Lecture 6:
Decision Support Systems and Business In Intelligence

CSS 200 - Intro to Information Systems

Module 1

- What is an information system?
- Where do we use information systems?
- What is the difference between Data, Information and Knowledge?

What is an information system?

- An information system is a combination of technology, people, and processes that work together to collect, store, manage, and share data. It helps organizations make decisions, solve problems, and improve efficiency by providing accurate and timely information.

Oct 31, 2024

Where do we use information systems?

- Information systems are used in various sectors like business, education, and healthcare to support daily operations and long-term planning. They include hardware, software, databases, and networks, all designed to process and distribute information to users who need it.

What is the difference between Data, Information and Knowledge?

- Data refers to raw, unorganized facts or figures that by themselves have no meaning. For example, numbers, dates, or a list of names are considered data.
- Information is what you get when data is processed, organized, or structured in a way that adds context and meaning. For instance, data about sales figures organized in a report becomes information that can be used to understand business performance.
- Knowledge goes a step further and is the understanding or insight gained from analyzing information. It involves interpreting information and applying it to make decisions or solve problems, such as using sales information to predict future trends or improve strategies.

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Module 2

- Explain the role of Enterprise Architecture in IT Governance
- Networking Devices: Hub, Repeater, Switch, Router, Gateway

Understanding Enterprise Architecture in IT Governance

What is Enterprise Architecture (EA)?

- Think of EA as a framework for how an organization's IT (technology) and business processes work together. It helps visualize and organize the different components like systems, data, and processes.

What is IT Governance?

- IT Governance is like a set of rules and guidelines that ensure the organization's IT supports its goals. It helps make sure that technology is used wisely and responsibly.

How Does EA Help with IT Governance?

- Alignment with Business Goals: EA ensures that IT projects and initiatives align with what the business wants to achieve. It's like making sure everyone is moving toward the same goal.
- Standardization: EA helps create standard processes and systems across the organization. This consistency makes it easier to manage and reduces confusion.
- Risk Management: By providing a clear view of all IT components, EA helps identify potential risks (like security issues) and allows organizations to plan ahead to avoid them.
- Informed Decision-Making: EA gives leaders a comprehensive view of technology and business processes, enabling them to make better decisions about where to invest and how to improve.
- Performance Measurement: EA often includes metrics that help track how well IT is performing. This allows organizations to see what's working and what isn't.

How Does EA Help with IT Governance?

- Managing Change: As businesses evolve, EA provides guidance on how to introduce new technologies or processes smoothly, reducing disruption.
- Improved Communication: EA acts as a common language that helps different parts of the organization communicate better, making collaboration easier.
- Regulatory Compliance: EA helps organizations ensure they are following laws and regulations related to technology, making it easier to prove compliance when needed.
- Resource Optimization: By identifying overlapping technologies or processes, EA helps organizations use their resources more effectively, saving time and money.
- Long-term Planning: EA encourages looking ahead and planning for future technology needs, ensuring the organization remains adaptable and sustainable.

Networking Devices

- Network Definition: A network is a group of connected devices that share data and resources. These networks can vary in scale, from small home setups to global enterprise systems.
- Hub: Broadcasts data to all connected devices. It lacks intelligence, sending data to everyone instead of the intended recipient.
- Switch: Intelligently forwards data only to the intended device within a local network, reducing congestion and allowing full-duplex communication.
- Router: Connects different networks and determines the best path for data between them using IP addresses. Essential for internet connectivity.
- Repeater: Amplifies and retransmits weak signals to extend network range. Operates at the physical layer.
- Gateway: Acts as a translator between different networks, enabling communication by converting protocols.

Module 3

- Explain the role and objectives of Customer Relationship Management (CRM) and Supply Relationship Management (SRM).
- Transaction Processing Systems (TPS)
- Office Automation Systems (OAS)
- Management Information Systems (MIS)
- Decision Support Systems (DSS)
- Executive Information Systems (EIS)

