Lecture 7:
Knowledge Management and E-Learning

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.

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.

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.

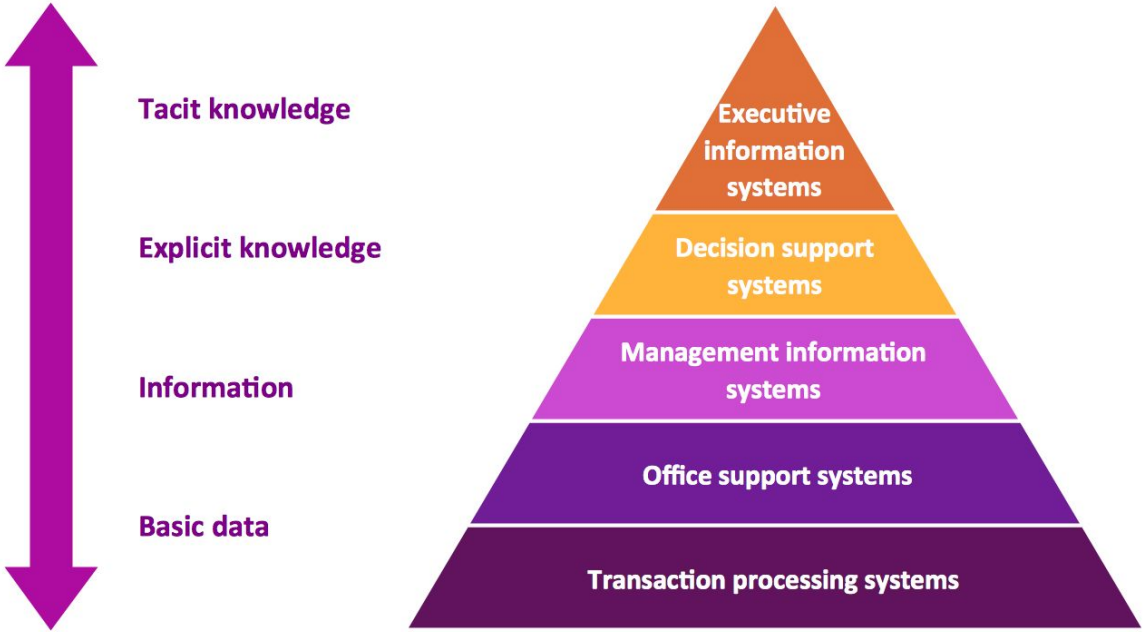
