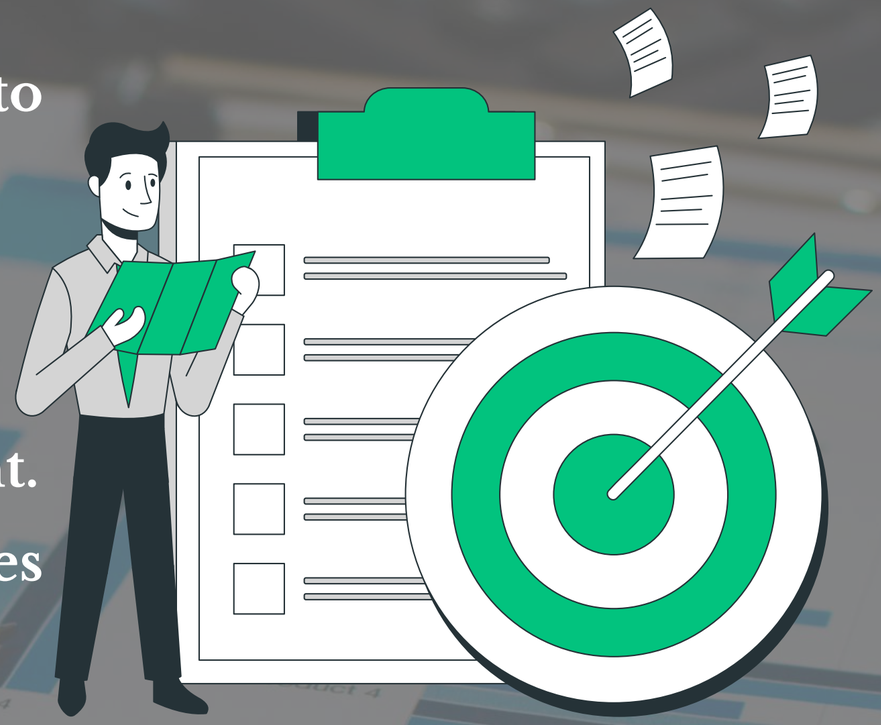
- BI and AI models should not favor or disadvantage any group.
- Decisions must not be based on gender, race, income level, or other unfair factors.
- Ethical BI promotes equality and objective analysis.

4. Security and Confidentiality

- Strong security measures must be used to protect data from cyber threats.

Ethics Required in Business Intelligence

- Unauthorized access, data leaks, or selling information is unethical and illegal.
- Poor data security can damage reputation and lead to legal penalties.



5. Ethical Data Collection

- Data should be collected legally and with user consent.
- Hidden tracking or deceptive data collection practices should be avoided.
- Responsible data collection ensures long-term trust.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