Types of Information Systems Overview
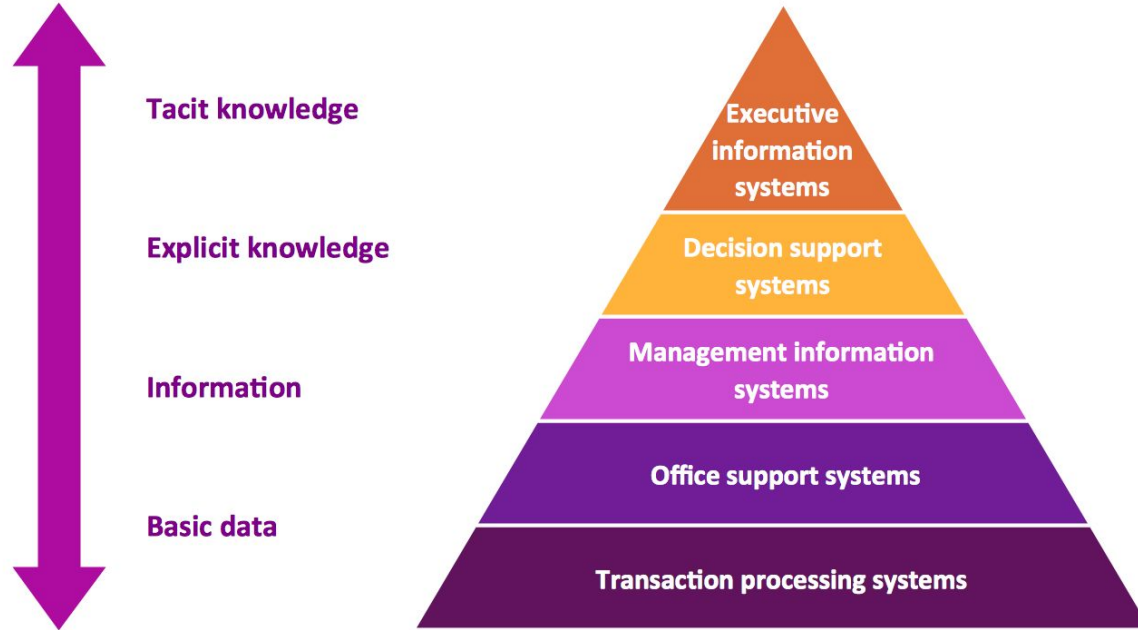
Hierarchy of Information Systems: From Data to Knowledge

- Transaction Processing Systems (TPS): These systems handle basic data, primarily concerned with the day-to-day transactions of an organization. They are foundational, dealing with large volumes of operational data like sales, inventory, and payroll.
- Office Support Systems (OSS): These systems help with the daily operations within an office environment, such as document management, communication (e.g., email), and basic collaboration tools.
- Management Information Systems (MIS): At this level, systems are used to convert raw data from transaction systems into more structured information. MIS provides middle management with reports and summaries, supporting routine decision-making.
- Decision Support Systems (DSS): These systems are used for more complex decision-making, offering tools for data analysis, forecasting, and simulation. DSS helps in processing explicit knowledge, giving managers insights to make informed decisions on non-routine matters.
- Executive Information Systems (EIS): At the top of the hierarchy, these systems are designed for top-level executives. They focus on summarizing and presenting key performance indicators and strategic information, often dealing with tacit knowledge (unwritten, intuitive knowledge) that guides high-level decision-making.

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Summary

| System	Purpose	Users	Key Features	Example
TPS	Handle routine, high-volume transactions	Operational staff (clerks, cashiers)	Structured, repetitive, real-time processing	POS systems, payroll systems
OAS	Automate routine office tasks	Clerical staff, knowledge workers	Productivity software (word processing, emails, etc.)	Microsoft Office suite
MIS	Provide reports for decision-making	Middle management	Summarized reports from structured data	Sales management systems
DSS	Support decision-making with data analysis	Managers, analysts	Analytical tools, "what-if" analysis, simulations	Forecasting, investment systems
EIS	Provide top-level information for executives	Executives, senior managers	High-level summaries, real-time dashboards	Executive dashboards

Module 4

- Microsoft Access
- Relational Databases (RDBMS)
- Key-Value Store
- Document Databases
- Graph Databases
- Object-Oriented Databases
- Hierarchical Databases

Database vs. Database Management System (DBMS)

- A Database and a Database Management System (DBMS) are closely related terms, but they serve different purposes:
- A database is a structured set of data. The data can be structured or unstructured and stored in various formats like tables, documents, and key-value pairs. It could be anything from a simple shopping list to a picture gallery or the vast amount of information in a corporate network.
- A Database Management System (DBMS) is software used to interact with a database. It provides an interface for users or applications to manipulate data, making the handling of large amounts of data more efficient and less error-prone. A DBMS oversees core administrative tasks such as data storage, retrieval, security, and query processing.