Networking Devices

- 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

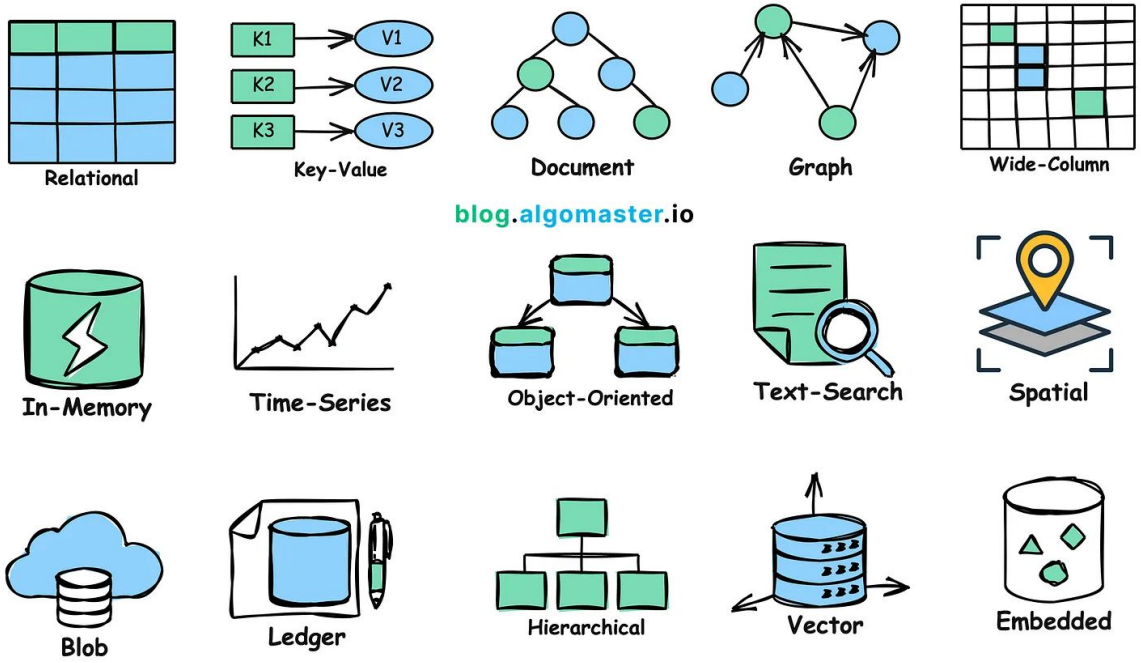
Module 4

- 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



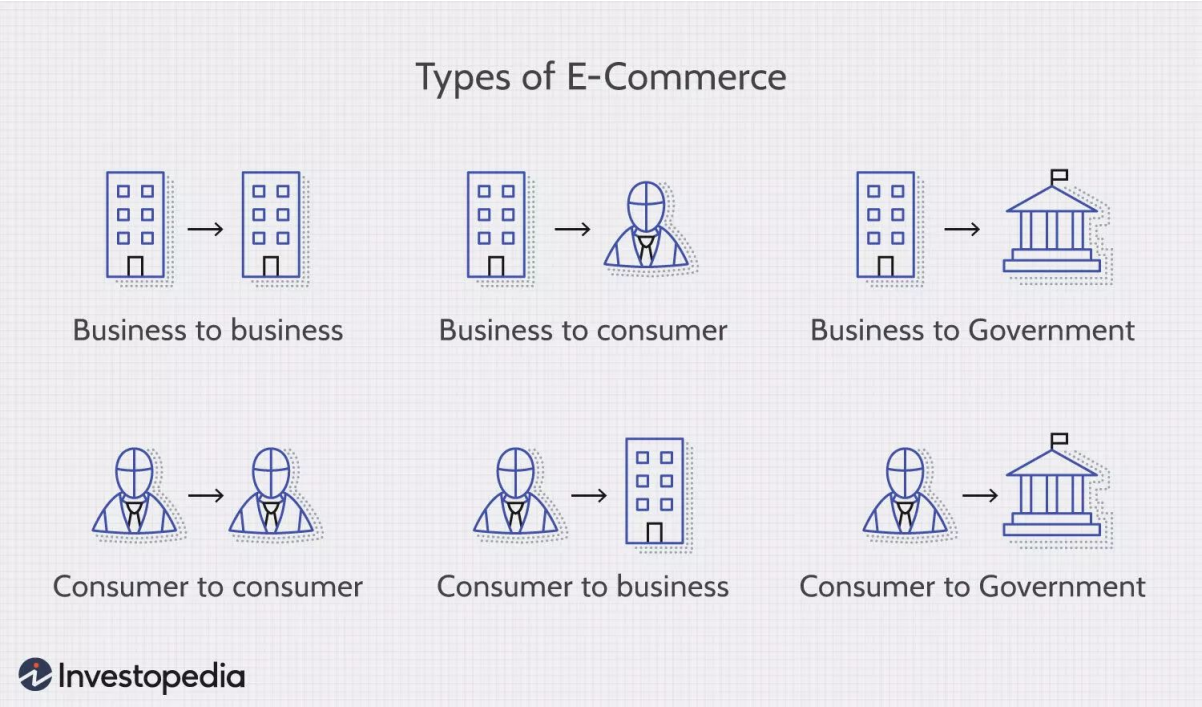
Summary

