Information System

Introduction

Course Objectives

- To introduce & apply the knowledge of computer based IS
- To provide the concept in designing & setting up complex information system.

Chapter 1-Overview

- Information System (4 hrs, 8 marks)
  - Classification & Evolution
  - IS in functional area
  - Information System Architecture
  - Qualities of Information systems
  - Managing information system resources
  - Balanced scorecard- case studies

1.1 Classification &Evolution of IS

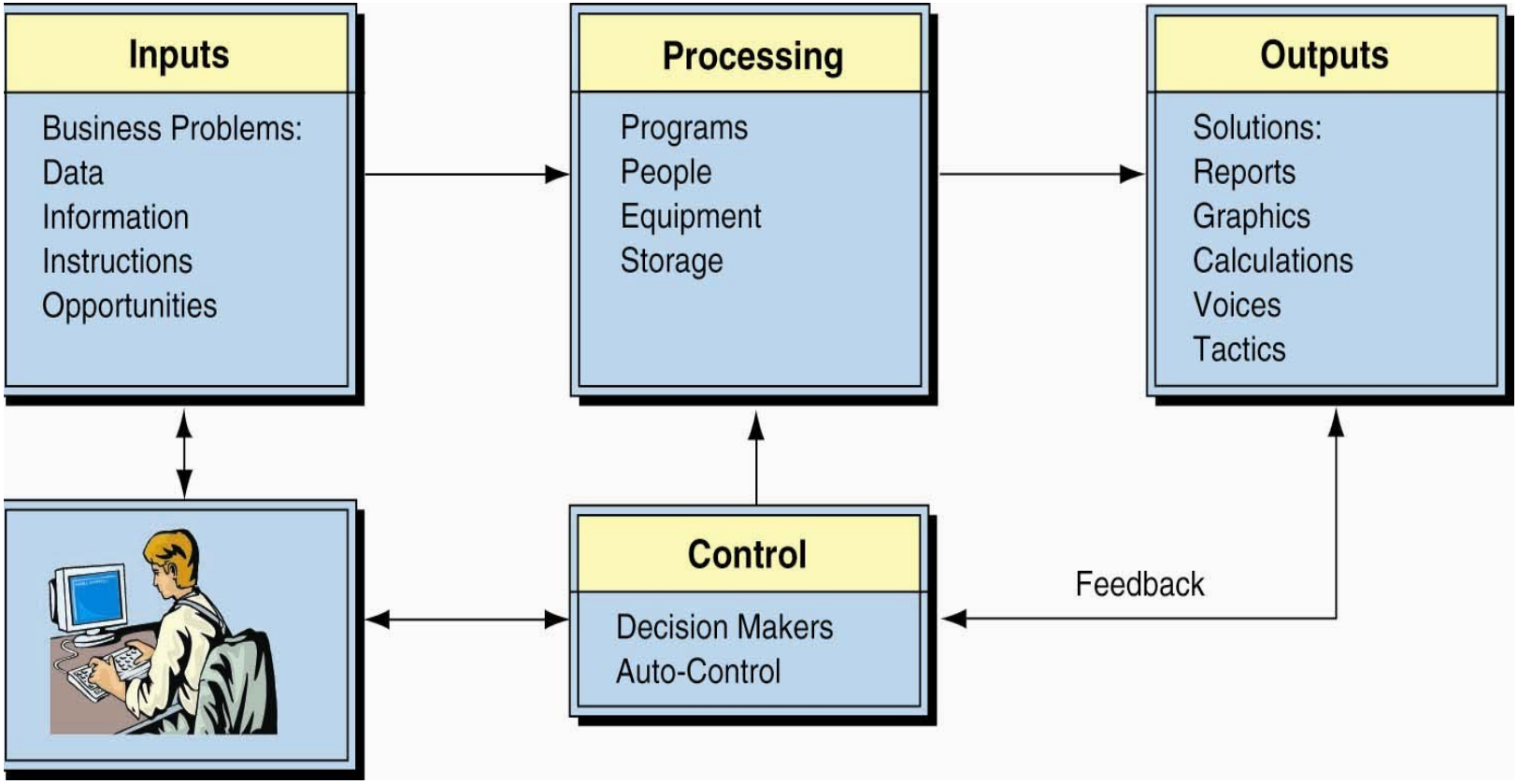
Information Systems: Concepts and Definitions

- **Information system (IS)** collects, processes, stores, analyzes, and disseminates information for a specific purpose.
- Includes ***inputs*** (data, instructions) and ***outputs*** (reports, calculations).
- ***Processes*** the inputs by using technology such as PCs and produces outputs that are sent to users or to other systems via electronic networks and a ***feedback*** mechanism that ***controls*** the operation.

Definition -Information System

Information system (**IS**) is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create and distribute data.

Information System Is A System



Data, Information & knowledge

- **Data Item.** Elementary description of things, events, activities and transactions that are recorded, classified and stored but are not organized to convey any specific meaning.
- **Information.** Data organized so that they have meaning and value to the recipient.
- **Knowledge.** Data and/or information organized and processed to convey understanding, experience, accumulated learning and expertise as they apply to a current problem or activity.

Information Systems: Concepts and Definitions (Continued)

- **Information Technology Architecture.** A high-level map or plan of the information assets in an organization, which guides current operations and is a blueprint for future directions.

Information Systems: Concepts and Definitions (Continued)

- **Information Technology Infrastructure.** The physical facilities, IT components, IT services and IT management that support an entire organization.

Computer based Information Systems

- **Computer-based Information System (CBIS)** An information system that uses computer technology to perform some or all of its intended tasks.

Basic Components of Information Systems

- **Hardware**
- **Software**
- **Database**
- **Network**
- **Procedures**
- **People**

Why Study Information Systems?

- You will be more effective in your chosen career if you understand how successful information systems are built, used, and managed.
- You also will be more effective if you know how to recognize and avoid unsuccessful systems and failures.
- According to the US Bureau of Labor Statistics, “Top seven fastest growing occupations fall within IT or computer related field”
- Developing “Computer” Literacy will only enhance your “Information” Literacy

NORCO PC Solution for Passenger Information System(PIS)

