

Module 10 - Information Systems

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General Notes

Information Systems Manager and Computer Information Systems

What is an Information System?

- An information system is a collection of people, procedures, software, hardware, data, and connectivity
- It provides information essential to running an organization
- The information is critical for producing a product or service and for deriving profit for profit-oriented enterprises

Why are Computers Used in Organizations?

- At a basic level, computers are used to record events
- At a deeper level, computers are used to make decisions
- Data from sales in stores and inventory items are used to decide employee bonuses and identify market trends, respectively

Understanding Information Flows in Organizations

- To effectively use computers in an organization, one must understand how information flows through different functional areas and management levels
- Different types of computer-based information systems include transaction processing systems, management information systems, decision support systems, and executive support systems
- Databases play an important role in supporting each level or type of information system

Conclusion

- Computers are used to record events and make decisions
- Different types of computer-based information systems and databases support different levels and types of information systems in an organization.

Organizational Information Flow

Introduction

- Computerized information systems support the vertical and horizontal flow of information within the organization, in addition to keeping track of transactions and day-to-day business operations.
- To understand the flow of information within an organization, we need to examine its structure from a functional perspective.

Organization Structure

- HealthWise Group, a hypothetical manufacturer of sporting goods, can be viewed from a functional perspective with various management levels.
- Effective operations require an efficient and coordinated flow of information throughout the organization.

Basic Functional Areas in Organizations

Most organizations have departments that specialize in one of five basic functions:

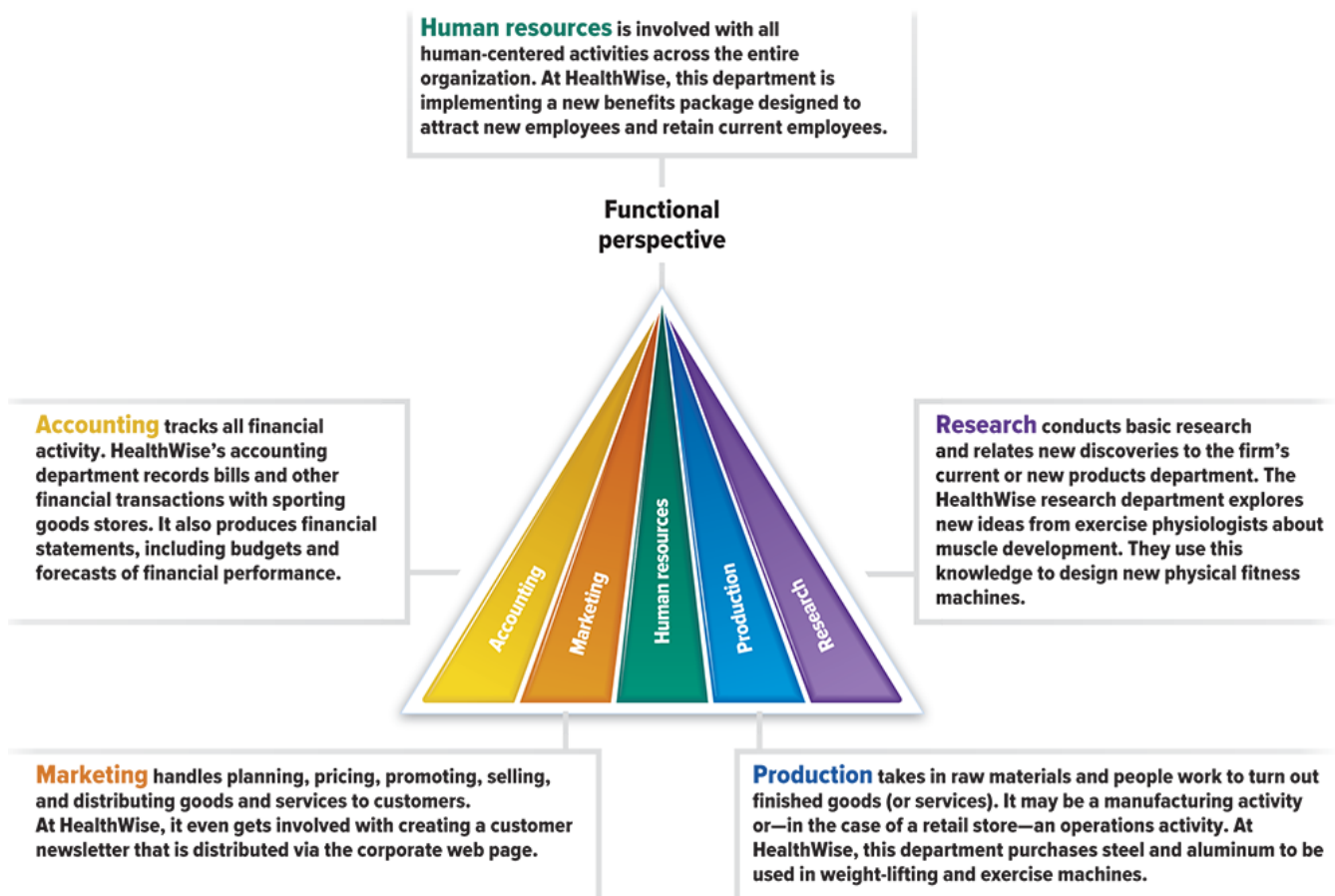
- **Accounting:** Records all financial activity from billing customers to paying employees.
- **Marketing:** Plans, prices, promotes, sells, and distributes the organization's goods and services.
- **Human resources:** Focuses on people—hiring, training, promoting, and any number of other human-centered activities within the organization.
- **Production:** Actually creates finished goods and services using raw materials and personnel.
- **Research:** Identifies, investigates, and develops new products and services.

