

Information Systems and Technologies

Lecturer: Dr Jay Krishna Thakur



**European Institute of Innovation,
Entrepreneurship and Technology
Lessingstraße 79,
13158 Berlin, Germany.
Email: info@eiiet.com**

Discover the world of EIIET

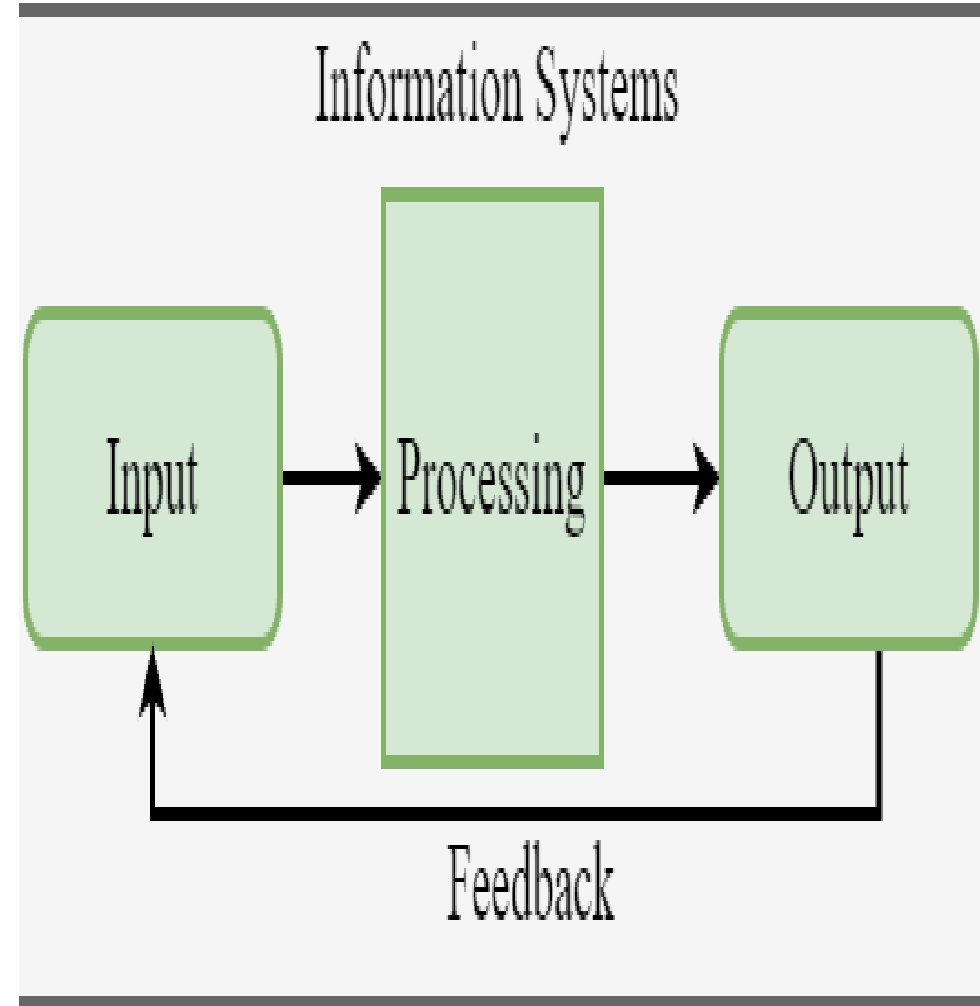
Objectives

- Explain and understand basic information systems concepts
- Distinguish among various types of information systems
- Obtain skills necessary to manage and analyse data
- Facilitate good IS to support decision making
- Assess the strategic significance of IS in organisations
- Familiarity with emerging technologies (AI, cloud, big data)
- Discuss ethical concerns, security, and privacy issues.



What is Information Systems?

- A system that collects, processes, stores, and distributes information.
- Converts raw data into meaningful information.
- Supports decision-making, coordination, and control in organisations.
- **Importance**
 - ✓ Improves efficiency and productivity.
 - ✓ Helps in better decision-making.
 - ✓ Enhances customer service.
 - ✓ Provides competitive advantage

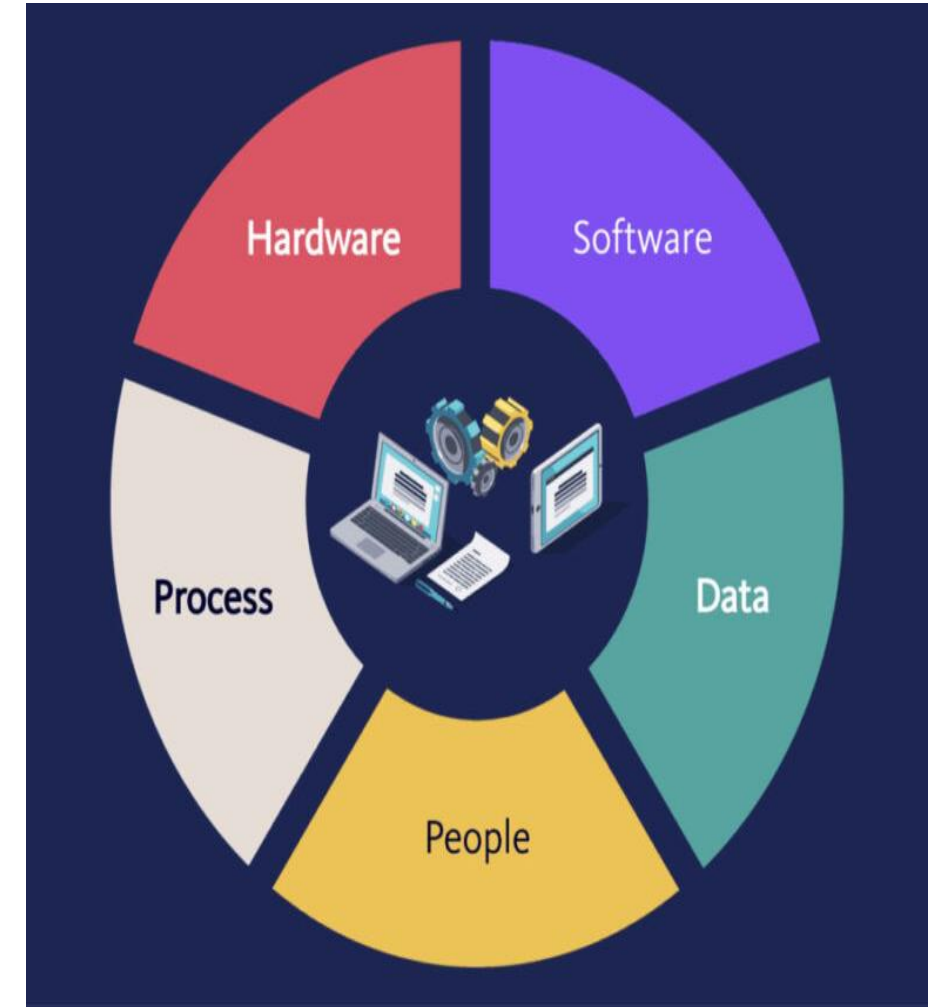


Role in modern organisations

- Decision making is supported by right data.
- Streamlines the process by automation.
- Facilitates communication and collaboration.
- Collects and processes data about an organisation.
- Facilitates business operations and processes.
- Enhances customer service.
- Provides a competitive edge.
- Allows for strategic planning and expansion.
- Improves data security and control.
- Promote digital transformation.