Central Control Unit

Sub-station Control Unit

Wireless Network

Vehicle-mounted Controller

Sub-station Control Unit

PIS Management System

Vehicle-mounted Controller

Weather Forecast

Time Table Enquiry

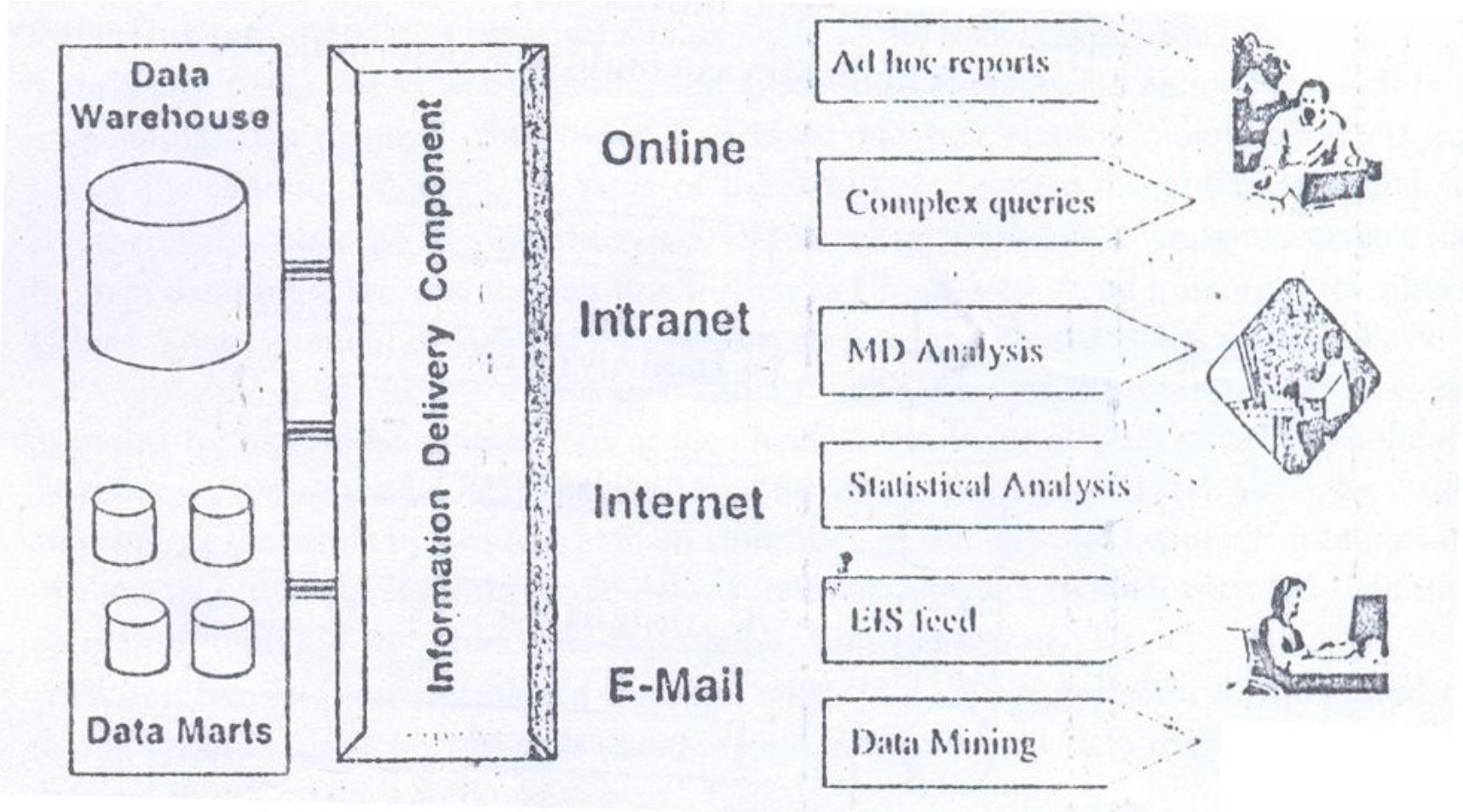
Automatic Station Name Announcing

Train Enquiry

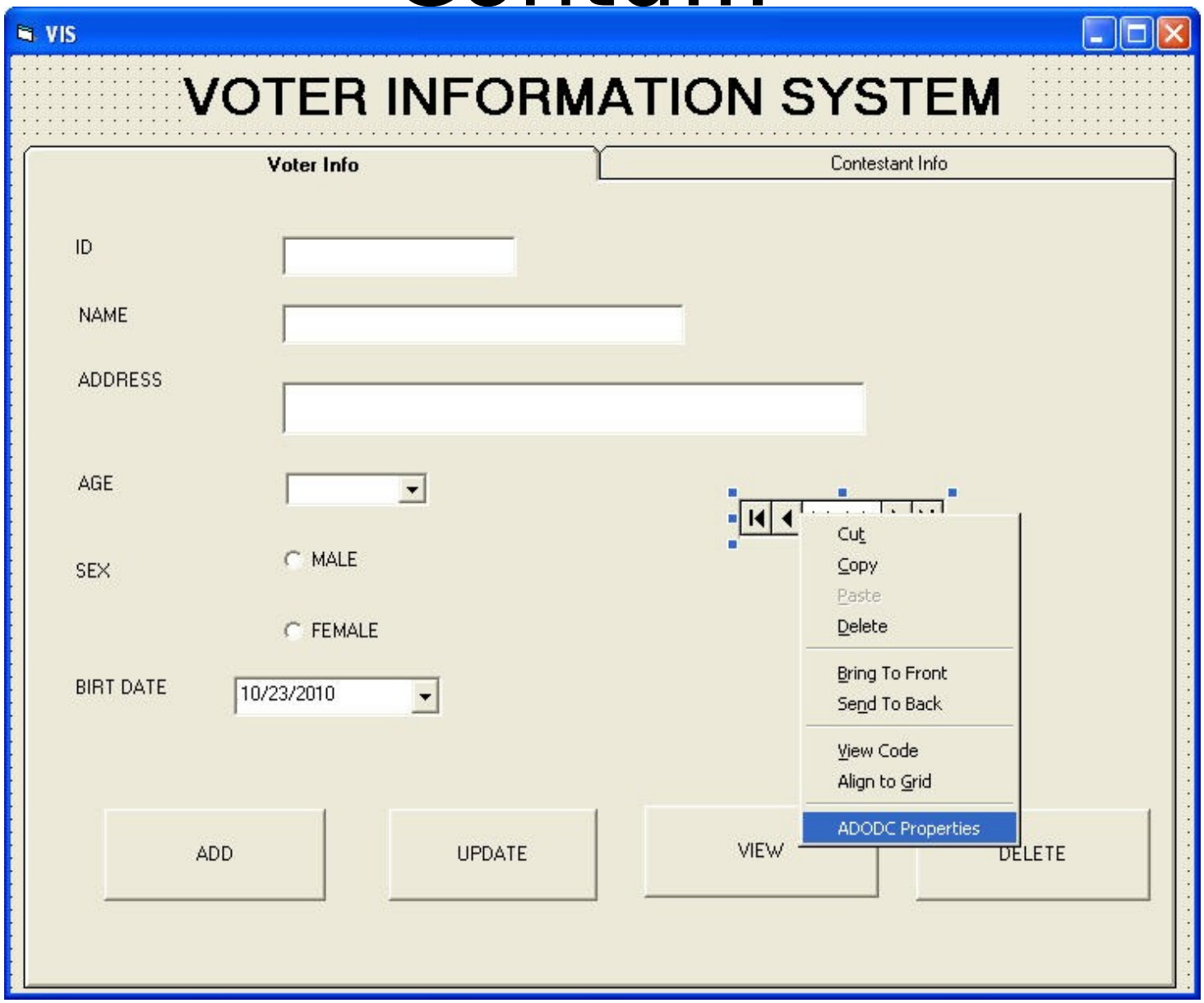
Banking/Securities Information

Advertisement

Contd..


Data Warehouse
Data Marts
Information Delivery Component
Online
Intranet
Internet
E-Mail
Ad hoc reports
Complex queries
MD Analysis
Statistical Analysis
EIS feed
Data Mining

Contd...


VIS
VOTER INFORMATION SYSTEM
Voter Info
Contestant Info
ID
NAME
ADDRESS
AGE
SEX
MALE
FEMALE
BIRT DATE
10/23/2010
Cut
Copy
Paste
Delete
Bring To Front
Send To Back
View Code
Align to Grid
ADODC Properties
ADD
UPDATE
VIEW
DELETE

Contd...

Integrated Solutions for GIS

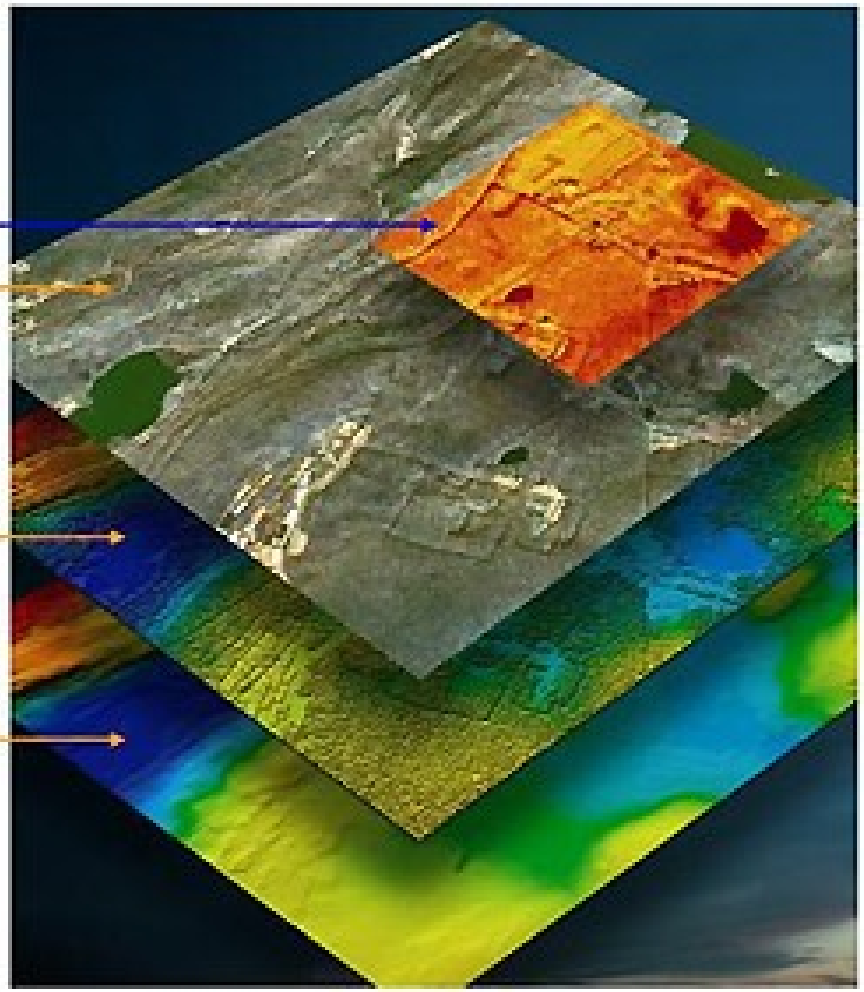
Satellite & Aerial Imagery
- 3D Terrain Modeling
- Stereo Imagery
- Multi & Hyper-Spectral
- Ortho-Imagery
- Film
- Digital (DSS or ADS)
- Thermal