Examples

- HealthWise's accounting department tracks all sales, payments, and transfers of funds. It also produces reports detailing the financial condition of the company.

- HealthWise's goods include a wide range of products related to sports and other types of physical activity.
- Human resources at HealthWise is responsible for implementing a new benefits package, for hiring new skilled workers, and much more.
- HealthWise manufactures a variety of sports equipment, including yoga mats.
- Scientists at HealthWise are investigating a light, inexpensive alloy for a new line of weight-training equipment.

Organization Chart



Conclusion

- Understanding the basic functions in an organization is important for effective communication and information flow within the organization.
- Departments specializing in these functions ensure that the organization runs efficiently and smoothly.

Management Levels and Information Flow

Introduction

- The foundation of any organization is its employees who produce goods and services.
- Different levels of managers plan, lead, organize, and control the organization to ensure that work gets done.
- Each level of management has different information needs, and information flows in different directions to support those needs.

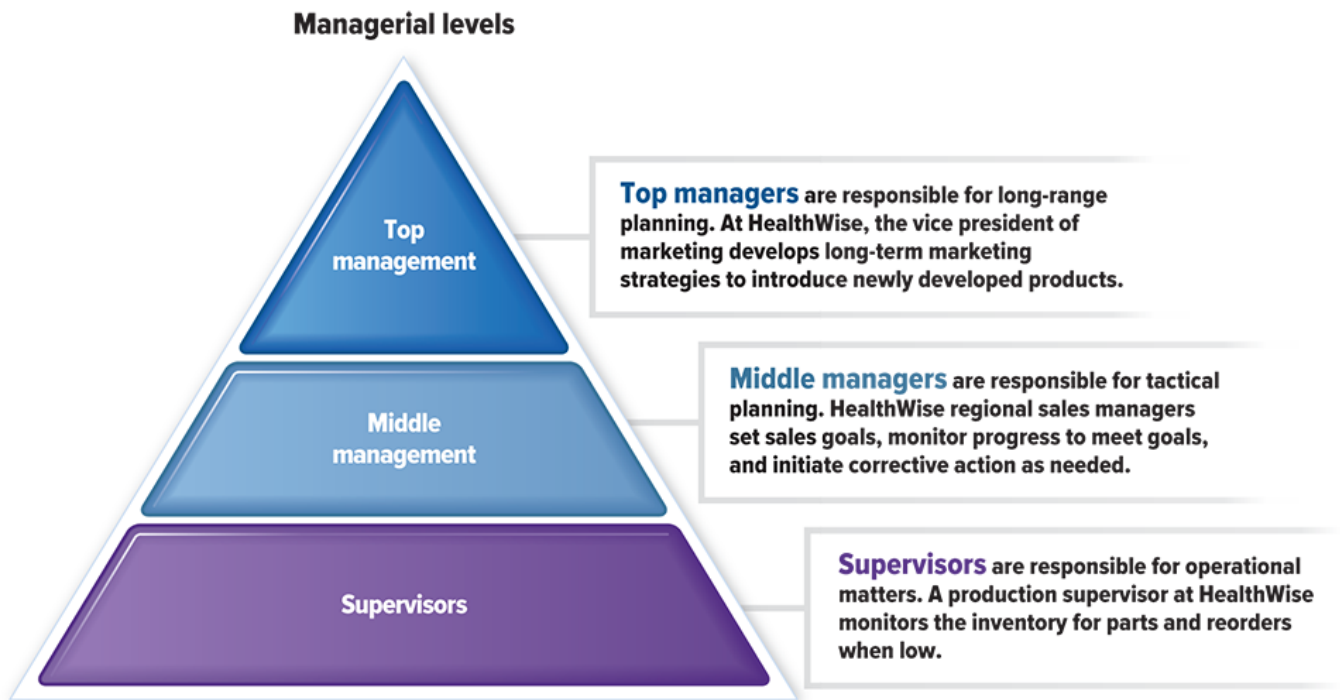
Management Levels

- Management in many organizations is divided into three levels:
 - **Supervisors:** Manage and monitor employees or workers, with responsibility relating to *operational matters*.