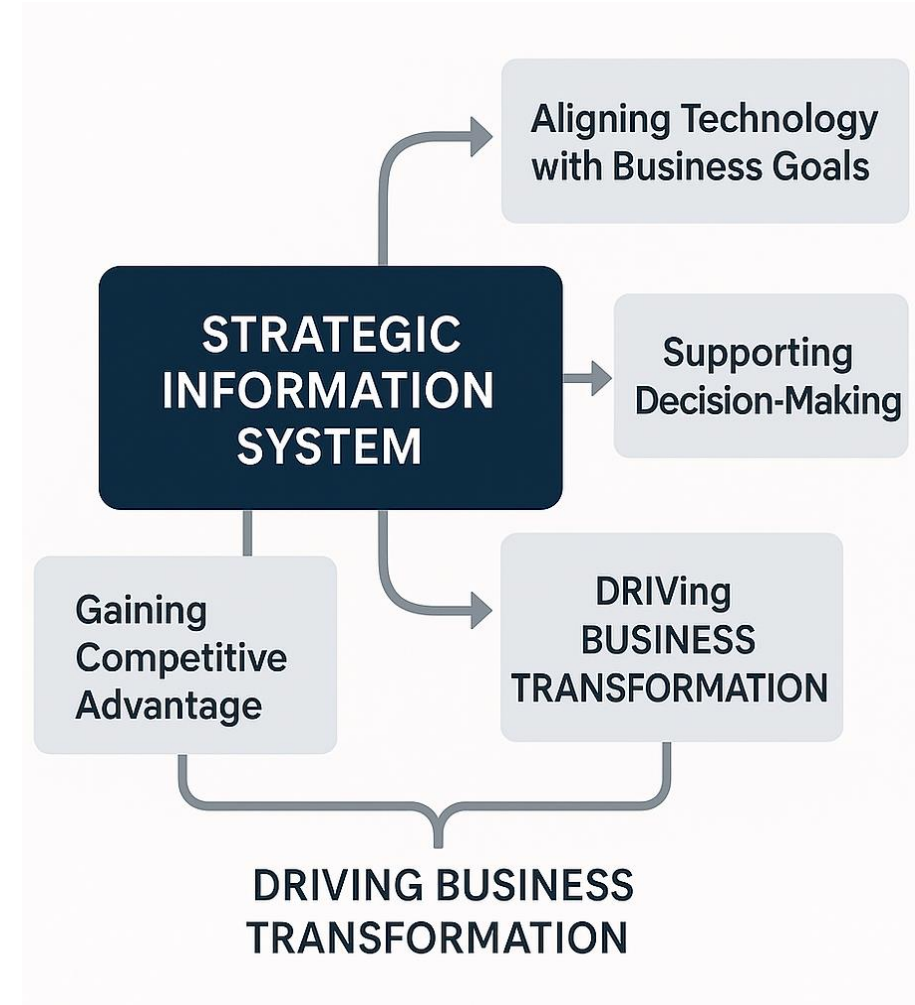
Components of IS

- **Hardware** – PCs, servers, devices
- **Software** – apps and operating systems
- **Data** – Raw facts and figures
- **People** – Users, managers, IT staff.
- **Process** – The procedures and rules for using the system



Strategic Role of IS

- **Definition:** Use of IS to support and achieve business goals
- **Roles**
 - ✓ Better Alignment
 - ✓ Increases efficiency and lowers costs
 - ✓ To achieve competitive advantage
 - ✓ Fosters innovation and new business models



Data Vs Information Vs Knowledge

- **Data**

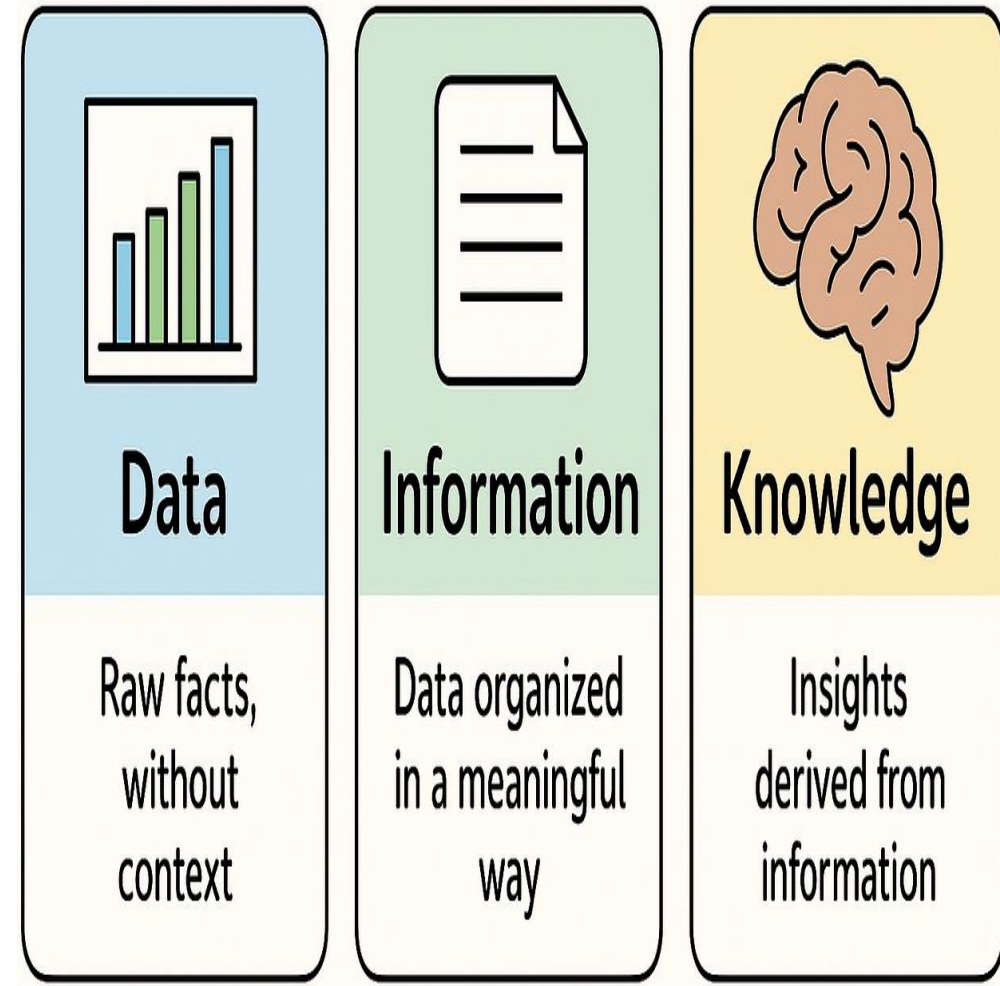
- ✓ Facts and figures, collected but not processed
- ✓ Not meaningful by themselves