Digital Surface Model

GIS Implementation

Derived Products

Bare Earth DEM/DTM



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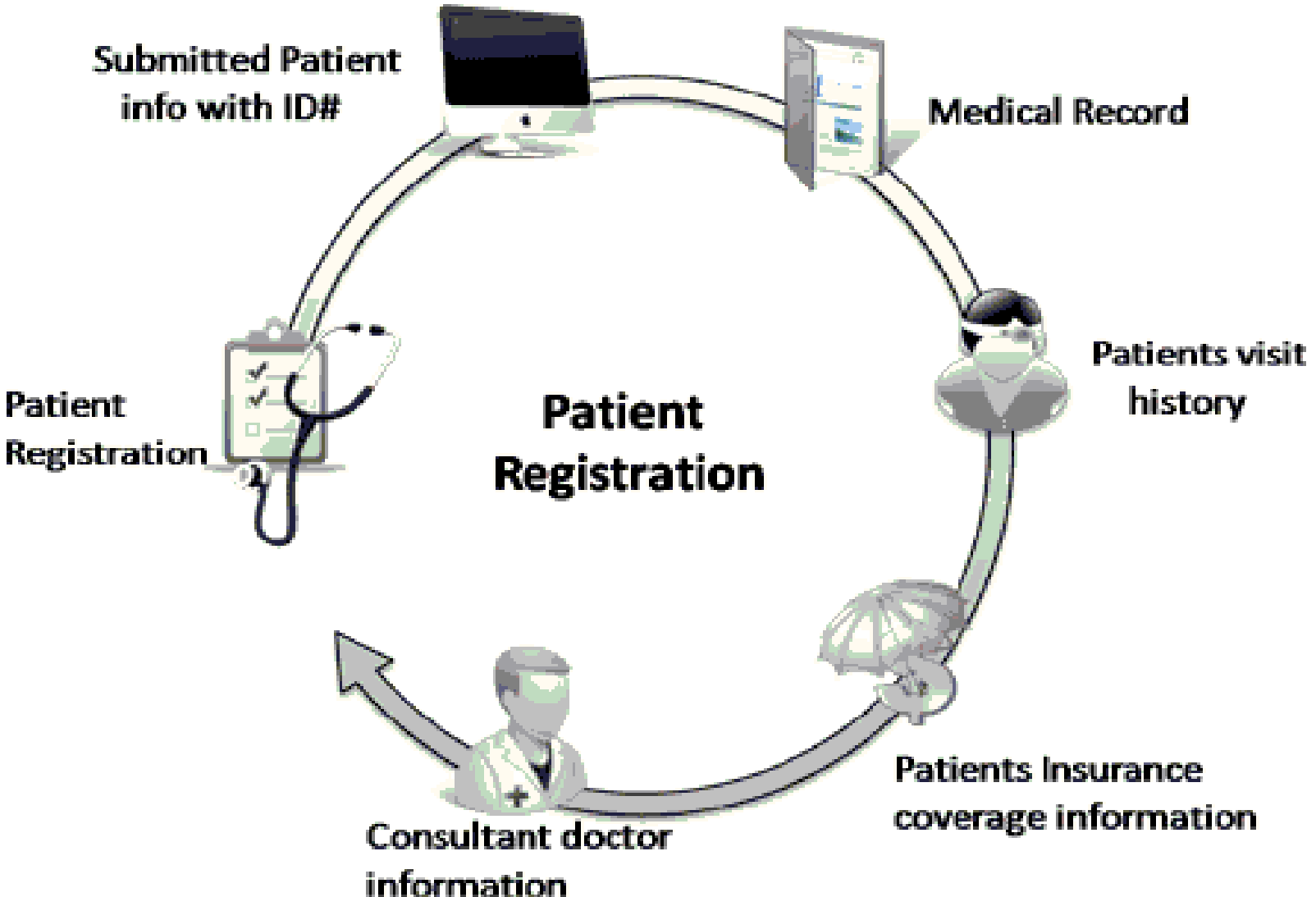

Submitted Patient info with ID#
Medical Record
Patients visit history
Patients Insurance coverage information
Consultant doctor information
Patient Registration
Patient Registration

Contd...


Supply Chain &
Vendor Management
Customer
Relationship
Management
Enterprise
Resource
Planning
Projects
And
HR Management
Finance
and Accounting
Manufacturing
Production & Service
Management & Delivery

Evolution of IS

- First business application of computers (in the mid- 1950s) performed repetitive, high-volume, transaction-computing tasks.
- The computers" crunched numbers" summarizing and organizing transactions and data in the accounting, finance, and human resources areas - called transaction processing systems (TPSs)

Evolution of IS contd…

- Management Information Systems (MISs): these systems access, organize, summarize and display information for supporting routine decision making in the functional areas.
- Office Automation Systems(OASs): such as word processing systems were developed to support office and clerical workers.

Evolution of IS contd…

- Decision Support Systems: were developed to provide computer based support for complex, Non routine decision.
- End- user computing: The use or development of information systems by the principal users of the systems' outputs, such as analysts, managers, and other professionals.

Evolution of IS contd…

- Intelligent Support System (ISSs): Include expert systems which provide the stored knowledge of experts to non experts, and a new type of intelligent system with machine- learning capabilities that can learn from historical cases.
- Knowledge Management Systems: Support the creating, gathering, organizing, integrating and disseminating of organizational knowledge.

Evolution of IS contd…

- Data Warehousing: A data warehouse is a database designed to support DSS, ESS and other analytical and end-user activities.
- Mobile Computing: Information systems that support employees who are working with customers or business partners outside the physical boundaries of their company; can be done over wire or wireless networks.
- eCommerce
  - Need to allow access to customers
- and many more……

Classification of Information Systems

These include classification by

- Organizational structure,
- Functional area within the organization,
- Use across multiple organizations,
- Mode of Data Processing
- Classification By System Objectives

Classification by Organization structure

- Organizations -made up of components such as divisions, departments, and work units,
- Organized in hierarchical levels
- For example,
  - organizations have functional departments, such as production and accounting,
  - which report to plant management,
  - which report to a division head.
  - The divisions report to the corporate headquarters

Classification by Organization structure(contd…)

  - Although some organizations have restructured themselves in innovative ways, such as those based on cross-functional teams,

- today the vast majority of organizations still have a traditional hierarchical structure.
- Thus, we can find information systems built for headquarters, for divisions, for the functional departments, for operating units, and even for individual employees.

Classification by Organization structure(contd…)

- Such systems can stand alone, but usually they are interconnected.
- Typical information systems that follow the organizational structure are ***functional (departmental), enterprise, and inter-organizational.***
- These systems are organized in a hierarchy in which each higher-level system consists of several (even many) systems from the level below it.

Classification by Organization structure(contd…)

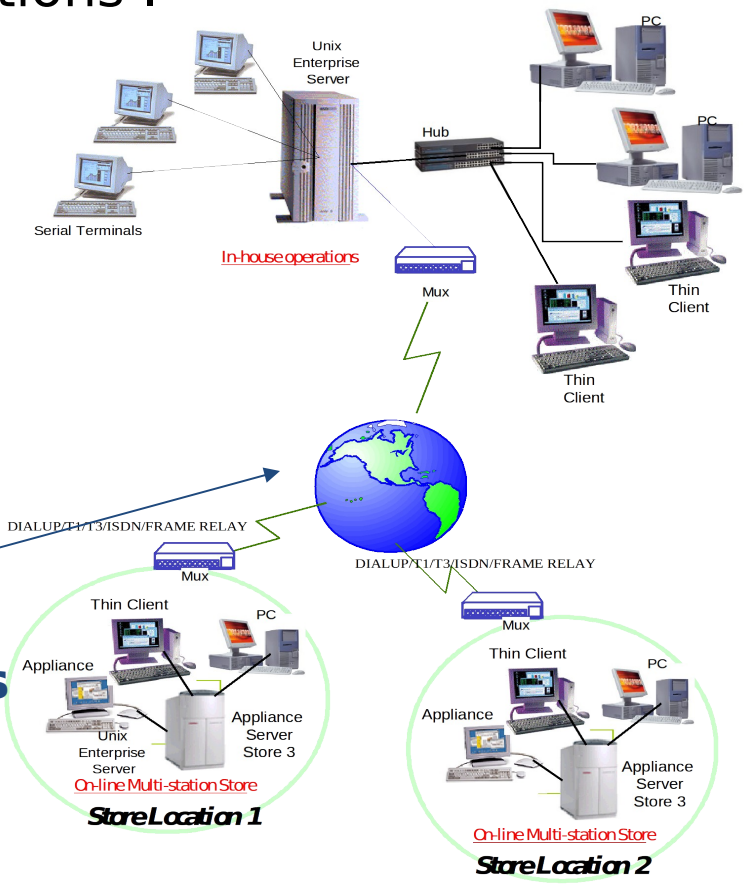
- At a higher level, the enterprise system supports the entire company, and inter-organizational systems connect different companies.