 - **Middle-level managers:** Deal with control, planning (*also called tactical planning*), and decision-making, implementing the long-term goals of the organization.
 - **Top-level managers:** Concerned with long-range planning (*also called strategic planning*) and need information that will help them plan the future growth and direction of the organization.

Examples

- The northwest district sales manager for HealthWise directs and coordinates all the salespeople in her area.
- Vice president of marketing, director of human resources, and production manager are other job titles in larger organizations.

Organization Chart



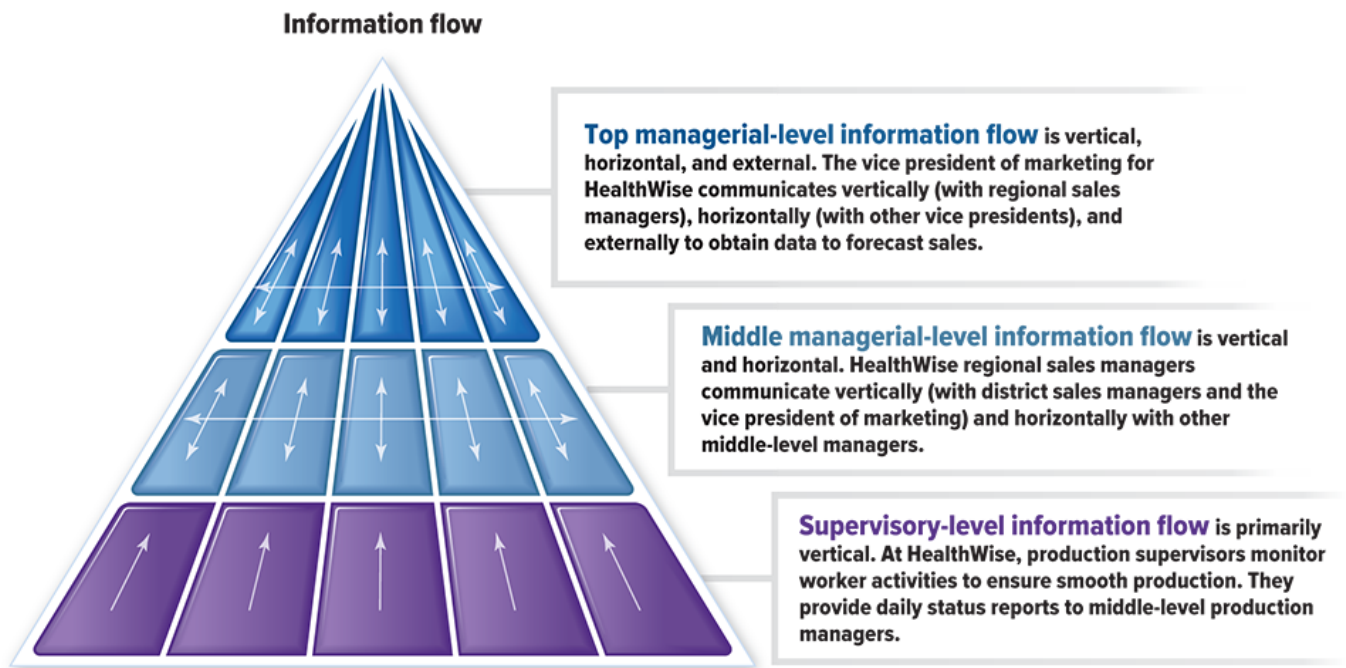
Information Flow

- Top-level managers need summary information describing the overall operations of the business and information from outside the organization to forecast and plan for long-range events.
- Middle-level managers need summarized information, develop budget projections, and evaluate the performance of supervisors.
- Supervisors need detailed, current, day-to-day information on their units to keep operations running smoothly.

Information Flow within an Organization

- For **top-level managers**, information flows vertically and horizontally from within and outside the organization.
- For **middle-level managers**, information flow is both vertical and horizontal across functional lines.
- For **supervisory managers**, information flow is primarily vertical, communicating mainly with their middle managers and the workers beneath them.