- **Information**

- ✓ Data that has been processed and organised
- ✓ In context and has meaning

- **Knowledge**

- ✓ Information that has been interpreted in light of experience
- ✓ For decisions to be made and actions taken

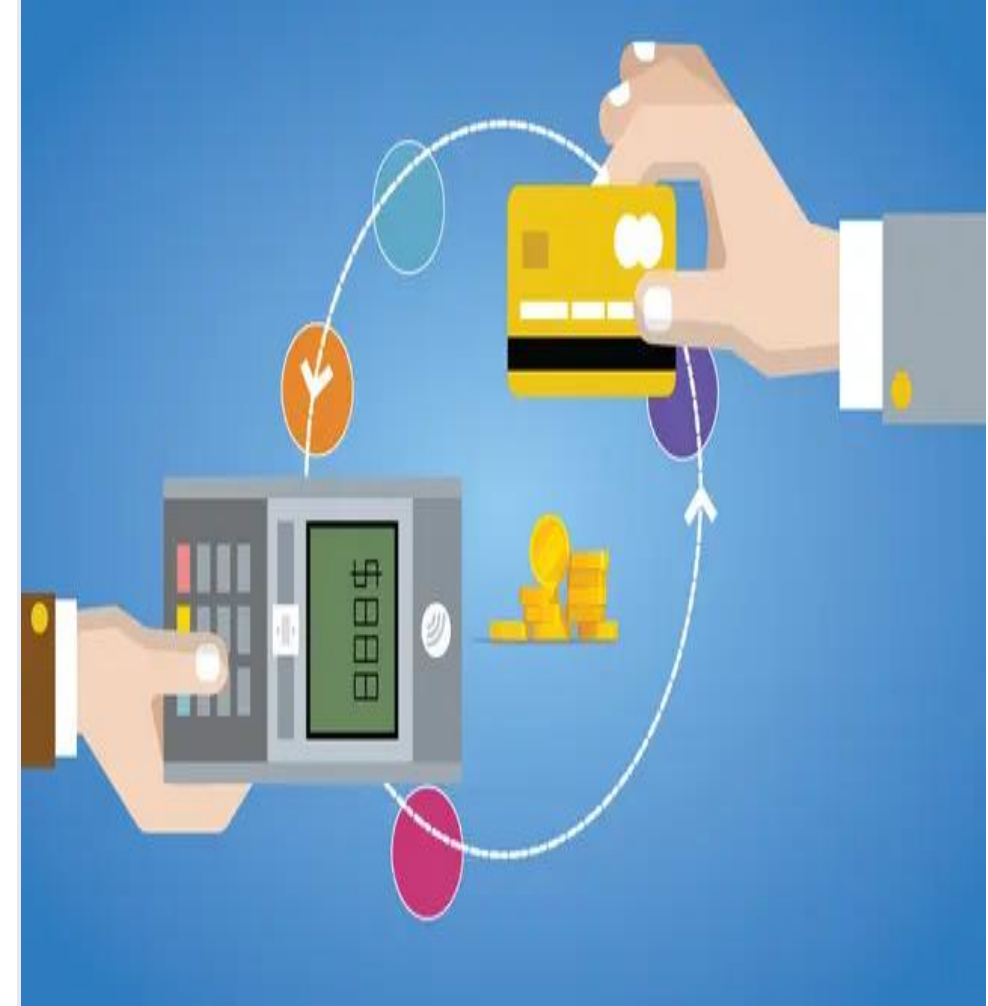


Types of Information System

- **Transaction Processing Systems (TPS)**
- **Management Information Systems (MIS)**
- **Decision Support Systems (DSS)**
- **Executive Support Systems (ESS)**

Transaction Processing Systems (TPS)

- Handling normal daily transactions
- Fast, Accurate Processing of Large Batches of Data
- Provides consistent and reliable data
- Provides support for tactical activities
- **Examples**
 - ✓ Billing systems
 - ✓ Payroll systems
 - ✓ Sales and order-processing systems
- **Tools:** Square, QuickBooks

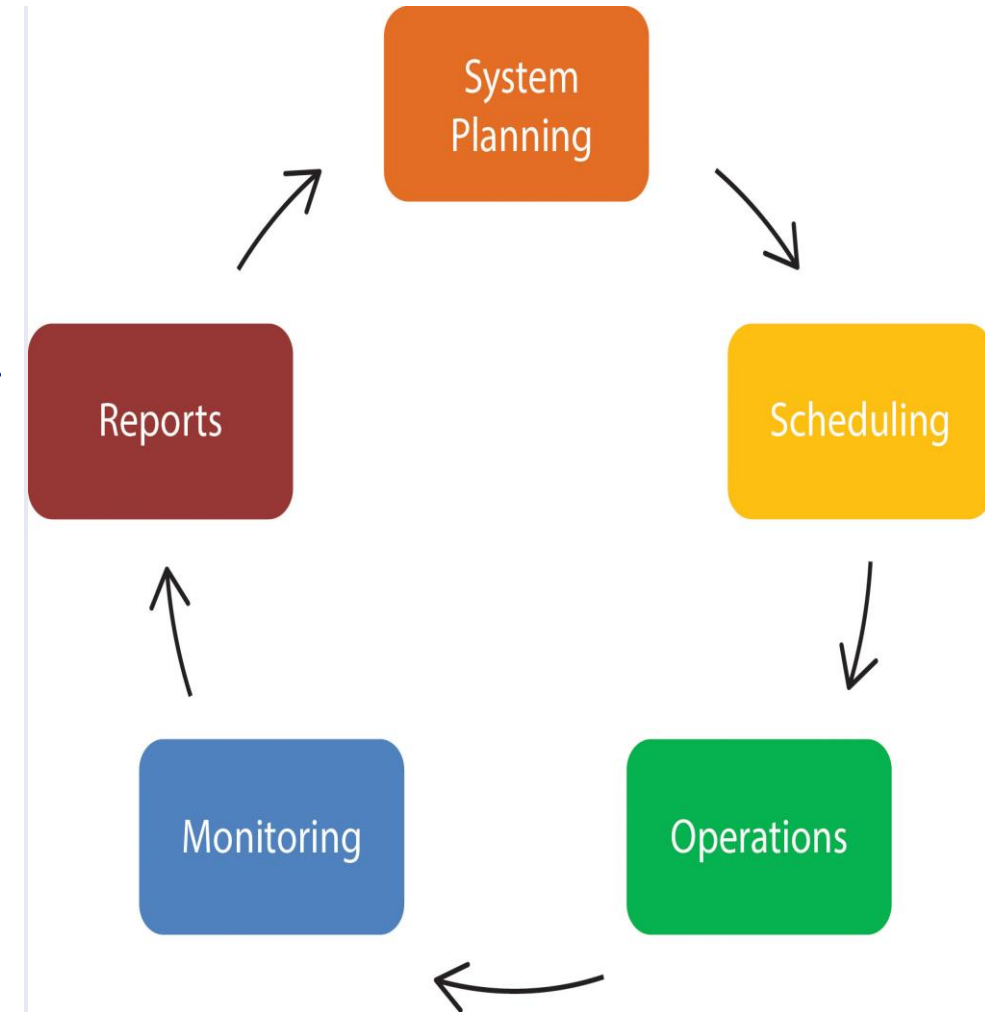


TPS – with Business Integration

- **With POS (Point of sale) / Retail:** updates inventory, records the sale, and sends data to finance and reporting systems in real time.
- **With Inventory Management:** automatically reduces stock; low-stock events can trigger replenishment orders or alerts.
- **With Accounting / Finance:** sends completed sales, payments, and orders directly to accounting software, so ledgers stay updated without manual entry.
- **With E-Commerce Platforms:** Online purchases run through TPS, which updates product stock, confirms payment, and triggers order fulfilment and shipping.
- **With CRM:** feeds purchase history and order details into CRM.
- **With Supply Chain (SCM):** TPS-driven order data links to SCM systems so firms can track goods from suppliers to customers more smoothly