Information System – Classification By Organizational Structure

An information system (IS) can span departments, business units and corporations .

- Departmental IS
- Enterprise-Wide IS
- Inter-Organizational IS

Information systems are usually connected by means of electronic networks



Classification by Function

- Functional organizations
  - are hierarchical structures and
  - center on a strong concept of supervisors and subordinates
- The controlling authority, often called top management, coordinates with each management level and functional department to keep the organization running smoothly

Classification by Function(Contd…)

- A functional organization analyzes the strengths and weaknesses of each member,
- groups them into categories and assigns them to tasks that best utilize their skills
- Jobs that perform a similar function are grouped in functional areas
- Each functional area contains employees with varied skills grouped based on specialization and put in separate units or departments

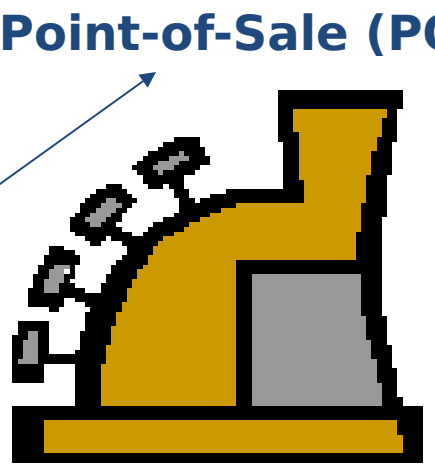
Classification by Function(Contd…)

- Information systems which served these functional departments are called functional information systems

Information System - Classification By Function (Department)

An information system (IS) support each department in a corporation.

- Operations
- Accounting
- Finance
- Marketing
- Human resources



Transaction Processing Systems (TPS): Automates routine and repetitive tasks that are critical to the operation of the organization

Evolution of Functional Organizations

- Functional organizations work best when a single product or service is involved
- The chain of command is linear, so everyone knows his position in the organization
- By clustering specialists with similar skills, leadership, tutoring and guidance concentrate on one area
- Employees have an obvious path for growth and promotion, either up or lateral

Evolution of Functional Organizations (Contd…)

- As a company gets larger, some of the positives of functional organizations become negatives
- Since decisions travel through the chain of command, the process becomes bureaucratic, and information and decisions move slowly
- Functional grouping can result in a narrowed overall perspective
- Because of communication and decision-making issues, the functional organization is slow to adapt to environmental changes

Evolution of Functional Organizations (Contd…)

Enterprise Information Systems

- While a departmental information system is usually related to a functional area, other information systems serve several departments or the entire enterprise
- These information systems together with the departmental applications comprise the enterprise information system (EIS).
- most popular enterprise applications is enterprise resources planning (ERP),
  - which enables companies to plan and manage the resources of an entire enterprise.

Evolution of Functional Organizations (Contd…)

Inter-organizational Information Systems

- Some information systems connect two or more organizations-referred as inter-organizational information systems (IOS's).
- IOS's support many inter-organizational operations, of which supply chain management is the best known
- An organization’s supply chain describes the flow of materials, information, money, and services from raw material suppliers through factories and warehouses to the end customers.

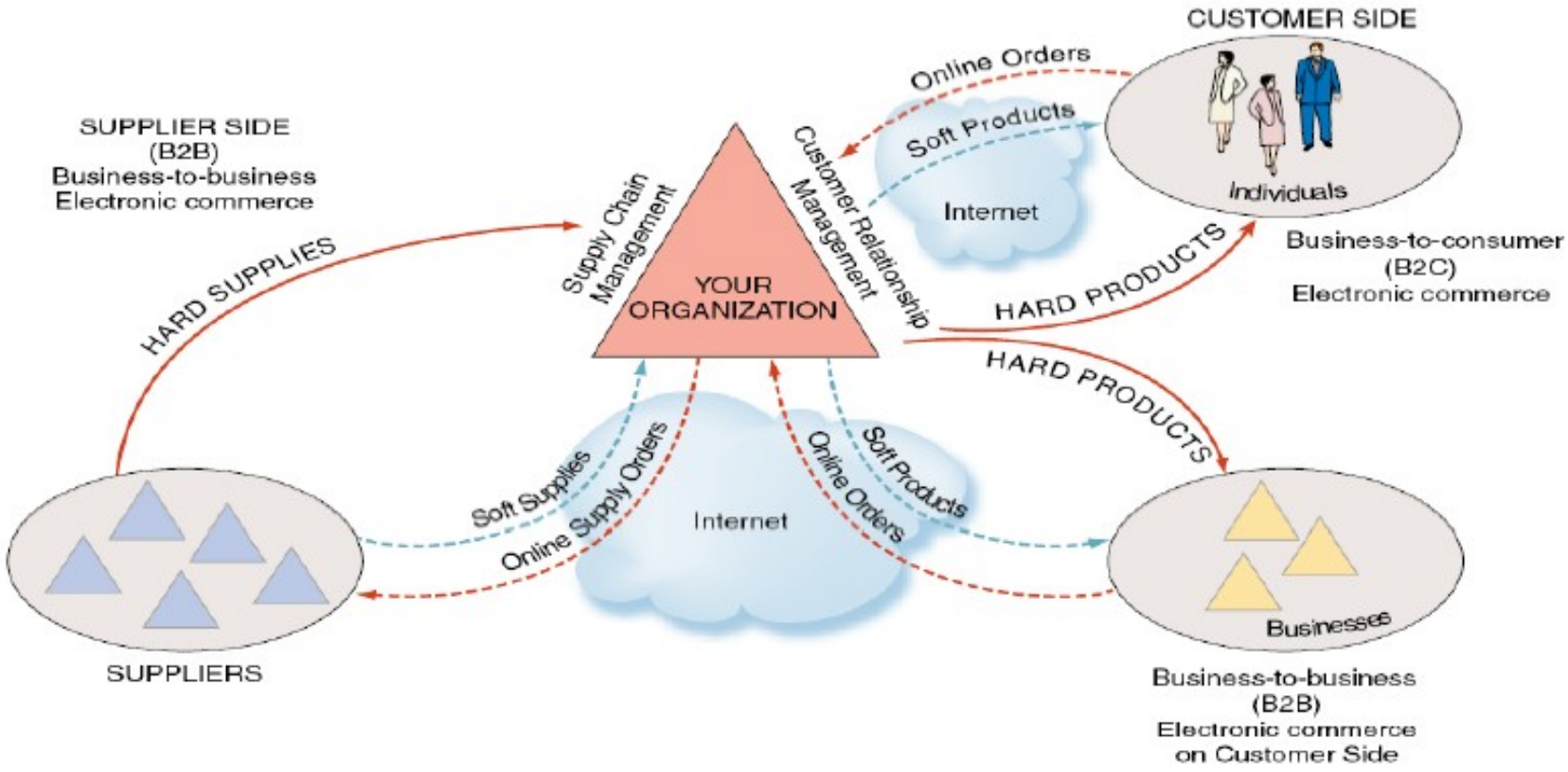
Evolution of Functional Organizations (Contd…)

- supply chain includes both physical flows and information flows.
- Information flows and digitisable products (e.g., music and software) go through the Internet, whereas physical products are shipped.
- For example, when you order a computer from *www.dell.com, your information goes to Dell via the Internet.*

Evolution of Functional Organizations (Contd…)