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

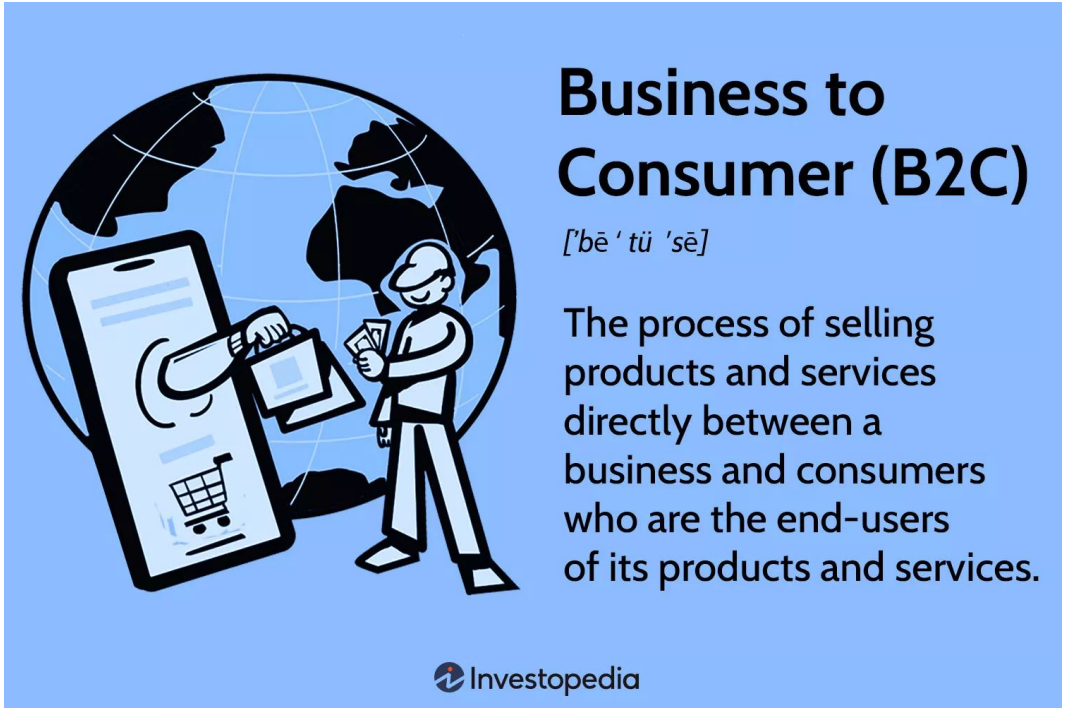
Module 5

- What is e-commerce?
- What types of e-commerce are there?
  - B2C
  - B2B
  - C2C
- What is HTML?
  - Headings
  - Paragraphs
  - Links
  - Lists
  - Forms
- What is CSS?