Management Information Systems (MIS)

- **System Planning** — Goal setting and determining resources and strategies for the MIS.
- **Scheduling** — Dividing time and jobs for the best system implementation.
- **Operations** — Daily activities and execution of the system.
- **Monitoring** — Real-time performance, progress and problems monitoring.
- **Reports** — Preparation of summaries for management review.
- **Business Tools used:**
 - ✓ Microsoft Excel
 - ✓ Microsoft Power BI



MIS in Business: ERP, CRM, and Operations

- **With ERP** – Pulls sales, inventory, and finance data for performance reports.
- **With CRM** – Links customer data to show revenue by segment or product.
- **With Inventory / SCM** – Shows stock levels, turnover, and order status.
- **With HR / Finance** – Tracks payroll and spending vs. headcount.
- **Retail example** – POS + ERP → MIS reports store sales and product margins.
- **Manufacturing example** – Production + forecasts → MIS shows utilization and delays.

Decision Support Systems (DSS)

- **Basic Elements:**

- ✓ People - Users and decision makers
- ✓ Assets – Resources, Data and Tools
- ✓ Business Processes – Daily Tasks

- **Key Functions / Benefits:**

- ✓ Future Planning – Strategic forecasting & scenario analysis
- ✓ Risk Management – Risk identification and reduction
- ✓ Business Improvement – Process and performance enhancement
- ✓ Visualisation – Easy-to-use dashboards and data insights

- **Business Tools Used:** Tableau, IBM SPSS

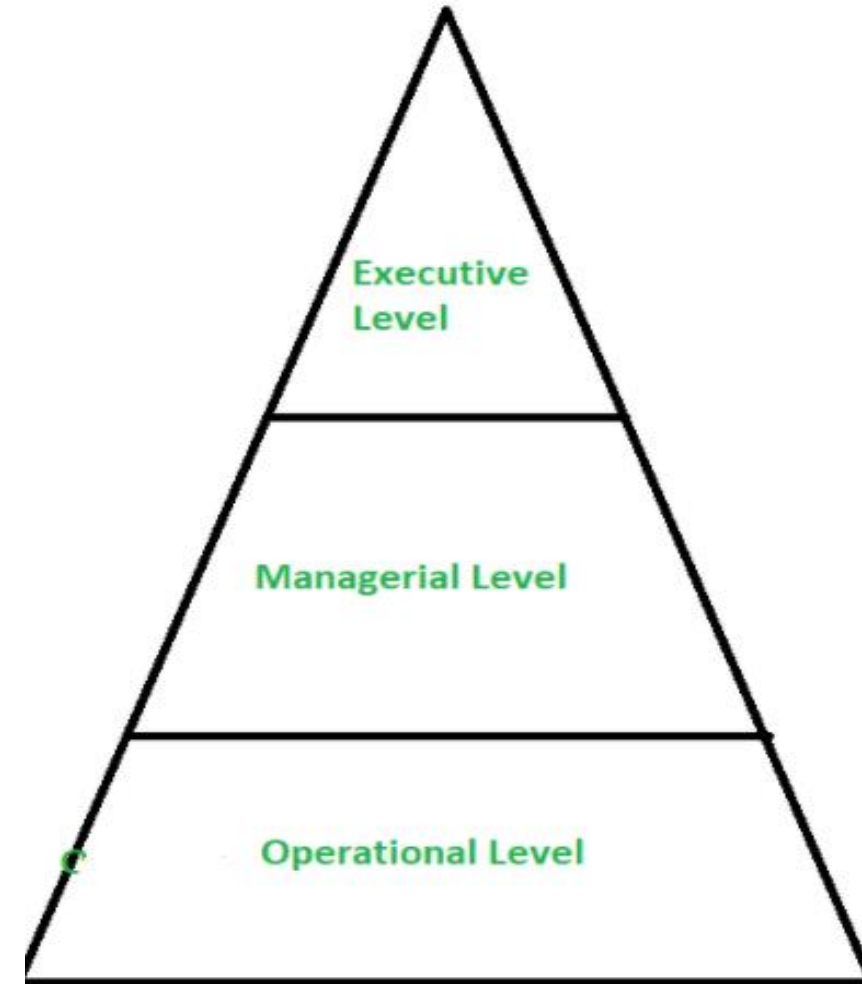


DSS – Overview and Business Integration

- **DSS** – Helps managers make complex decisions using data and models.
- **With TPS** – Uses daily transactions for demand, inventory, and cash-flow decisions.
- **With MIS** – Uses reports to test pricing, staffing, and budget options.
- **With ERP** – Uses shared data for cross-functional planning.
- **Retail** – Uses sales and inventory to set stock levels and promotions.
- **Finance** – Uses transactions and risk data for loans and investments.
- **Manufacturing** – Uses production data to plan schedules and maintenance.

Executive Support Systems (ESS)

- **Executive Level (Top) → ESS**
 - ✓ Provides information from internal and external sources to help top management make strategic decisions.
- **Managerial Level (Middle) → MIS / DSS**
 - ✓ Where tactical decisions are made as well as the day-to-day management.
- **Operational Level (Bottom) → TPS / Operations systems**
 - ✓ Performs routine transactions and daily business.
- **Tools:**
 - ✓ SAP Analytics Cloud
 - ✓ Oracle Business Intelligence



ESS in Business Market

- **ESS definition:** ESS helps top executives make strategic decisions.
- **In the business market:** ESS shows summarised internal and external data on dashboards.
- **Key features:**
 - ✓ Simple visuals, KPIs, and drill-down to details.
 - ✓ Real- or near-real-time performance views.
- **Business use:**
 - ✓ Executives use ESS to track revenue, profit, market share, risk, and campaigns.
 - ✓ Marketing leaders compare campaigns and competition.
- **In conclusion,** ESS gives senior leaders a real-time, high-level view of the business and market for strategic decisions.

Enterprise Systems Overview

- **ERP Enterprise Resource Planning** – An integrated central system that covers all departments of an organisation
- **Financial Management** – Controls bookkeeping, budgeting, and financial reporting
- **Human Resource Management (HRM)** – Deals with recruitment, payroll and employee information
- **Customer Relationship Management (CRM)** – Tracks customer interaction and sales
- **Supply Chain Management (SCM)** – Regulates the flow of goods, suppliers and logistics
- **Manufacturing Resource Planning (MRP)** – Oversees the planning of production and materials.