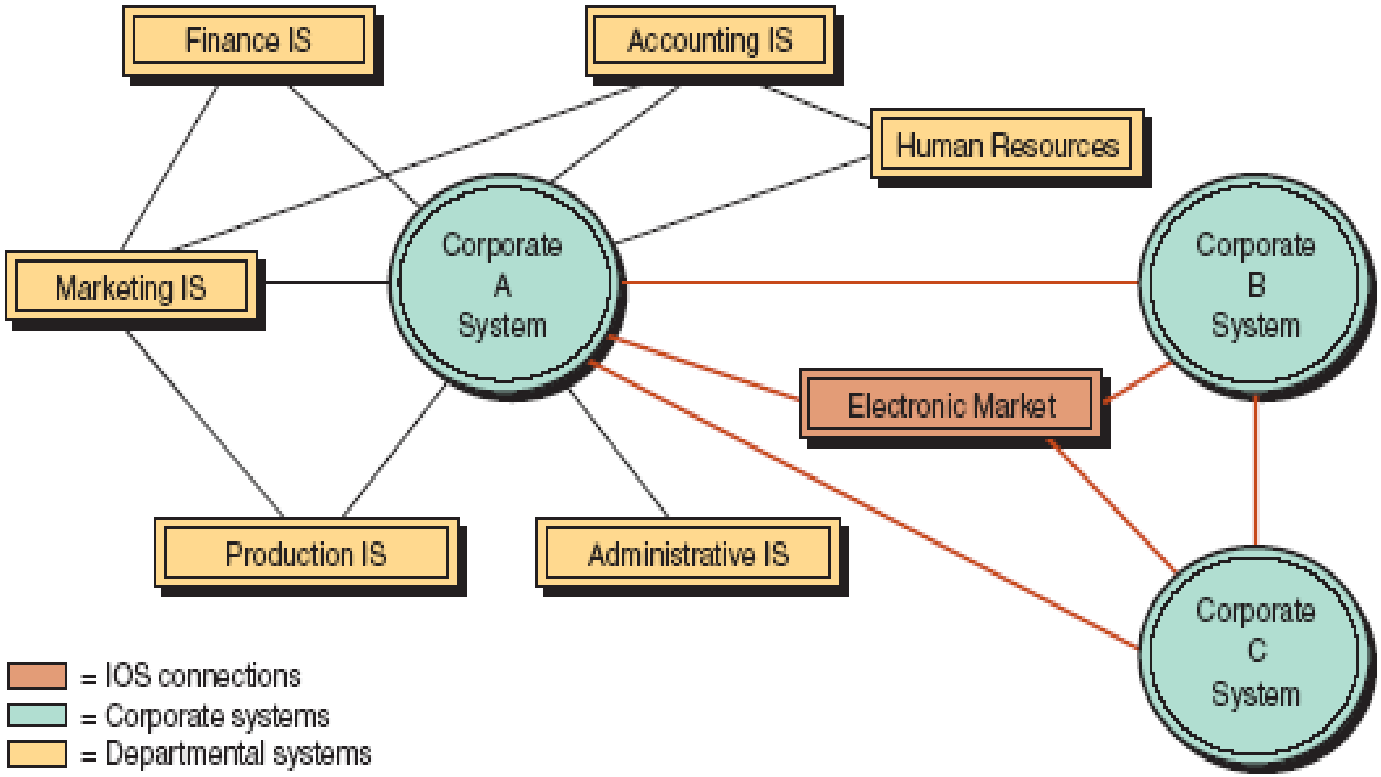
- When your transaction is complete (i.e., your credit card is approved and your order is processed), Dell ships your computer to you.

Figure: Inter-organizational IS



Information System - Classification By Function (Department)

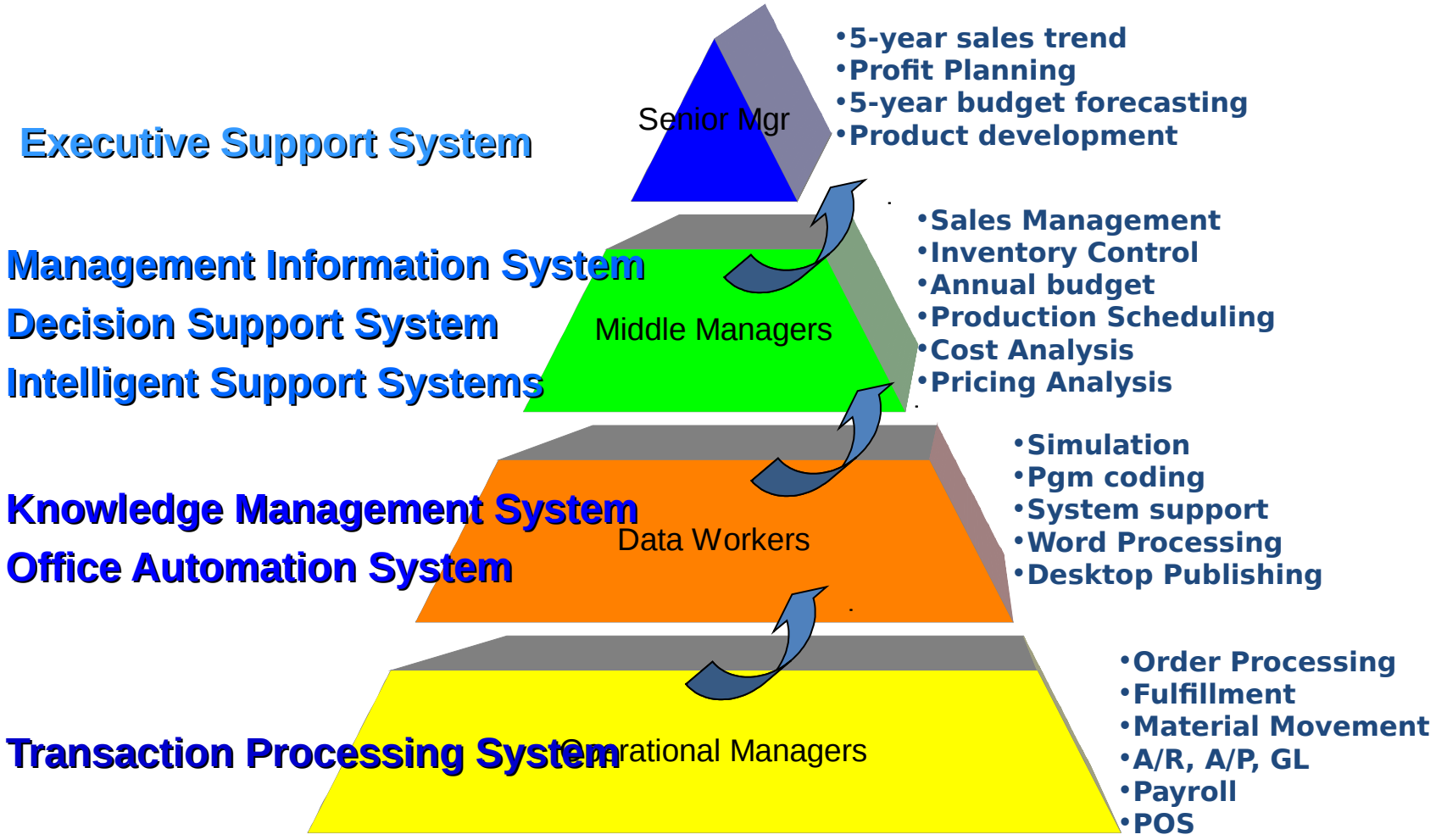
An information system (IS) support each department in a corporation.



Classification by Mode of Data Processing

- Batch Processing Systems:
  - Transactions are collected as they occur, but processed periodically, say, once a day or week.
- On-line Batch Systems:
  - Transaction information is captured by on-line data-entry devices and logged on the system, but it is processed periodically as in batch processing systems.
- On-line Real-time Systems:
  - Transaction data capture as well as their processing in order update is carried out in real-time as the transaction is taking place