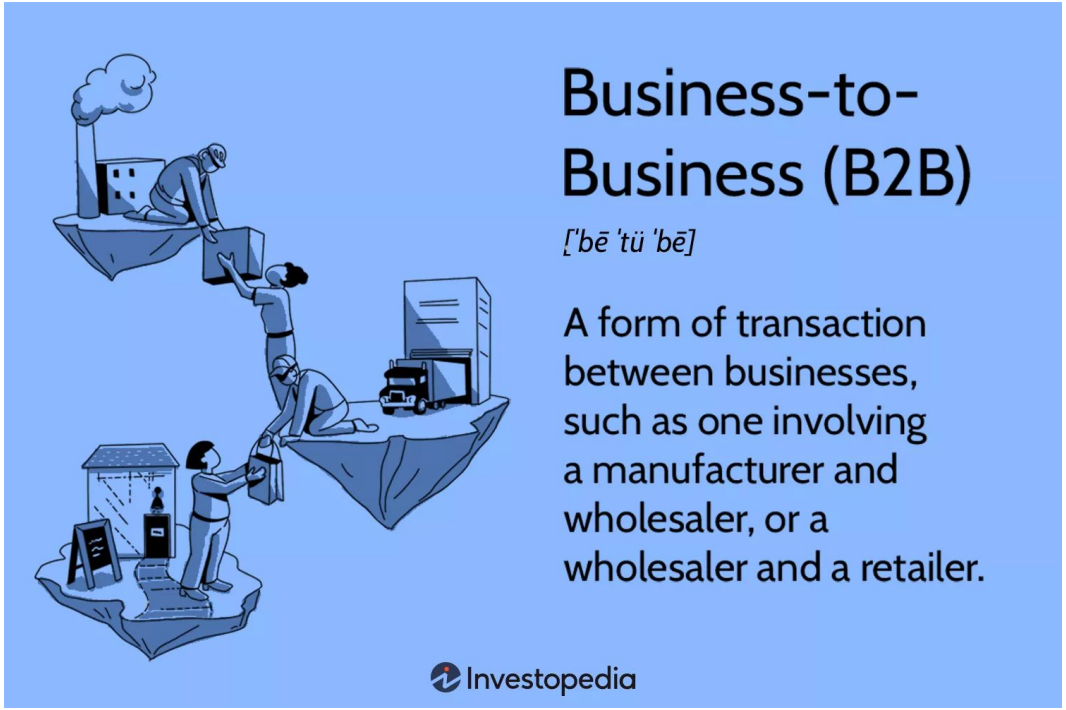
Types of e commerce



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.

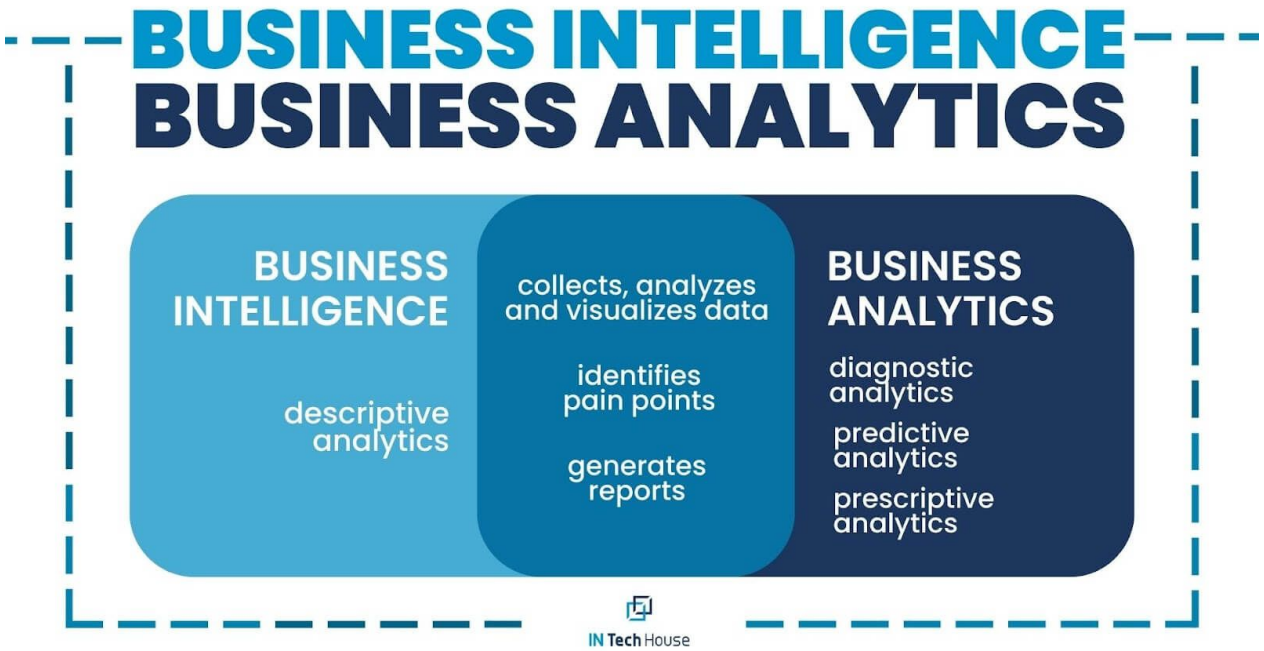
Introduction to CSS

- 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).