Information Flow Chart



Conclusion

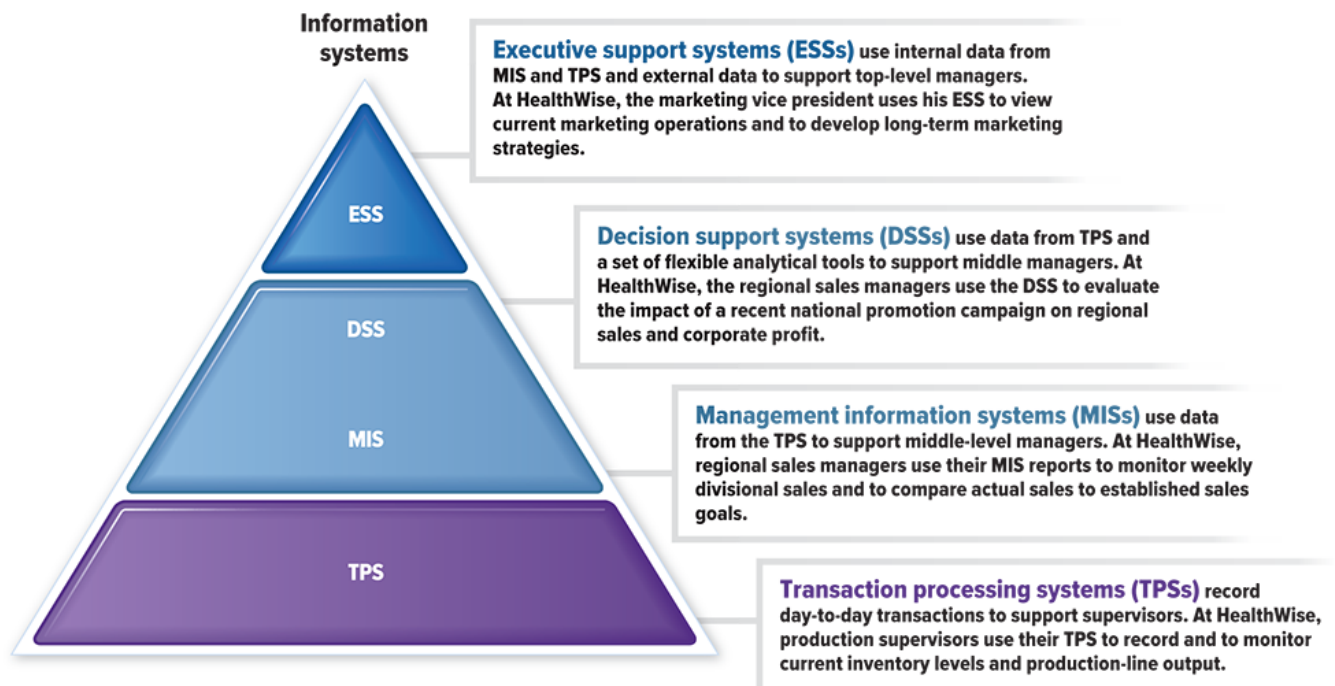
- Understanding the different management levels and their information needs is essential for effective communication and information flow within the organization.
- Each level of management requires different types of information, and information flows in different directions to support those needs.

Computer-Based Information Systems

Types of Information Systems

- Transaction processing system (TPS)
- Management information system (MIS)
- Decision support system (DSS)
- Executive support system (ESS) or executive information system (EIS)

Information Systems Chart



Transaction Processing System (TPS)

- Records day-to-day transactions, such as customer orders, bills, inventory levels, and production output.
- Generates databases that act as the foundation for other information systems.
- Helps supervisors by providing detailed data for decision-making.

Management Information System (MIS)

- Summarizes the detailed data of the TPS in standard reports for middle-level managers.
- Provides standard reports like weekly sales and production schedules.
- Helps managers make operational decisions.

Decision Support System (DSS)

- Provides a flexible tool for analysis.
- Helps middle-level managers and others in the organization analyze a wide range of problems, such as the effect of events and trends outside the organization.
- Draws on the detailed data of the TPS.

Executive Support System (ESS) or Executive Information System (EIS)

- Presents information in a highly summarized form.
- Helps top-level managers oversee the company's operations and develop strategic plans.
- Combines the databases generated from the TPS and the reports generated from the MIS with external data.