Different Types Of Databases
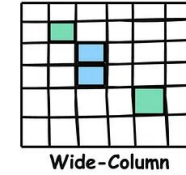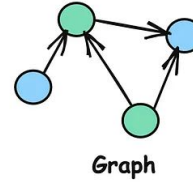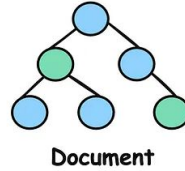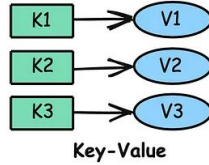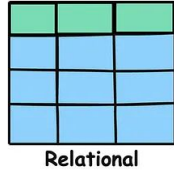
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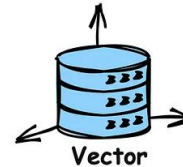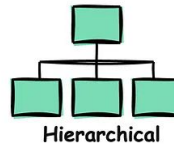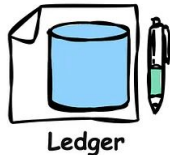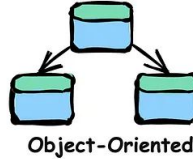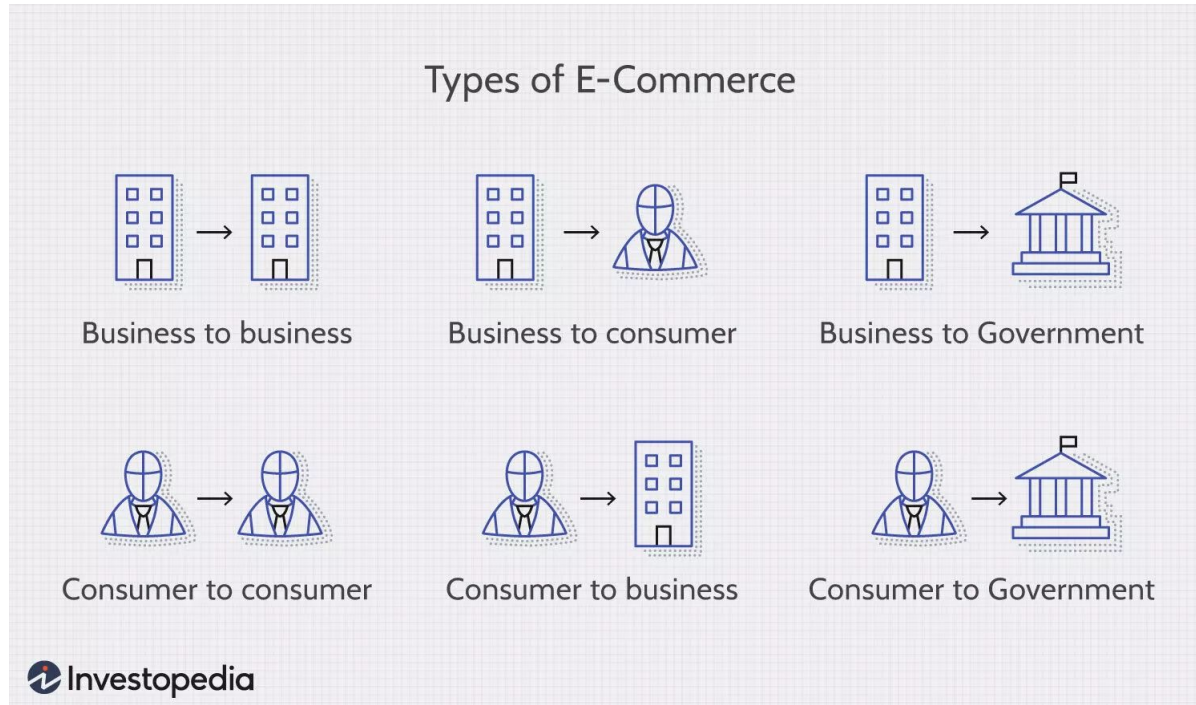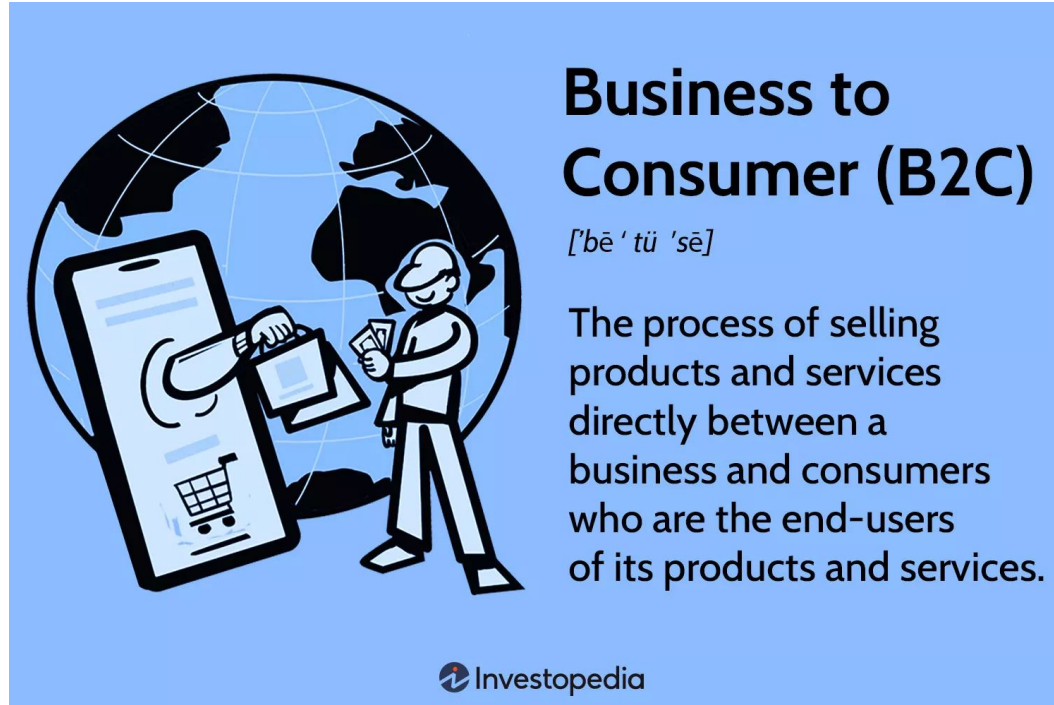
Summary