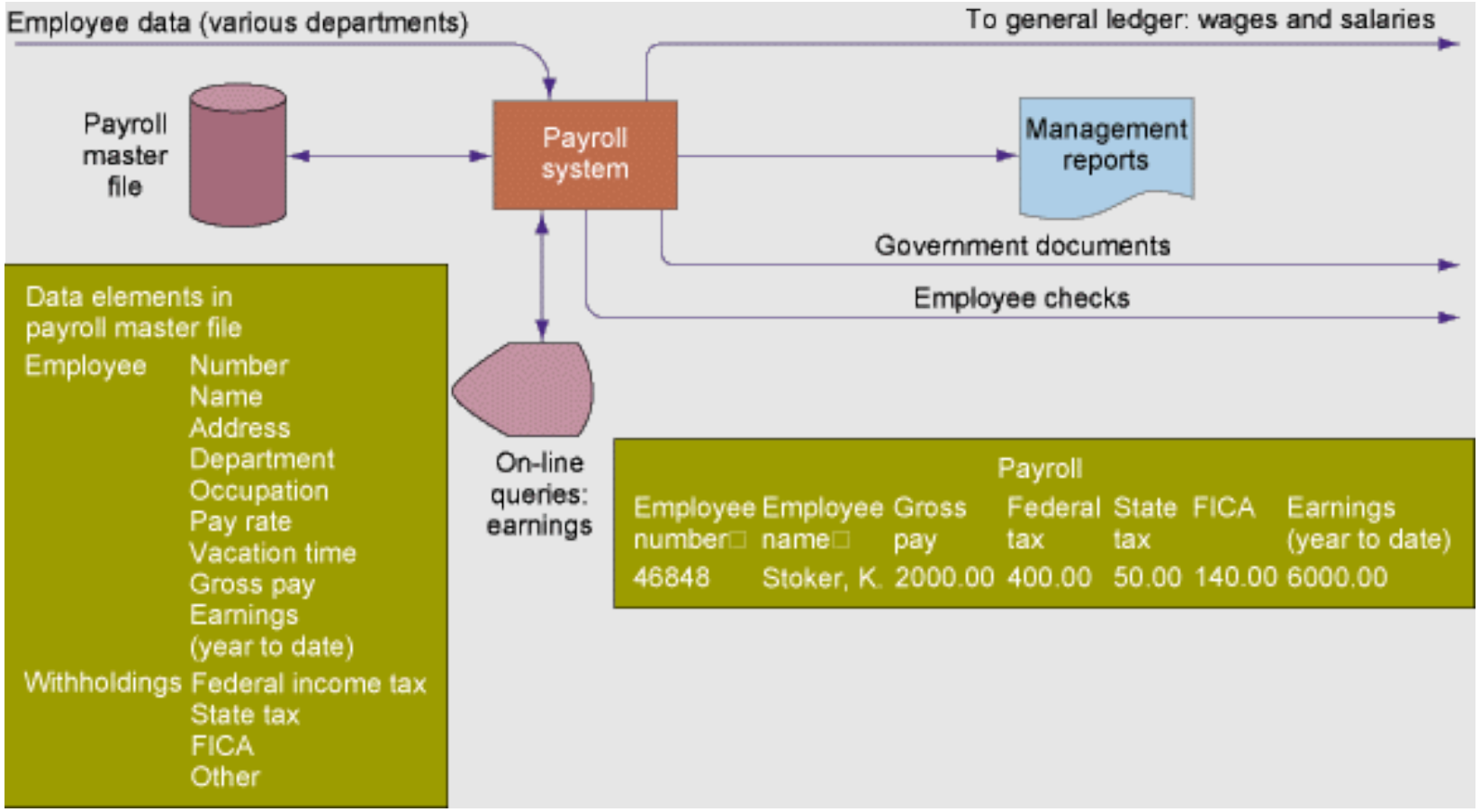
Information System - Classification By System Objectives



Transaction Processing System (TPS)

- TPS automates routine and repetitive tasks that are critical to the operation of the organization, such as preparing a payroll, billing customers, Point-of-Sale and Warehouse operations.
- Data collected from this operation supports the MIS and DSS systems employed by Middle Management
- Computerizes the primary and most of the secondary activities on the Value Chain.
- Primary purpose to perform transactions and collect data.

Payroll TPS


Employee data (various departments)
To general ledger: wages and salaries
Payroll master file
Payroll system
Management reports
Government documents
Employee checks
Data elements in payroll master file
Employee
Number
Name
Address
Department
Occupation
Pay rate
Vacation time
Gross pay
Earnings (year to date)
Withholdings
Federal income tax
State tax
FICA
Other
On-line queries: earnings
Payroll
Employee number
Employee name
Gross pay
Federal tax
State tax
FICA
Earnings (year to date)
46848
Stoker, K.
2000.00
400.00
50.00
140.00
6000.00

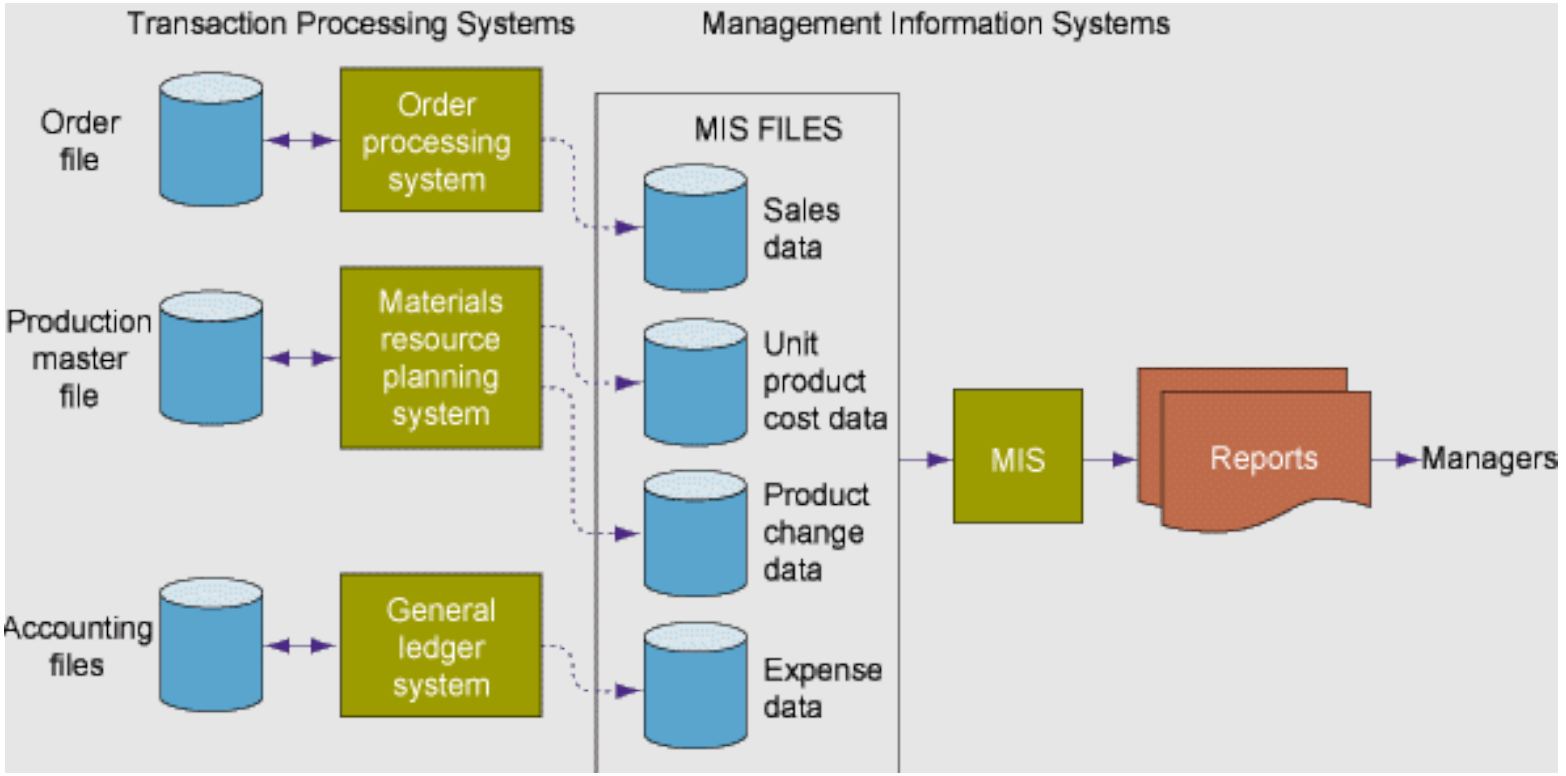
Types of TPS Systems

	TYPE OF TPS SYSTEM				
	Sales/ marketing systems	Manufacturing/ production systems	Finance/ accounting systems	Human resources systems	Other types (e.g., university)
Major functions of system	Sales management	Scheduling	Budgeting	Personnel records	Admissions
	Market research	Purchasing	General ledger	Benefits	Grade records
	Promotion	Shipping/receiving	Billing	Compensation	Course records
	Pricing	Engineering	Cost accounting	Labor relations	Alumni
	New products	Operations		Training	
Major application systems	Sales order information system	Machine control systems	General ledger	Payroll	Registration system
	Market research system	Purchase order systems	Accounts receivable/payable	Employee records	Student transcript system
	Sales commission system	Quality control systems	Funds management systems	Benefit systems	Curriculum class control systems
				Career path systems	Alumni benefactor system

Management Information Systems (MIS)