Conclusion

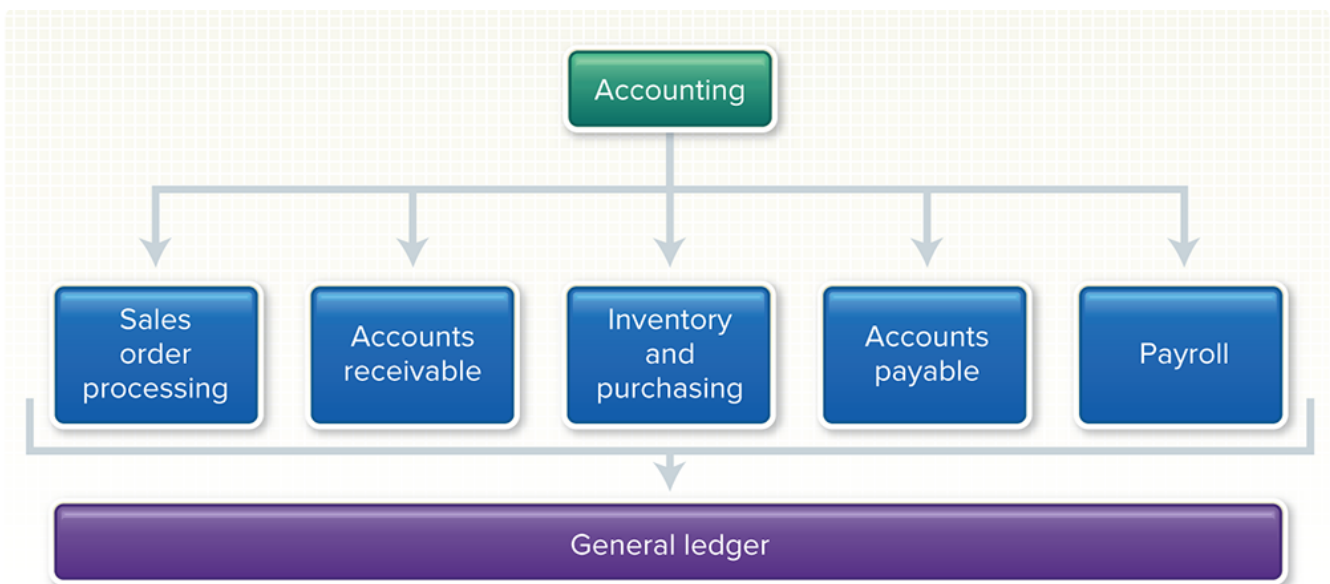
- Almost all organizations have computer-based information systems, which are categorized into four types: TPS, MIS, DSS, and ESS.
- TPS records day-to-day transactions and generates databases that serve as the foundation for other information systems.
- MIS summarizes the detailed data of the TPS and provides standard reports for middle-level managers to make operational decisions.
- DSS provides a flexible tool for analysis to help middle-level managers analyze a wide range of problems.
- ESS presents information in a highly summarized form to help top-level managers oversee the company's operations and develop strategic plans.
- All four systems play a critical role in supporting an organization's decision-making and improving operational efficiency.

Transaction Processing System (TPS)

A transaction processing system helps an organization keep track of routine operations and records these events in a database. Some firms call this the data processing system (DPS). The data from operations is stored in a database that records the transactions of the company. This database of transactions is used to support the MIS, DSS, and ESS.

Accounting TPS

One of the most essential transaction processing systems for any organization is in the accounting area. Every accounting department handles six basic activities. These are:



1. **Sales Order Processing:** records the customer requests for the company's products or services.
2. **Accounts Receivable:** records money received from or owed by customers.
3. **Inventory and Purchasing:** the parts and finished goods that the company has in stock are called inventory. An inventory control system keeps records of the number of each kind of part or finished good in the warehouse. Purchasing is the buying of materials and services.
4. **Accounts Payable:** refers to money the company owes its suppliers for materials and services it has received.
5. **Payroll:** concerned with calculating employee paychecks.
6. **General Ledger:** keeps track of all summaries of all the foregoing transactions. A typical general ledger system can produce income statements and balance sheets. Income statements show a company's financial performance, and balance sheets list the overall financial condition of an organization.

Other TPSs

- **Automatic Teller Machines (ATMs):** record cash withdrawals.
- **Online registration systems:** track student enrollments.
- **Supermarket discount cards:** track customer purchases.

Conclusion

A transaction processing system (TPS) is a system that helps organizations keep track of routine operations and records these events in a database. The most important TPS is the accounting TPS, which consists of six basic activities.

There are other TPSs, such as ATMs, online registration systems, and supermarket discount cards.