Module 6

- What is Business Intelligence?
- What is Business Analytics?
- Difference between Business Intelligence and Business Analytics
- Decision Support Systems
- Types of Decision Support Systems
- Components of a Decision Support System
- Examples of Decision Support System Software

Business Intelligence vs. Business Analytics



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.

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.

What will we cover today?

- MLO 1: Explain use of social networking in a corporate setting. (CLO 5)
- MLO 2: Explain the role of Knowledge Management. (CLO 5)
- MLO 3: Explain the role of data in decision making. (CLO 5)

What is knowledge management?

- Knowledge management involves a sequence of processes involving the storage, management, sharing, and usage of an organization's knowledge and information.
- The objective is to efficiently store organizational knowledge for optimal utilization.
- This continuous process emphasizes identifying and refining organizational knowledge, ensuring accessibility, and fostering a culture of continuous sharing and learning.

What is a knowledge management system?

- A knowledge management system (KMS) is software designed to facilitate the creation, organization, sharing, and utilization of knowledge within an organization.
- It includes features that facilitate the systematic gathering, storage, retrieval, and sharing of knowledge.
- A KMS aims to enhance overall organizational efficiency by providing tools and processes that enable individuals and teams to access, contribute to, and leverage the collective knowledge of the organization.

What can be included in a knowledge management system?

- Organizational knowledge is the collection of individual or team knowledge and experiences within a company.
- It serves as a repository of resources that can be shared, consumed, and applied to facilitate day-to-day activities in an organization. These resources are broadly classified into three types.

What can be included in a knowledge management system?

- Explicit knowledge: Often referred to as "know-what" knowledge. It's the most prevalent form of knowledge within an organization and can be easily expressed, documented, and organized.
- Implicit knowledge: Also known as "know-how" knowledge, is gained through the application of explicit knowledge in practical situations. It's acquired through hands-on experience, often without the learner consciously realizing the acquisition of knowledge. While capturing this type of knowledge might be challenging, it can be transferred within the organization from one individual to another.
- Tacit knowledge: Is the expertise and skills cultivated through years of on-the-job experience. This type of knowledge is complicated to document or convey verbally because it involves personal wisdom and intuition. Tacit knowledge can be gained through regular interactions with experienced employees and observation.

Use cases of knowledge management

- Employee onboarding: An efficient onboarding process is essential for new hires to quickly adapt to their roles and ensure that they quickly acquire the necessary information and skills for their roles.
- By centralizing and organizing relevant information, organizations can streamline the onboarding of new hires and make sure they have access to the information they need before they get started with their work.

Use cases of knowledge management

- Product onboarding for customers: By maintaining a well-organized repository of product-related information, companies can help their customers easily understand their products or services.
- This ensures that the customers understand the product's functionality, know how to use its essential features.

Use cases of knowledge management

- Customer support: Knowledge management significantly impacts the efficiency of customer support operations and enables improved customer satisfaction.
- By centralizing information about products, services, and common issues, support teams can provide timely and accurate assistance to customers.

Use cases of knowledge management

- Self-service customer portals: Self-service portals for customers offer a platform to find quick solutions to their queries without the need for direct assistance from customer support. This enhances customer satisfaction and reduces the number of routine inquiries handled by support teams.

The knowledge management process

- Knowledge discovery: The initial phase of the knowledge management process is recognizing valuable sources of information, both internally and externally.
- This involves systematically gathering data from diverse channels, consulting with experts, identifying information that resides in employees' heads, determining which information requires documentation, and identifying any duplicates or irrelevant data.