- These systems access, organize, summarize, and displayed information for supporting *routine decision making* in the functional areas. Geared toward middle managers, MIS are characterized mainly by their ability to produce periodic reports such as a daily list of employees and the hours they work, or a monthly report of expenses as compared to a budget
- Typical uses would be in Replenishment, Pricing Analysis (Markdowns) and Sales Management
- Decisions supported are more structured.
- Primary purpose to process data into information

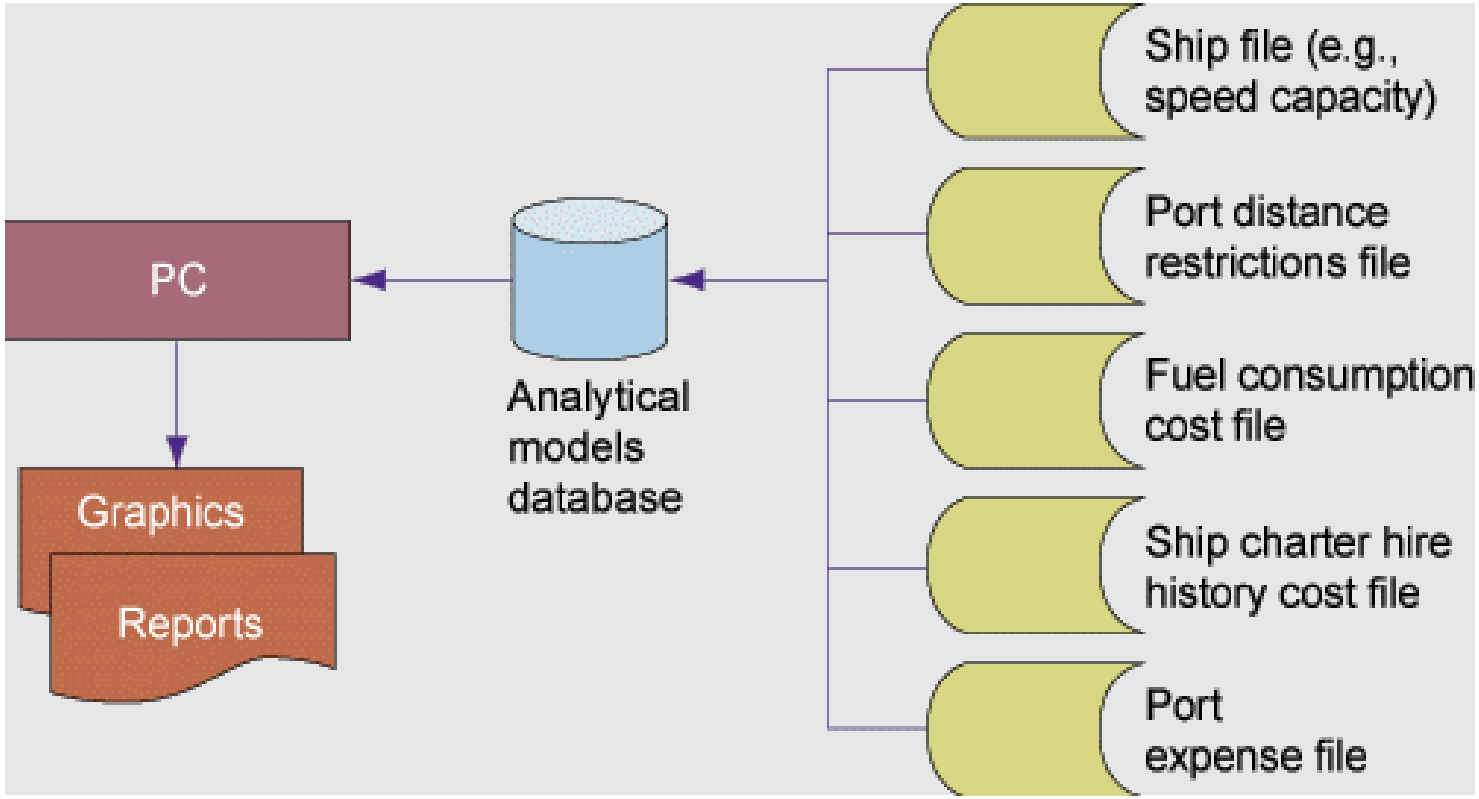
Management Information System (MIS)



Decision Support Systems (DSS)

- These systems support complex non-routine decisions.
- Primary purpose to process data into information
- DSS systems are typically employed by tactical level management whose decisions and what-if analysis are less structured.
- This information system not only presents the results but also expands the information with alternatives.
- Some DSS methodologies
  - Mathematical Modeling
  - Simulation
  - Queries
  - What-If (OLAP-Cubes)
  - Data mining

Decision Support System (DSS)

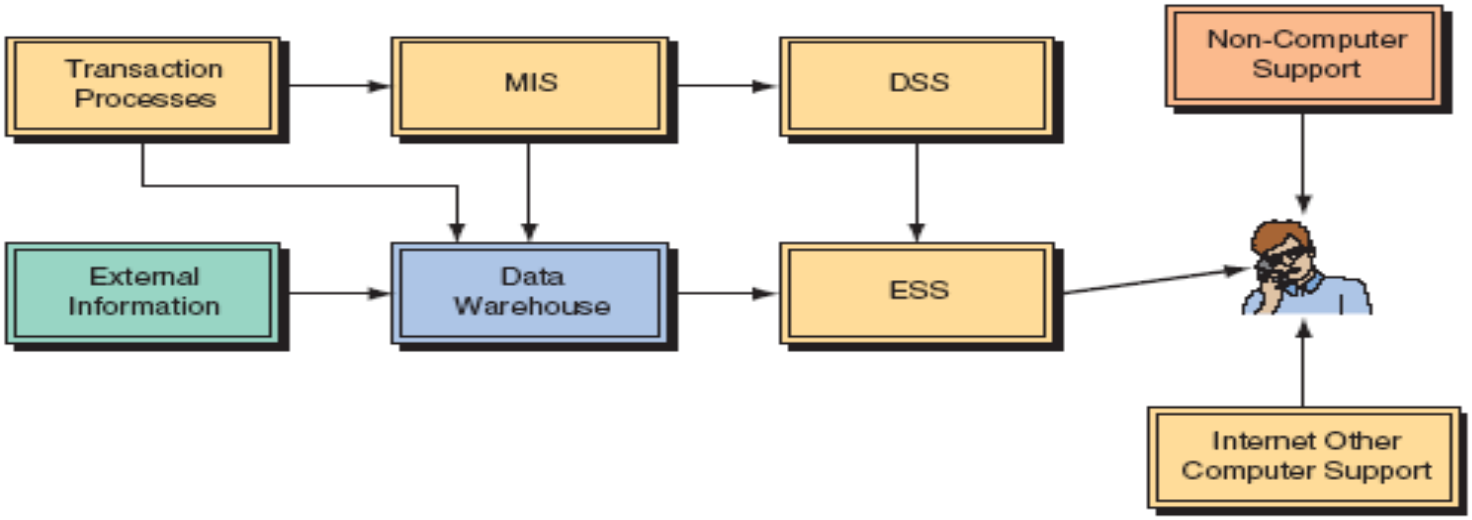


Intelligent Support Systems (ISS)

- Essentially, artificial intelligence (AI) these systems perform intelligent problem solving.
- One application of AI is expert systems. *Expert systems* (ESs) provide the stored knowledge of experts to nonexperts, so the latter can solve difficult or time-consuming problems. These advisory systems differ from TPS, which centered on data, and from MIS and DSS, which concentrated on processing information. With DSS, *users* make their decisions according to the information generated from the systems. With ES, the *system* makes recommended decisions for the users based on the built-in expertise and knowledge.

Executive Support Systems (ESS)

- ESS systems or Enterprise Information Systems (EIS) originally were implemented to support Senior management. These systems have been expanded to support other managers within the enterprise.
- At the senior management level they support *Strategic activities* which deal with situations that significantly may change the manner in which business is done.