Database Type	Data Structure	Use Cases	Advantages	Examples
Relational Databases	Tables with rows and columns, structured relationships (SQL-based)	Enterprise applications, banking, e-commerce platforms	Data integrity, complex queries	MySQL, PostgreSQL, Oracle DB
Key-Value Store	Key-value pairs	Caching, session, storage, real-time data processing	Simple, fast retrieval, highly scalable	Redis, DynamoDB
Document Databases	Semi-structured documents	Content management, real-time analytics, IoT	Flexible schema, fast reads/writes, good for evolving data	MongoDB, Couchbase,Apache Couchbase
Graph Databases	Graphs, nodes, edges, properties	Social networks, recommendation systems, knowledge graphs	Efficient traversal of connected data, flexible querying	Neo4j, Amazon Neptune
Object-Oriented Databases	Objects (similar to OOP languages)	Object-oriented applications, multimedia databases	Seamless OOP integration, efficient object management	ObjectDB, db4o
Hierarchical Databases	Tree-like structure (parent-child relationships)	Organizational charts, file systems	Efficient for one-to-many relationships	IBM IMS, Windows Registry

Types of e commerce

Types of E-Commerce

Business to business

Business to consumer

Business to Government

Consumer to consumer

Consumer to business

Consumer to Government

Investopedia

Business to Consumer (B2C)