Management Information System (MIS)

A **Management Information System (MIS)** is a computer-based information system that produces standardized reports in summarized structured form. An MIS uses databases of various departments to provide summary data that supports middle managers.

Example Report

Regional Sales Report

| Region | Actual Sales | Target | Difference |
|----------|-----------------|-----------|------------|
| Central | 166,430 175,000 | (\$8,570) | |
| Northern | 137,228 | 130,000 | 7,228 |
| Southern | 137,772 | 135,000 | 2,772 |
| Eastern | 152,289 | 155,000 | (2,711) |
| Western | 167,017 | 160,000 | 7,017 |

Key Points

- Whereas a transaction processing system *creates* databases, an MIS *uses* databases.
- MIS produces predetermined reports, following a standard format and providing the same content.
- MIS requires a database management system to integrate databases from different departments.
- MIS supports middle managers by providing summary data drawn from across different functional areas.

- MIS reports are **periodic**, **exception**, and **demand** reports.

Categories of MIS Reports

1. **Periodic Reports:** These are produced at regular intervals such as weekly, monthly, or quarterly.
 - The sales reports from district sales managers are combined into a monthly report for the regional sales managers.
 - For comparison purposes, a regional manager is also able to see the sales reports of other regional managers.
2. **Exception Reports:** These reports call attention to unusual events.
 - For instance, if fewer exercise bicycles are selling than were predicted for the northwest sales region, the regional manager will receive an exception report. That report may be used to alert the district managers and salespeople to give this product more attention.
3. **Demand Reports:** These reports are produced on request. An example is a report on the numbers and types of jobs held by women and minorities. At HealthWise, many government contracts require this information. It is used to certify that HealthWise is within certain government equal-opportunity guidelines.

Conclusion

MIS is an important tool for middle managers as it provides them with a summary of data from different departments. It produces predetermined reports in a standardized format, which include periodic, exception, and demand reports. MIS requires a database management system that integrates databases from different departments to provide summary data.

Decision Support System (DSS)

A decision support system (DSS) is a tool used by managers to get answers to unanticipated, non-recurring problems. DSS is different from transaction processing systems and management information systems, as it analyzes data and produces flexible reports.

Parts of a DSS

A DSS consists of four parts: the **user**, **system software**, **data**, and **decision models**.

1. **User:** The user is typically a middle-level manager who has to make decisions.
2. **System software:** The software is designed to work behind the scenes and is typically menu or icon driven to provide an intuitive interface for the user.
3. **Data:** Data in a DSS is stored in a database and can be **internal** or **external**.
 - **Internal** data consists of transactions from the transaction processing system
 - **External** data is gathered from outside the organization.
4. **Decision models:** Decision models provide the analytical capabilities of a DSS. There are three types of decision models:
 - **Strategic:** Assist top-level managers in long-range planning.
 - *Ex. Stating company objectives or planning plant locations.*
 - **Tactical:** Help middle-level managers control the work of the organization.
 - *Ex. Financial planning and sales promotion planning.*
 - **Operational:** Help lower-level managers accomplish the organization's day-to-day activities.
 - *Ex. Evaluating and maintaining quality control.*

Group Decision Support Systems (GDSS)

Some DSSs are designed to support a team of decision makers, known as **Group Decision Support Systems (GDSS)**.

- These systems include tools to support group meetings and collective work.

Concept Check

- The purpose of a decision support system is to provide managers with answers to unanticipated, non-recurring problems.

- The four parts of a DSS are the user, system software, data, and decision models.
- The three basic types of decision models are strategic, tactical, and operational.

Executive Support Systems (ESSs)

- Sophisticated software designed to present, summarize, and analyze data from an organization's databases in an easy-to-use format for top-level executives.
- ESSs are specifically designed to be easy to use so that top executives with little spare time can obtain essential information without extensive training.
- The information is often displayed in a very condensed form with informative graphics.

Example of an ESS

- The President of HealthWise uses an executive support system available on his personal computer.
- The ESS displays a condensed account of activities in five different areas of the company: Accounting, Marketing, Production, Human Resources, and Research.