E-Commerce and Digital Business

- **E-Commerce** is the exchanging of goods and services online.
- **Digital business** is the application of a combination of digital technology to enable new types of business that was not possible before.
- **Key Benefits:**
 - ✓ Wider Reach — Access global customers 24/7
 - ✓ Cost Efficiency — Lower overhead than physical stores
 - ✓ Data-Driven Insights· Better understand of customer behaviour
 - ✓ Personalisation & Convenience — Faster, tailored shopping experiences
 - ✓ Scalability — No physical walls to stand in the way of growth or expansion.

E-Commerce and CRM

- **E-Commerce:** Online buying and selling of goods and services.
- **CRM:** System that stores and manages customer data and interactions.
- **E-Commerce with CRM:** CRM helps e-commerce understand customers and personalise offers.
- **Key Benefits**
 - ✓ Improves customer retention and loyalty.
 - ✓ Supports cross-selling, upselling, and cart recovery.
 - ✓ Increases sales through targeted communication.
- **Conclusively:** E-commerce brings customers in; CRM keeps them returning.

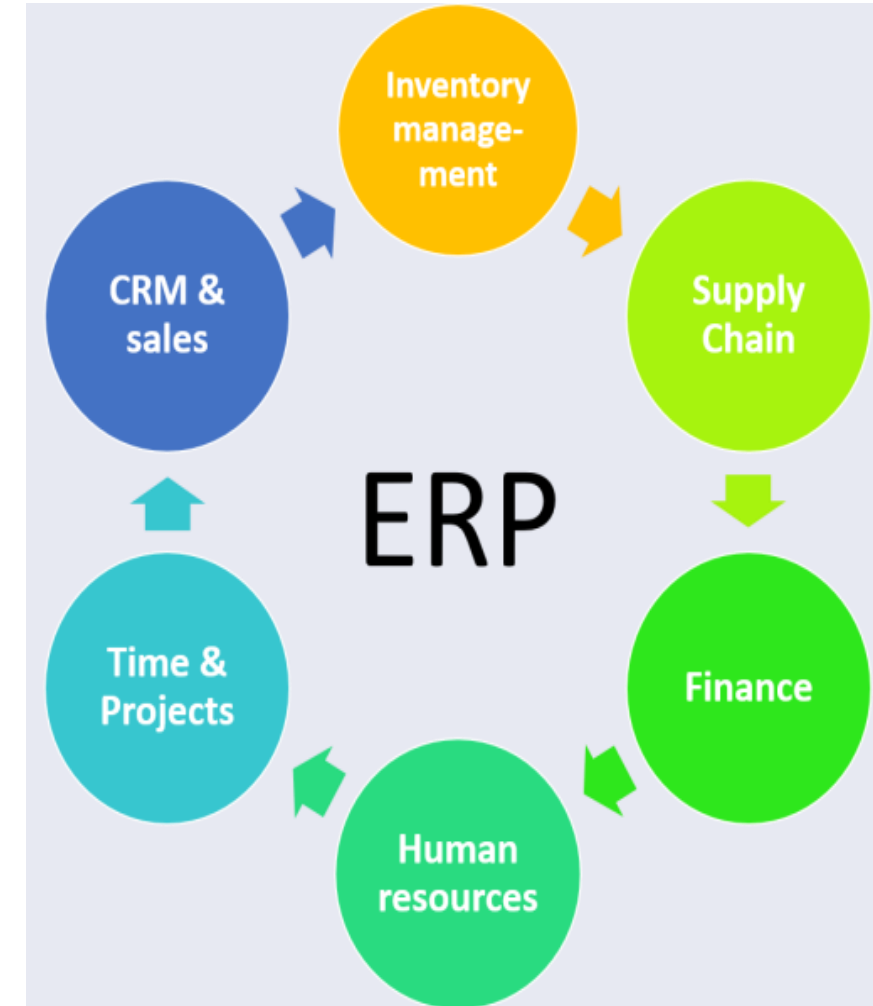


Supply Chain and Operations

- **Supply Chain:** Supply chain covers the flow of goods, data, and money from suppliers to customers, including procurement, logistics, and distribution.
- **Operations:** Operations manages internal processes such as production, service delivery, and daily workflows to turn inputs into outputs efficiently.
- **Supply Chain and Operations Together**
 - ✓ They jointly plan, source, produce, store, and deliver products while reducing cost, improving quality, and meeting demand.
- **Key Focus**
 - ✓ Supply chain focuses on external flows and partners;
 - ✓ Operations focuses on internal execution and resource use.
- **Conclusively,** the supply chain sends the right product to the right place; operations make sure it is produced and delivered efficiently

Enterprise Resource Planning

- **Interpretation:** Unified enterprise management structure.
- **Objective:** To consolidate information, as well as automate workflows among departments.
- **Key advantages:** More aligned teams, quicker decisions and less work duplication.
- **Typical modules include:** Finance, HR, procurement, inventory, sales, and supply chain.
- **Value to the business:** Increases efficiency, visibility and control.