The knowledge management process

- Knowledge capture and organization: After gathering information, it must be documented in a manner that's accessible to all.
- The content in the resources should be formatted and organized into categories and stored in a hierarchical structure.
- This ensures ease of retrieval, navigation, reuse, and sharing among employees.

The knowledge management process

- Knowledge sharing: After organizing the knowledge base, the next crucial step involves sharing the information with those who require it.
- It's important to identify the intended users and grant the appropriate levels of access. Tailoring access permissions ensures that information is distributed systematically. It provides the right amount of access to users based on their roles and responsibilities within the organization to enhance efficiency and avoid information leaks.

The knowledge management process

- Assessment and optimization: The next step involves evaluating the effectiveness of knowledge management processes.
- Existing content in the knowledge base should be regularly updated based on new insights, relevance, and validity of information.
- Continuous monitoring of knowledge usage and relevance helps identify areas for improvement, which will optimize knowledge management processes and enhance overall efficiency and effectiveness.

Types of Knowledge

Explicit knowledge

- Explicit knowledge is easily articulated, documented, and shared. It includes information codified in books, manuals, databases, and other formalized structures.
- Explicit knowledge is systematic and easily transferable between individuals or groups, making it the most accessible form.
- This knowledge can be communicated through language, symbols, diagrams, and other forms of documentation.

Explicit knowledge: Examples

- A company's training manual that outlines the procedures for using a particular software is an example of explicit knowledge. Employees can easily refer to the manual to understand how to perform specific tasks.
- Software development documentation, such as API guides or system architecture diagrams, is explicit knowledge. Developers can use to understand and work with the software.

Implicit knowledge

- Implicit knowledge is the practical application of explicit knowledge. People often develop the know-how through experience and practice without consciously thinking about it.
- Implicit knowledge is not as quickly articulated as explicit knowledge but can be inferred from actions and decisions. While it's derived from explicit knowledge, implicit knowledge is more intuitive and often remains unspoken.

Implicit knowledge: Examples

- General problem-solving skills formed over time by experiencing and overcoming various challenges and tasks.
- Customer service representatives who know the exact tone and approach when dealing with an upset customer.
- An engineer knows which tools or techniques to fix a recurring issue based on years of experience with similar problems.

Tacit knowledge

- Tacit knowledge is deeply embedded in individual experience and intuition, making it difficult to articulate or transfer to others. It includes insights, intuitions, and skills that are often learned through personal experience or social interactions rather than formal instruction.
- Tacit knowledge is passed on through observation, practice, and shared experiences rather than through written or verbal communication.

Tacit knowledge: Examples

- Effective leadership often relies on tacit knowledge, such as the ability to inspire a team, or navigate complex interpersonal dynamics.
- A long-term employee's deep understanding of the company's culture, unwritten rules, and social norms that helps them navigate the workplace effectively and foster positive relationships with colleagues.

Declarative knowledge

- Declarative knowledge, often called “know-what,” is understanding factual information, concepts, and truths. It encompasses the knowledge of facts, definitions, theories, and principles that can be explicitly stated and communicated.
- This foundational knowledge forms the basis for further learning and understanding various fields. In the workplace, declarative knowledge is essential for roles that require a strong sense of specific concepts or facts, such as in education, research, or any field where information must be analyzed, explained, or taught.

Declarative knowledge: Examples

- Knowledge of key dates, events, and milestones in the company's history. For instance, knowing when the company was founded, major product launches, or significant mergers and acquisitions.
- Detailed information about a company's products, such as technical specifications, features, and benefits. For example, a salesperson's knowledge of the specifications of a particular model of a laptop they are selling.

Procedural knowledge

- Procedural knowledge refers to the understanding of how to perform specific tasks or processes through a series of steps or actions. It is practical and action-oriented and is typically acquired through hands-on experience, practice, and repetition, making it essential for tasks that require a certain level of skill and precision.
- Procedural knowledge is often sequential, following a logical order that ensures tasks are completed correctly and efficiently. This knowledge is foundational in manufacturing, customer service, project management, and any other domain where specific procedures must be followed to achieve desired outcomes.