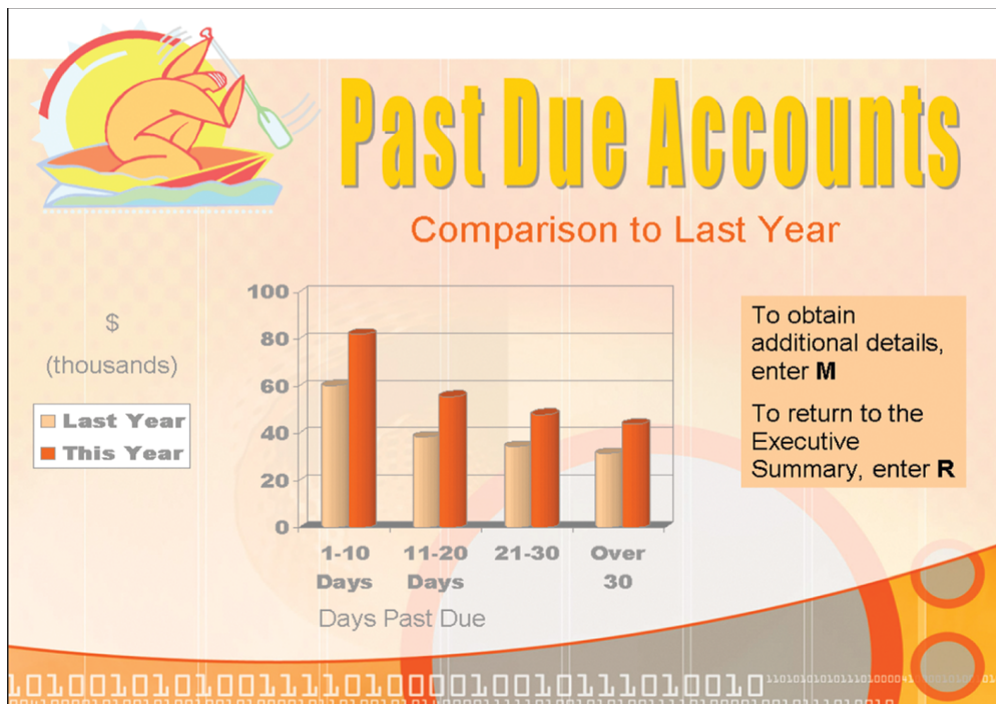
On one particular morning, the ESS shows business in four areas proceeding smoothly, but the percentage of late-paying customers (past due accounts) has increased by 3% in Accounting.

1. To find out the details, the President selects Accounting and sees a graph of past due accounts comparing today's late payers in red to last year's late payers in yellow.
2. The differences between today and a year ago are significant and clearly presented, and the President decides to take action to speed up customer payments.

ESS Main Menu



ESS Past Due Accounts



Advantages of ESSs

- ESSs permit a firm's top executives to gain direct access to information about the company's performance.
- They provide direct electronic communication links to other executives.
- Some ESSs have the ability to retrieve information from databases outside the company, such as business-news services.

- This enables a firm to watch for stories on competitors and stay current on relevant news events that could affect its business.

Summary of Information Systems

| Type | Description |
|------------|--|
| TPS | Tracks routine operations and records events in databases; also known as data processing systems |
| MIS | Produces standardized reports (periodic , exception , and demand) using databases created by TPS |
| DSS | Analyzes unanticipated situations using data (internal and external) and decision models (strategic , tactical , and operational) |
| ESS | Presents summary information in a flexible, easy-to-use, graphical format designed for top executives |

- **TPS** tracks routine operations and records events in databases, also known as data processing systems.
- **MIS** produces standardized reports using databases created by TPS.
- **DSS** analyzes unanticipated situations using data and decision models.
- **ESS** presents summary information in a flexible, easy-to-use, graphical format designed for top executives.

Comparison of ESSs to MISs and DSSs

- ESSs and MISs can present, summarize, and analyze data from an organization's databases, but ESSs are specifically designed to be easy to use for top executives with little spare time.
- DSSs analyze unanticipated situations using data and decision models, whereas ESSs focus on presenting summary information in a flexible, easy-to-use, graphical format designed for top executives.

Conclusion

- An executive support system is a sophisticated software designed to present, summarize, and analyze data from an organization's databases in an easy-to-use format for top-level executives.

- ESSs are specifically designed to be easy to use and often display information in a condensed form with informative graphics. They permit a firm's top executives to gain direct access to information about the company's performance and provide direct electronic communication links to other executives.
- ESSs are similar to MISs in that they can present, summarize, and analyze data from an organization's databases, but ESSs are specifically designed to be easy to use for top executives with little spare time.
- DSSs, on the other hand, focus on analyzing unanticipated situations using data and decision models.