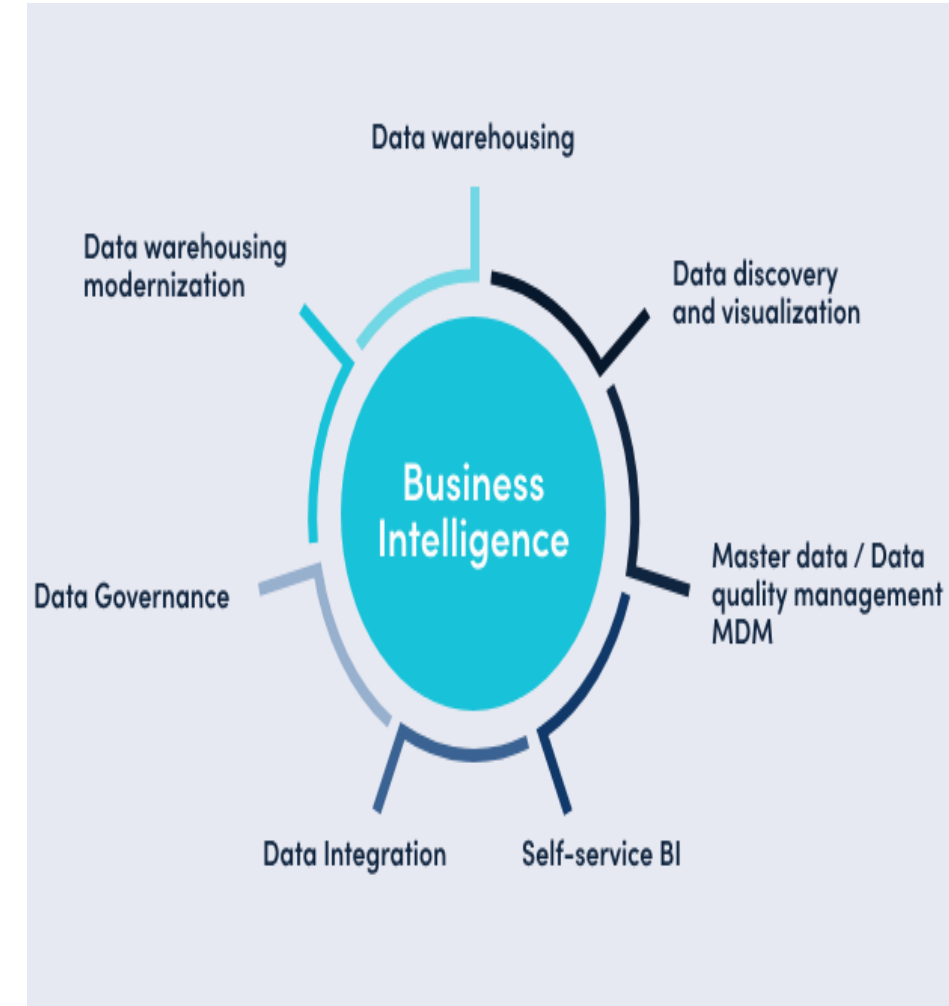


Example of ERP Use

- **A simple example of ERP** use is a retail company using one system to manage sales, inventory, billing, and accounting together.
- **Example**
 - ✓ When a customer buys a product:
 - ✓ The sale is recorded automatically.
 - ✓ Inventory is updated in real time.
 - ✓ Finance gets the billing entry.
 - ✓ The warehouse sees what item needs to be shipped.
- **In one line:** ERP helps different departments work from the same data, so the business runs faster and with fewer errors

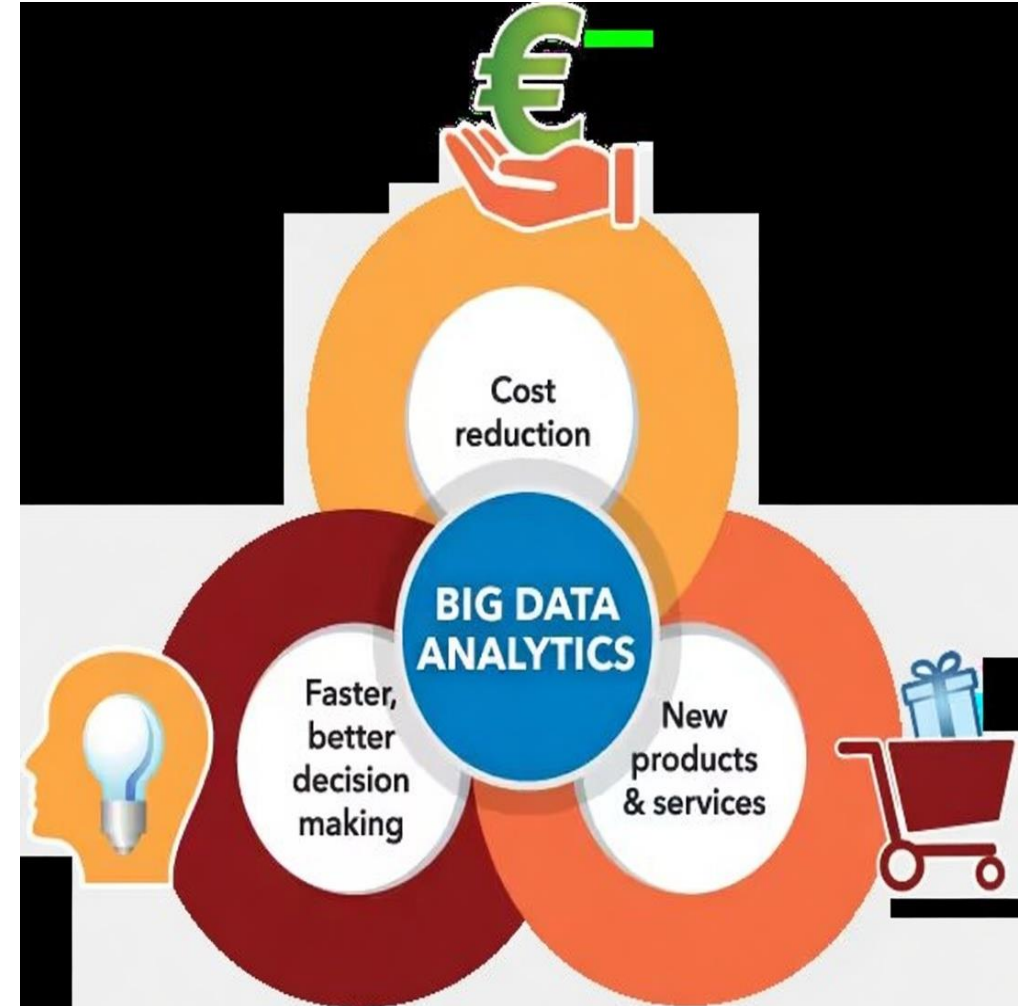
Business Intelligence (BI)

- **Data Warehousing** – One place store of data
- **Data Warehousing Modernisation** – Cloud and real-time enhancements
- **Data Discovery & Visualization** – Dashboards & exploration applications
- **Master Data / Data Quality (MDM)** – Clean, consistent data
- **Self-Service BI** – Reporting Made Simple for All Users
- **Data Integration** – Linking data from different sources
- **Data Governance** – Policies for security, quality & compliance



Big Data Analytics

- **Big Data Analytics** refers to the application of advanced analytics techniques on big data, which helps in finding valuable insights.
- **Advantages:**
 - ✓ **Reducing Cost Benefits** – It streamlines operations, cuts down waste and boosts productivity.
 - ✓ **Decision Making Faster, Better** – Make data-driven decisions at the speed and accuracy you need.
 - ✓ **New Products & Services** – Detects market opportunities and stimulates innovation.



Data Warehouse and Data Mining

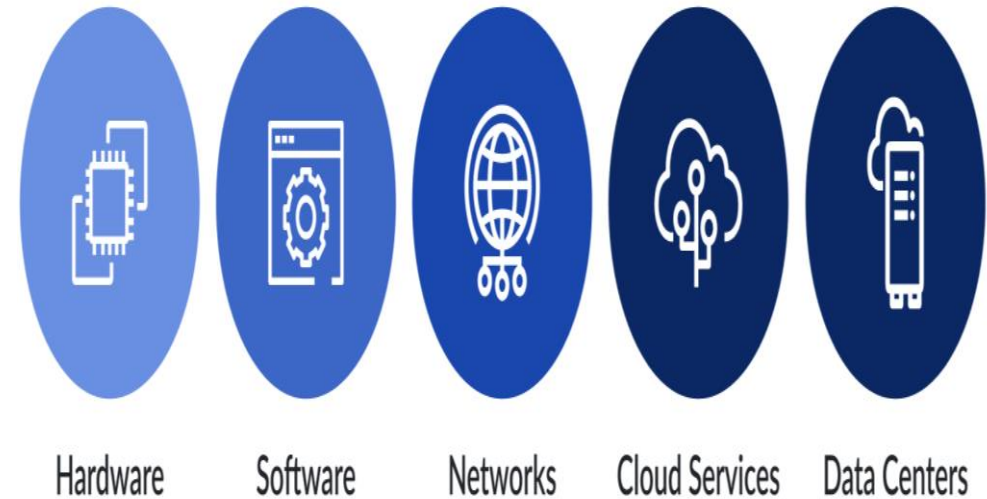
- **Data Warehouse:** A centralised store of cleaned, integrated, historical data used for reporting and analysis.
- **Data Mining:** The process of analysing large datasets to discover patterns, trends, and useful insights for decision-making
- **Relationship:** the warehouse provides the data foundation, and mining turns it into insight.
- **OLAP tools:** Oracle OLAP, Microsoft Analysis Services, IBM Cognos, SAP BusinessObjects, Tableau, Google Data Studio, Power BI, QlikView



IT Infrastructure

- **Hardware** – Physical entities such as computers, servers and storage units.
- **Software** – Operating systems and software applications.
- **Networks** – Communications and the Internet.
- **Cloud Services** – Computing and storage services over the Internet.
- **Data Centres** – Facilities for storing and managing data securely.