Business to Business (B2B)
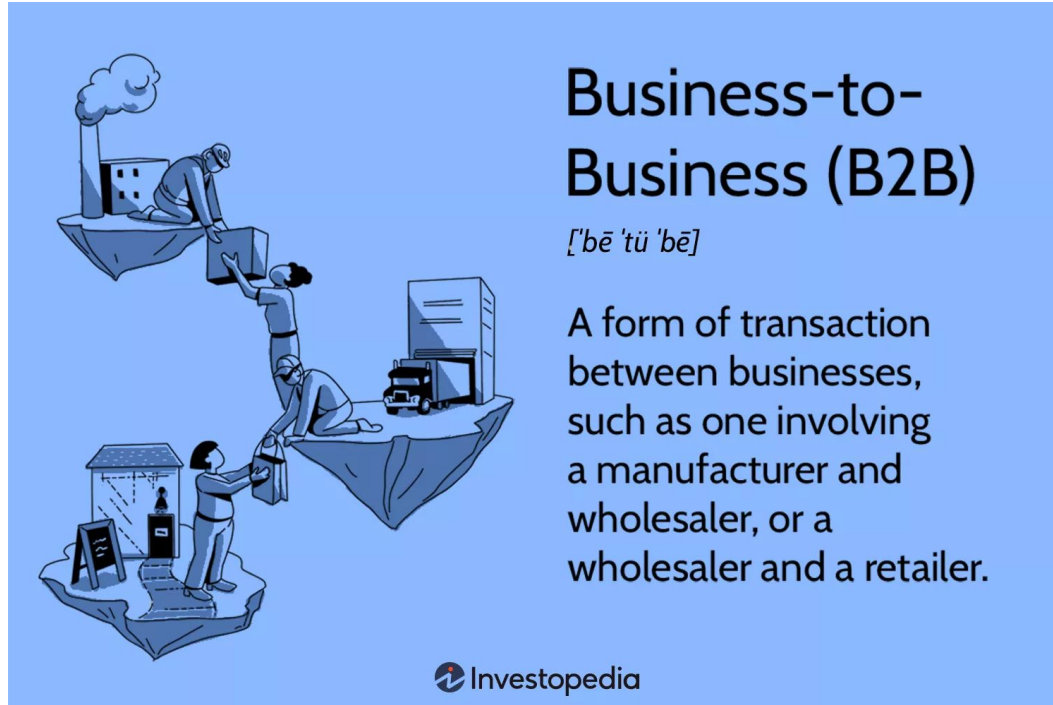
Customer to Customer (C2C)

C2C / B2C / B2B Comparison

Characteristic	C2C	B2C	B2B
Definition	Transaction between consumers	Transactions between businesses and consumers	Transactions between businesses
Target Audience	Individual consumers	General public	Other businesses or organizations
Platform Type	Marketplaces or auction sites	Retail websites	Wholesale platforms or direct sales
Example Business	eBay	Amazon	Alibaba

Introduction to HTML

- What is HTML?
  - HTML stands for HyperText Markup Language. It's the language used to create web pages.
  - HyperText refers to links that connect web pages.
  - Markup Language means that it uses tags to define elements within a document.
- What does HTML do?
  - It structures content on the web. It DOESN'T style or control how the content looks (that's CSS).
  - HTML is the foundation of any web page. It organizes text, images, links, and other content into a coherent structure.

Introduction to CSS

- What is CSS?
  - CSS stands for Cascading Style Sheets. It's used to style and layout web pages.
- What does CSS do?
  - CSS controls the appearance of HTML elements, such as colors, fonts, layout, and spacing.
  - Separates the structure (HTML) from the presentation (CSS).

What will we cover today?

- MLO 1: Explain the use of MS Excel in decision support systems (DSS) for data analysis and decision-making enhancement.
- MLO 2: Explain the role of Data in business intelligence.
- MLO 3: Explain how to use external learning resources to enhance the webpage development.

Module 6 Course Project – Phase 1

- This course project will be completed in three parts:
    - Project Proposal
    - Excel Spreadsheet
    - PowerPoint Presentation and Class Presentation

Module 6 Course Project – Phase 1

- As you begin working on the project, you will be assigned to a team of three.
- <u>You and the other members</u> of your team will decide on the times and dates you will meet and the rules and expectations of the group.
- For Phase 1, pick one e-commerce company on the internet (e.g., Apple, Tesla, Walmart, Amazon, Google, Wayfair).
- Study the company and explain its purpose, the type of products or services it provides, and how user-friendly its website is (ease of use, high-quality images, etc.).
- Write a paper to describe the e-commerce company you selected and provide background information based on the articles you have found from your research.
- This paper should be at least 500–700 words, **<u>NOT</u>** including the title page and references. Use at least three sources and follow APA style in writing your text, citations, and references.

Module 6 Lab: Excel for Decision Making

Instructions:

- Students will work as a group to complete the guided discussion using Excel.
- Students will then project their work and discuss their findings.