Other Information Systems

Introduction

- Information workers distribute, communicate, and create information.
- There are two types of information workers:
 - **Data workers**
 - **Knowledge workers**
- There are two types of systems to support information workers:
 - **Office automation systems (OASs)**
 - **Knowledge Work Systems (KWS)**

Information Workers

- Information workers distribute, communicate, and create information
- Administrative assistants, clerks, engineers, and scientists are examples of information workers
- **Data workers** are involved with distribution and communication of information
 - *Ex. Administrative assistants and clerks*
- Knowledge workers are involved with the creation of information
 - *Ex. Engineers and scientists*

Office Automation Systems (OAS)

- Designed primarily to support data workers

- Focus on managing documents, communicating, and scheduling
- Word processing, web authoring, desktop publishing, and other image technologies are used for managing documents.
- **Project managers** are programs designed to schedule, plan, and control project resources.
- **Videoconferencing systems** are computer systems that allow people located at various geographic locations to communicate and have in-person meetings.

Knowledge Work Systems (KWS)

- Knowledge workers use OAS systems and specialized information systems called Knowledge Work Systems (KWSs) to create information in their areas of expertise
- KWSs consist of powerful personal computers running special programs that integrate the design and manufacturing activities
- CAD/CAM systems are widely used in the manufacture of automobiles, product design, and by engineers.
 - **Computer-aided design/computer-aided manufacturing (CAD/CAM) systems**
- Expert systems are another widely used KWS

Expert Systems

- Expert systems are a type of artificial intelligence that uses a database to provide assistance to users
- They are also known as knowledge-based systems
- Expert systems capture the knowledge of a human expert and make it accessible to everyone through a computer program
- The knowledge base contains facts and rules distilled from a human expert
- Users interact with an expert system by describing a particular situation or problem
- Industries where expert systems are popular include medicine, geology, architecture, and nature.

Conclusion

- Information systems supporting information workers include OAS and KWS
- OAS is designed for managing documents, communicating, and scheduling while KWS is designed to create information in the areas of expertise of knowledge

workers

- Expert systems are specialized software that use a knowledge base to provide assistance to users in specific industries.

Information Systems Manager

Job Description

- Information systems managers oversee computer professionals, create and implement corporate computer policy and systems.
- They manage the work of programmers, computer specialists, systems analysts, and other computer professionals.

Requirements

- Individuals with strong technical backgrounds and a master's degree in business are often preferred by employers.
- Strong leadership and excellent communication skills are also essential.
- Communication skills should be in both technical and non-technical terms.
- Consultants or managers in previous positions are often preferred.
- Experience in computer and network security is in demand.

Salary and Advancement

- Information systems managers can expect an annual salary of 90,430 to 208,000.
- Advancement opportunities typically include leadership in the field.

Careers in IT

What is an Information Systems Manager?

- Information Systems Managers oversee the work of programmers, computer specialists, systems analysts, and other computer professionals.
- They create and implement corporate computer policy and systems.
- Employers look for individuals with strong technical backgrounds, sometimes as consultants, with a master's degree in business.

- Information Systems Managers must have strong leadership and excellent communication skills and must be able to communicate with people in technical and non-technical terms.
- Information Systems Management positions are often filled by individuals who have been consultants or managers in previous positions.
- Those with experience in computer and network security will be in demand as businesses and society continue to struggle with important security issues.

Salary and Advancement Opportunities

- Information Systems Managers can expect an annual salary of 90,430 to 208,000.
- Advancement opportunities typically include leadership in the field.

IBM's Watson

- IBM's Watson is an information-finding supercomputer.
- In 2011, Watson defeated the two best contestants in the game show Jeopardy.
- Watson can read the question, understand what was being asked, search through 200 million pages of text, figure out what the best answer would be, and then hit a buzzer before the other contestants to deliver the answer.
- Watson is being used by several organizations.
- One healthcare company uses Watson to help suggest options based on a patient's unique circumstances. It assists physicians and nurses by looking through millions of pages of medical research and then quickly identifying the most likely diagnosis and treatment options for the patient.
- To help Watson learn more about the medical field, IBM has partnered with a cancer center in order to "teach" Watson how to process the massive amount of cancer-related research and case studies.
- In the finance field, Watson has recently been learning about the complexities of Wall Street, with the hopes that it can help financial firms identify risks and rewards to improve the advice given to their customers.
- IBM envisions Watson's technology being an integral part of healthcare and finance industries.
- Other companies such as Uber and the UK's National Health Service have also developed similar systems.
- The future of information technology could transform the way all of us do research and seek answers for our toughest problems.

Conclusion

- Information Systems Managers play an important role in creating and implementing corporate computer policy and systems.
- With the development of powerful systems like IBM's Watson, professionals in various industries could benefit from quick access to vast amounts of information.
- While the technology has the potential to transform the way we do research, it is important to consider the impact on employment in various industries.