IT Infrastructure Components



IT Strategy and Business Alignment

- **IT Strategy:**

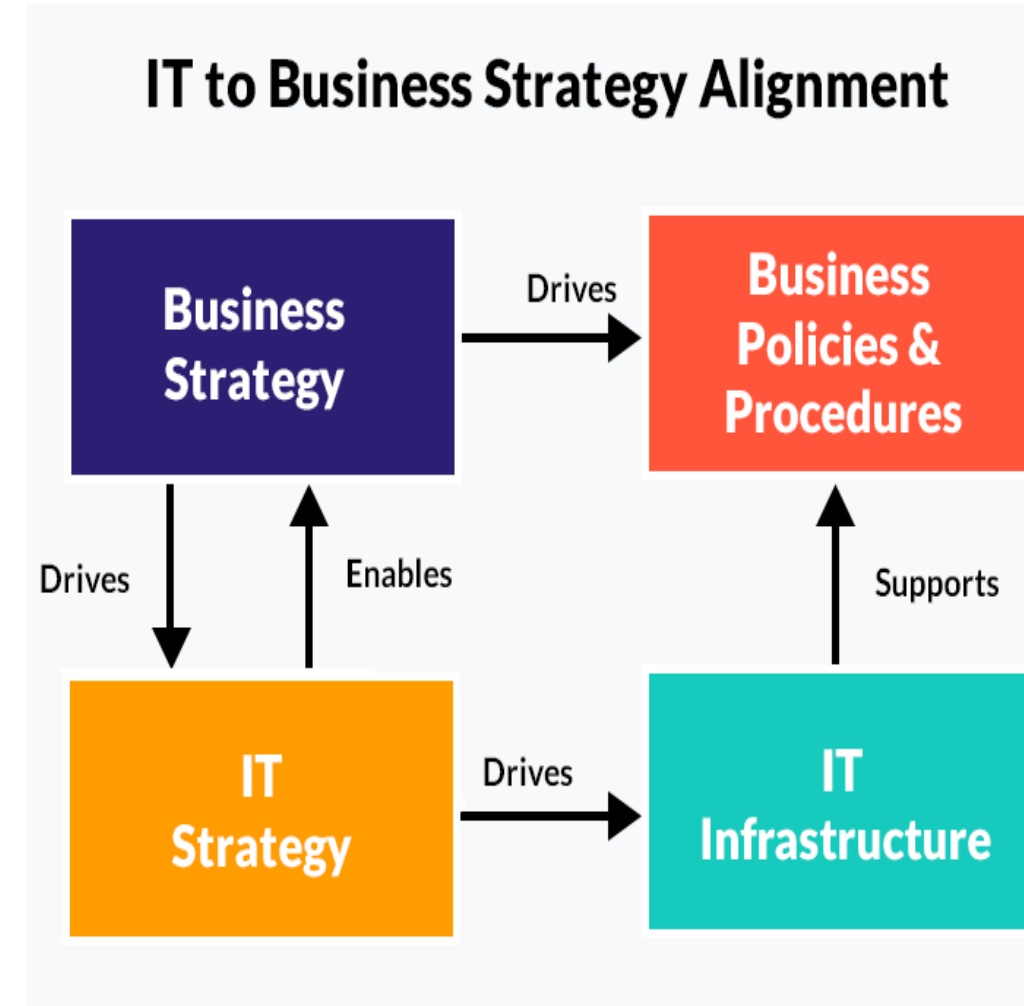
- ✓ IT strategy is a plan that aligns technology decisions, expenditures, and capabilities with the organisation's mission and business.

- **Business Alignment:**

- ✓ Business alignment is when IT activities are clearly focused on supporting business goals, such as growth, cost containment, customer service, and innovation.

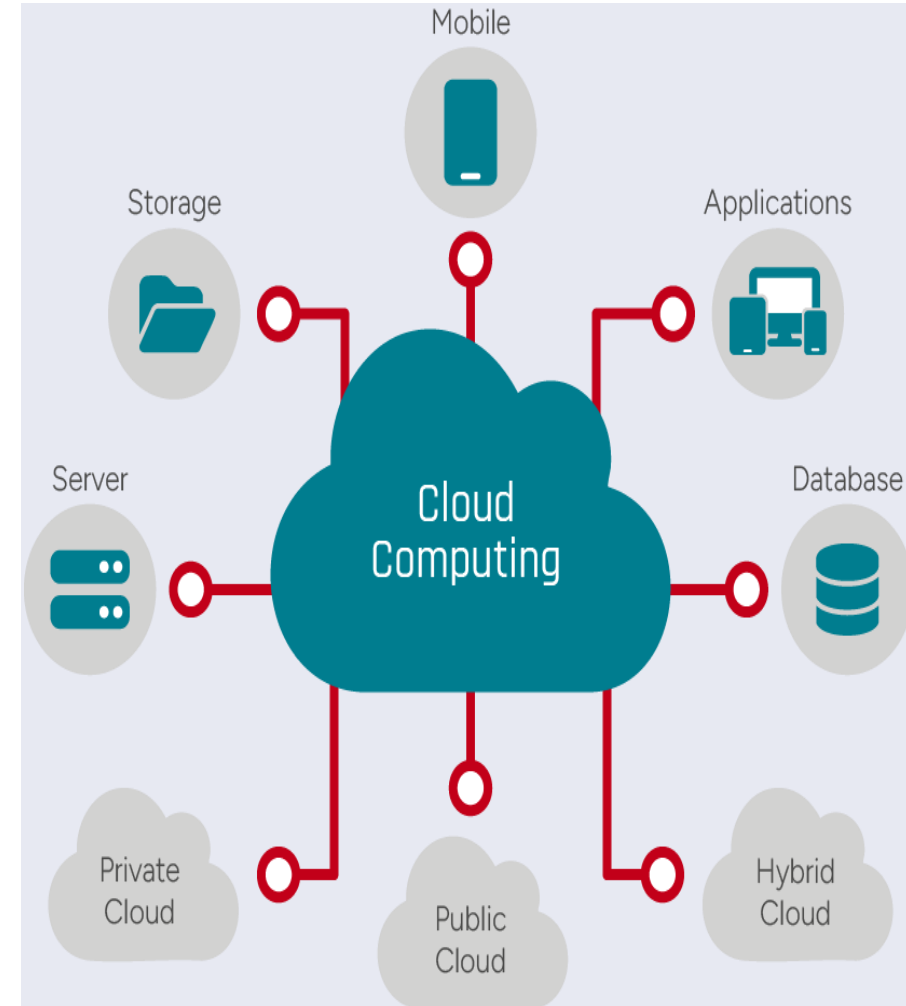
- **Key Idea:**

- ✓ IT strategy and business alignment promote technology as a strategic enabler and not just a support function or cost centre.