Procedural knowledge: Example

- Knowledge of operating specific software applications, such as Excel for data analysis or Photoshop for graphic design.
- The step-by-step knowledge of operating machinery and producing goods in a manufacturing setting.

A priori knowledge

- A priori knowledge is independent of experience, relying on reasoning and logical deduction. It is the knowledge considered universally true and can be known through thought alone, without the need for empirical evidence or sensory experience.
- This knowledge is foundational in mathematics, philosophy, and logic, where certain truths are accepted as self-evident and do not require external validation.

A priori knowledge: Example

- Ability to excel in mathematics or logical reasoning due to their natural ability to understand and interpret information without further explanation.
- An individual's inherent ability to recognize patterns and solve complex problems without extensive training or prior experience.

A posteriori knowledge

- A posteriori knowledge is derived from experience and empirical evidence. Unlike a priori knowledge, which is based on reasoning independent of experience, a posteriori knowledge is gained through observation, experimentation, and sensory experience.
- This type of knowledge is often used in scientific research, data analysis, and practical decision-making, where outcomes are determined by testing hypotheses against real-world data. A posteriori knowledge is fundamental in areas that require validation through evidence, making it crucial for understanding and navigating complex environments where direct experience informs understanding.

A posteriori knowledge: Example

- A company's knowledge of consumer preferences and purchasing behavior, derived from analyzing survey data and sales trends, is a posteriori knowledge.
- Understanding an employee's effectiveness based on observed performance metrics and feedback is an example of a posteriori knowledge.

Embedded knowledge

- Embedded knowledge is ingrained within an organization's processes, systems, products, and culture. It is often not explicitly documented but is integral to the organization's functioning and success. This knowledge is reflected in the way things are done within the company, such as operational workflows, technology platforms, and organizational routines.
- Embedded knowledge is difficult to extract and transfer because it is built into the organization's fabric, often through years of practice, cultural norms, and accumulated expertise. It supports the consistency and efficiency of operations, enabling the organization to maintain quality and achieve strategic goals.

Embedded knowledge: Example

- The specific steps and machine settings used in a manufacturing process that consistently produces high-quality products are embedded knowledge developed and refined over time.
- The unspoken rules and behavioral expectations within a company, such as decision-making processes or communication styles, are embedded knowledge that influences how employees interact and perform their roles.

Institutional knowledge

- Institutional knowledge refers to the collective understanding, skills, processes, and historical context that an organization accumulates over time. This type of knowledge is often undocumented and resides in the minds of long-standing employees or is embedded within the organization's culture and practices.
- Institutional knowledge encompasses everything from the company's founding history to its decision-making processes, internal policies, and unwritten norms. It is critical to maintaining continuity, ensuring smooth operations, and preserving the organization's identity.

Institutional knowledge: Example

- Knowledge of how the company was established, including the original mission, vision, and challenges faced by the founders.
- Understanding the history of key customer accounts, including past interactions, preferences, and the nuances of relationship management.

Domain expertise

- Domain expertise knowledge refers to the deep, specialized understanding and skills an individual obtains in a particular field or industry. This type of knowledge is gained through extensive experience, education, and continuous learning within a specific domain, making the individual an expert or authority in that area.
- Domain expertise is critical for solving complex problems, making informed decisions, and driving innovation within a particular field. It encompasses the theoretical knowledge of the subject and the practical application and nuances that are often only learned through years of dedicated practice.

Domain expertise: Examples

- An investment banker with extensive knowledge of financial markets, valuation techniques, and risk management strategies. This expertise allows them to make informed decisions on mergers and acquisitions, investment opportunities, and financial structuring.
- A software engineer with deep expertise in AI, machine learning algorithms, and data science, capable of developing advanced AI models and systems that drive innovation in technology companies.