Module 6 Lab: Excel for Decision Making

Scenario:

- The Springfield Family Community Center has an outdoor pool that operates from May through October.
- The director is interested in learning whether the center can afford the $57,000 cost of installing a pool-covering dome so people can swim year-round. It will also cost about $200 a month for power to keep the dome inflated for six months each year. How can the director use forecasting to evaluate the likelihood of selling sufficient tickets to pay for this improvement?
- Prepare a brief report to the director that explains the forecasting. Be sure to include suggestions on both internal and external data that would be useful for this analysis.

Module 6 Lab: Excel for Decision Making

Deliverable:

- A report to the director (both an Excel file and a Word document).
- Each group will work to create this report and then present their findings.

What is Business Intelligence?

- Traditionally, business intelligence has been defined as the use of data to manage day-to-day operational management within a business.
- Business intelligence tools can include a variety of software tools and other systems. Some of these include spreadsheets, online analytical processing, reporting software, business activity monitoring software, and data mining software.
- Overall, business intelligence helps leaders navigate organizational and industry-related challenges and ensures that companies stay focused on their primary target to successfully get where they want to go.

What is Business Analytics?

- Business analytics has generally been described as a more statistical-based field, where data experts use quantitative tools to make predictions and develop future strategies for growth.
- For example, while business intelligence might tell business leaders what their current customers look like, business analytics might tell them what their future customers are doing.
- Business analytics tools are employed for many functions, including correlational analysis, regression analysis, forecasting analysis, text mining, image analytics, and others.

Business Intelligence vs. Business Analytics

- Experts define business intelligence (BI) and business analytics (BA) differently.
- Trends: Variances reflect trends in business language and job growth.
- Organizational Factors: Differences may depend on the size and age of the organization.
- Focus on Investment: Organizations need to assess whether to invest in present performance (BI) or future insights (BA).
- Decision-Making: Business leaders should consider these differences when deciding on investments in BI and analytical tools.

Business Intelligence vs. Business Analytics
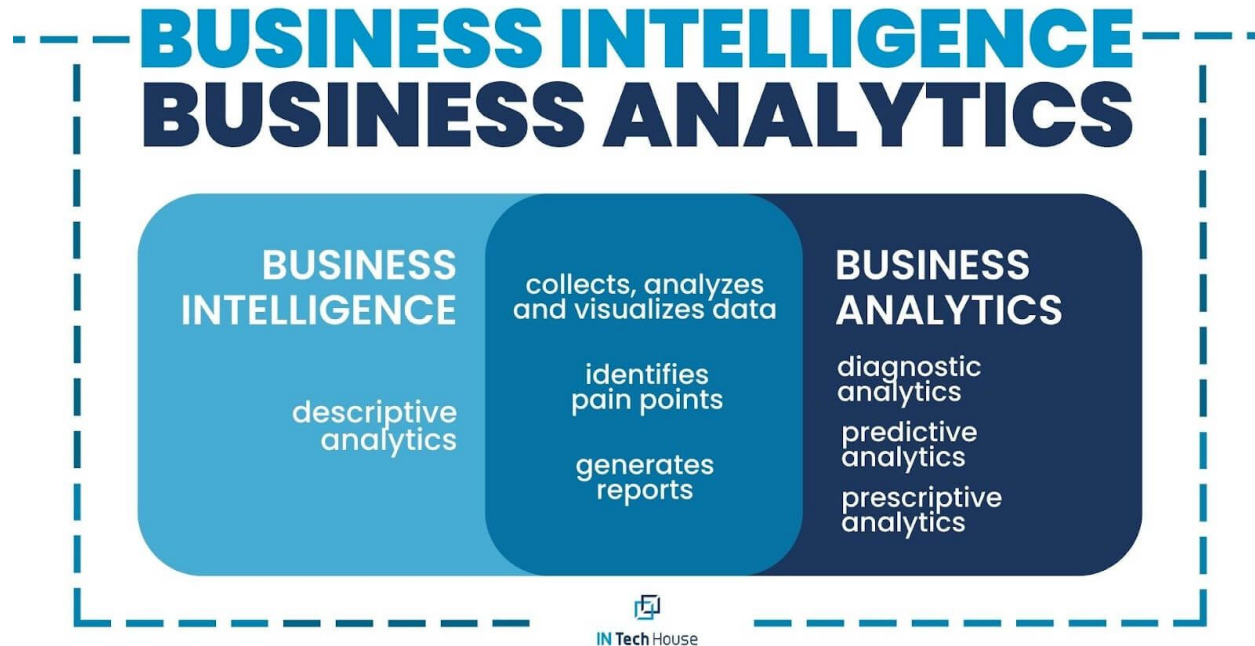
Decision Support Systems Definition

- A decision support system (DSS) is an interactive information system that analyzes large volumes of data for informing business decisions.
- A DSS supports the management, operations, and planning levels of an organization in making better decisions by assessing the significance of uncertainties and the tradeoffs involved in making one decision over another.