Cloud Computing

- **Mobile Devices:** Smartphones/tablets that connect to cloud services.
- **Applications:** Software that are cloud-based such as SaaS tools, Google Docs.
- **Database:** Structured data that is centralised stored and accessed through the cloud.
- **Storage:** Cloud storage for your files, images and backups.
- **Server:** Virtual servers, on which you run your applications and process your data.



Artificial Intelligence

- **AI definition:** AI is machines doing smart tasks like learning, understanding language, and making decisions.
- **How it works:** AI learns from data and finds patterns to act without manual rules for every step.
- **Uses in business:** AI helps automate work, personalise service, and give quick data-driven insights.
- **One-line:** AI makes machines act smart by learning from data and doing human-like tasks.



Automation and Workflow Systems

- **Automation:**

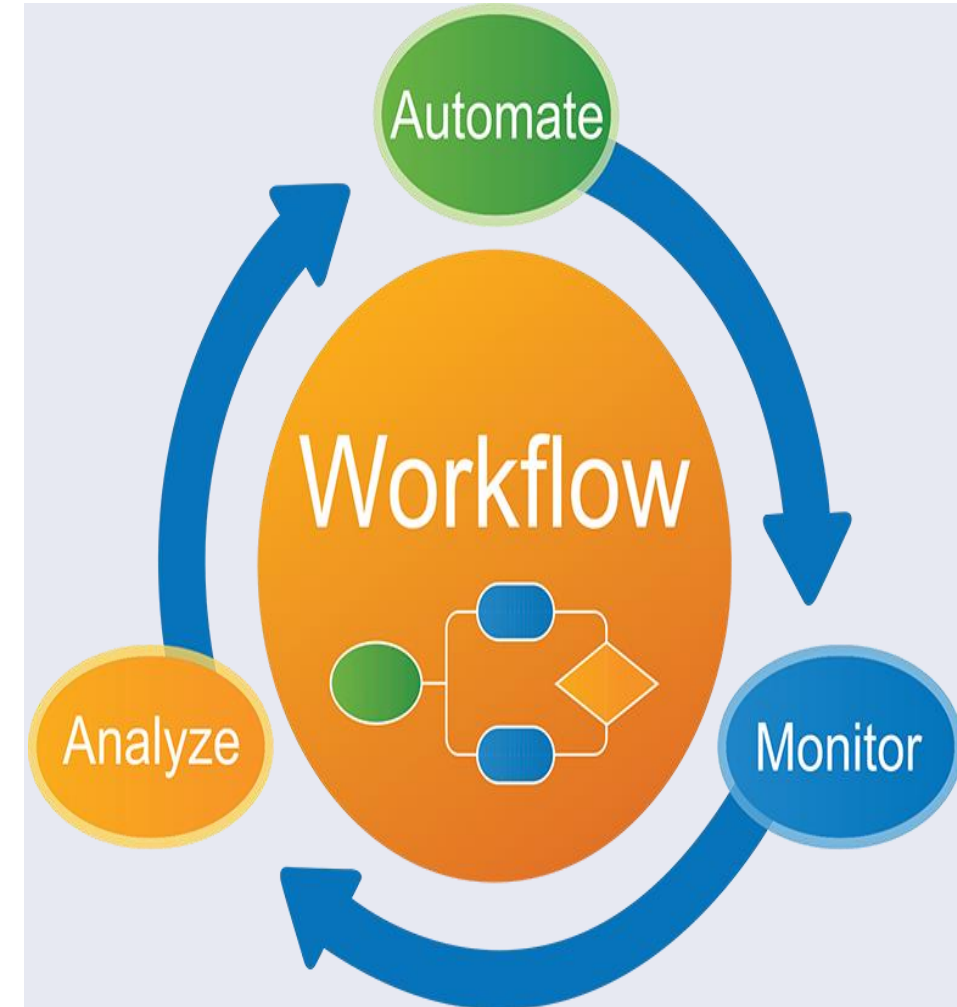
- ✓ Uses software to perform repetitive tasks (like approvals or data entry) without manual effort.

- **Workflow Systems:**

- ✓ Map business processes into automatic steps and rules, moving work between people and systems.

- **Combined Effect:**

- ✓ Makes processes faster, more accurate, and easier to track.



Cybersecurity

- **Definition:** Safeguarding systems, networks, and information from digital attacks
- **Purpose:**
 - ✓ Stop hacking, steal data, and gain unauthorised access to systems
 - ✓ Make sure the information is kept confidential, that it's not tampered with and that is safe
- **Tools:** Firewalls, Antivirus, Encryption
- **Threats:** Phishing, Malware, Hacking
- **Importance**
 - ✓ Defend personal and business information from theft or misuse
 - ✓ Ensures safe online use and transactions



Emerging Technologies

- **Agentic AI & Multi-Agent Systems** — AI agents that work autonomously in workflows and decisions
- **Physical AI & Robotics** — Automation of tasks in the physical space using AI
- **Generative AI** — Content, insight and productivity applications
- **Digital Twins** — Virtual twins for simulation and optimisation
- **Edge Computing & IoT** — Processing in real time on source
- **Immersive Tech (AR/VR)** — Training, collaboration, and customer experiences
- **Blockchain / Digital Provenance** — Transparent tracking and compliance

Ethical and Social Issues

- **Data Privacy** – Keeping personal and sensitive data safe.
- **Security** – Blocking unauthorised users and attacks.
- **Intellectual Property** – Observe the copyrights, patents and software licenses.
- **Information Accuracy** – Making sure data is accurate and dependable.
- **Digital Divide** – The gap between those who have access to technology and information and those who do not.
- **Impact on Jobs** – displacement through automation.
- **Surveillance & Monitoring** – The ethics of user/employee tracking.
- **Legal Obligations** – Compliance with data protection legislation.

Key Takeaways

- Information systems transform data into information.
- Facilitate decisions at every level of an organisation.
- Increase efficiency, productivity, and communication.
- Consists of systems such as TPS, MIS, DSS, ESS.
- Business systems (ERP, CRM, SCM) unify business processes.
- Cloud, AI, and big data technologies are driving innovation.
- Protect data security, privacy, and ethical use.
- Deliver competitive advantage and strategic value.
- Needed for digital transformation in today's organisations.

Further Learning and Resources

- Management Information Systems – Kenneth C. Laudon & Jane P. Laudon
- Information Systems for Managers – Goyal
- Digital Business & E-Commerce Strategy – Abijit J.
- Competing in the Age of AI – Marco Iansiti & Karim R. Lakhani
- Coursera: Information Systems Specialisation (University of Minnesota)
- edX: Digital Transformation (Boston University)
- Udemy: Business Analysis & Systems Thinking
- LinkedIn Learning: Enterprise Systems & Digital Strategy

Thank you



**European Institute of Innovation,
Entrepreneurship and Technology
Lessingstraße 79,
13158 Berlin, Germany.
Email: info@eiiet.com**