Decision Support System

- Route optimization: A DSS can be used to plan the optimal route between two points by analyzing the available options. These systems often include the capability to monitor traffic in real-time to route around congestion.
- American Airlines uses an intelligent gate routing program to automatically assign the nearest gate available to arriving aircraft, thus reducing taxi times and saving thousands of gallons of jet fuel per year.

Decision Support System

- Crop planning: Farmers use DSS to help determine the best time to plant, fertilize, and reap their crops.
- Bayer Crop Science has applied analytics and decision support to every element of its business, including the creation of "virtual factories" to perform "what-if" analyses at its corn manufacturing sites.

Decision Support System

- Clinical DSS: These systems help clinicians diagnose their patients and achieve better outcomes.
- Fresenius Medical Care has developed a system that leverages predictive analytics, machine learning, and cloud computing to proactively identify when kidney dialysis patients might be suffering a potentially life-threatening complication.

Decision Support Systems vs. Business Intelligence

- Decision support systems are generally recognized as one element of business intelligence systems, along with data warehousing and data mining.
- Whereas BI is a broad category of applications, services, and technologies for gathering, storing, analyzing, and accessing data for decision-making, DSS applications tend to be purpose-built for specific decisions.
- For example, a business DSS might help a company project its revenue over a set period by analyzing past product sales data and current variables. Healthcare providers use clinical decision support systems to make the clinical workflow more efficient: computerized alerts and reminders to care providers, clinical guidelines, condition-specific order sets, and so on.

Types of Decision Support System

- Data-driven DSS: These systems include file drawer and management reporting systems, executive information systems, and geographic information systems (GIS).
- They emphasize access to and manipulation of large databases of structured data, often a time-series of internal company data and sometimes external data.

Types of Decision Support System

- Model-driven DSS: These DSS include systems that use accounting and financial models, representational models, and optimization models.
- They emphasize access to and manipulation of a model. They generally leverage simple statistical and analytical tools.

Types of Decision Support System

- Knowledge-driven DSS: These systems suggest or recommend actions to managers. Sometimes called advisory systems, consultation systems, or suggestion systems, they provide specialized problem-solving expertise based on a particular domain.
- They are typically used for tasks such as classification, configuration, diagnosis, interpretation, planning, and prediction that would otherwise depend on a human expert.
- These systems are often paired with data mining to sift through databases to produce data content relationships.

Components of a Decision Support System

- Decision support systems consist of three key components: the database, software system, and user interface.
- DSS database: The database draws on a variety of sources, including data internal to the organization, data generated by applications, and external data purchased from third parties or mined from the Internet. The size of the DSS database will vary based on need, from a small system to a large data warehouse.
- DSS user interface. Dashboards and other user interfaces that allow users to interact with and view results.
- DSS software system. The software system is built on a model (including decision context and user criteria). The number and types of models depend on the purpose of the DSS.

Decision Support System Software

- XLSTAT: Is an Excel data analysis for corporate users and researchers. It boasts more than 250 statistical features, including data visualization, statistical modeling, data mining, stat tests, forecasting methods, machine learning, and more.
- 1000minds: Is an online collection of tools and processes for decision-making, prioritization.
- QlikView: It's designed to help users with their day-to-day tasks using a configurable dashboard.

Decision Support System Software

- **SAP BusinessObjects**: Consists of reporting and analysis applications to help users understand trends and root causes.
- **TIBCO Spotfire**: This data visualization and analytics software helps users create dashboards and power predictive applications and real-time analytics applications.
- **Briq**: Is a predictive analytics and automation platform built specifically for general contractors and subcontractors in construction. It leverages data from accounting, project management, CRM, and other systems, to power AI for predictive and prescriptive analytics.