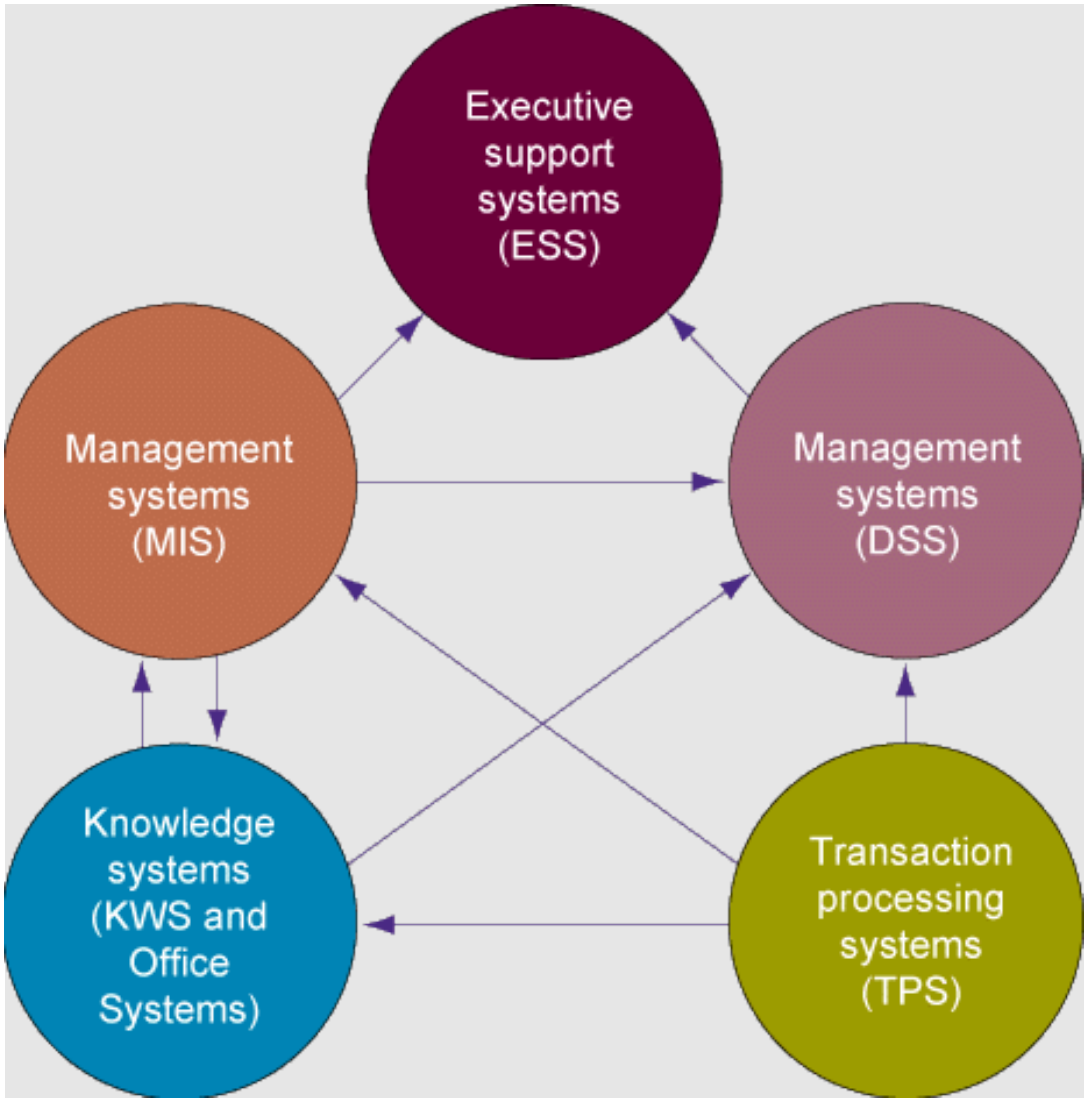
Office Automation Systems (OAS)

- Electronic communication is only one aspect of what is now known as an *office automation system* (OAS). Other aspects include *word processing systems*, *document management systems* and *desktop publishing systems*.
- OAS systems are predominantly used by *clerical workers* who support managers at all levels. Among clerical workers, those who use, manipulate, or disseminate information are referred to as **data workers**.

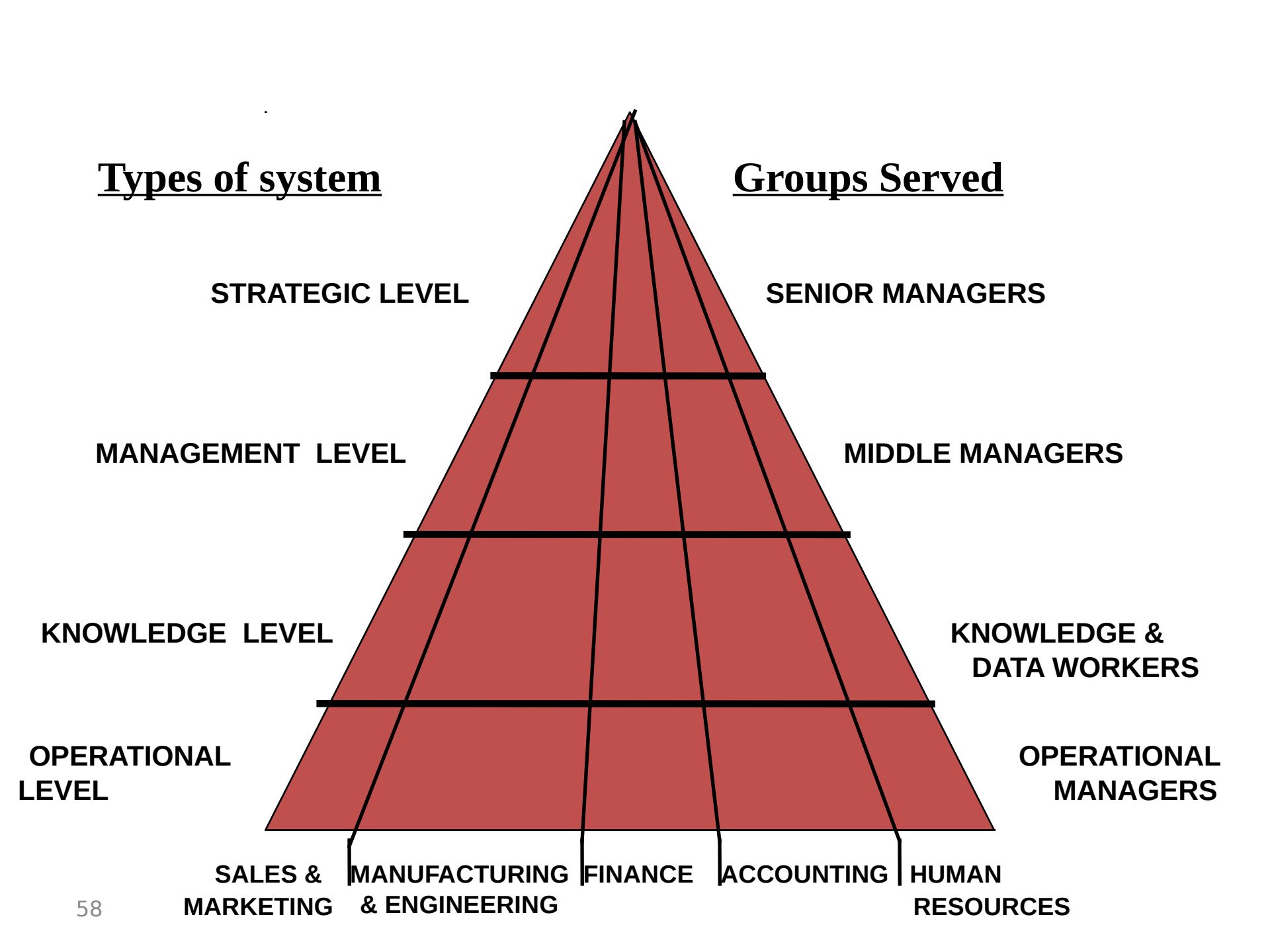
Knowledge Management Systems (KMS)

- An additional level of *staff support* now exists between top and middle management. These are professional people, such as financial and marketing analysts that act as advisors and assistants to both top and middle management. They are responsible for finding or developing new knowledge (External Content) for the organization and integrating it with existing knowledge (Internal Content).
- KMS that support these **knowledge workers** range from Internet search engines and expert systems, to Web-based computer-aided design and sophisticated data management systems

INTERRELATIONSHIPS AMONG SYSTEMS



1.2 IS in Functional Area


Types of system
Groups Served
STRATEGIC LEVEL
SENIOR MANAGERS
MANAGEMENT LEVEL
MIDDLE MANAGERS
KNOWLEDGE LEVEL
KNOWLEDGE & DATA WORKERS
OPERATIONAL LEVEL
OPERATIONAL MANAGERS
SALES & MARKETING
MANUFACTURING & ENGINEERING
FINANCE
ACCOUNTING
HUMAN RESOURCES

Information Systems

- **Functional Perspective**

  Marketing

  - Identify customers
  - Determine what they want
  - Planning products
  - Advertising and promoting products
  - Determine prices for products

Information Systems

- **Functional Perspective**

  Sales

  - Contact customers
  - Sell the product
  - Take the order
  - Follow-up on the sale
  - 5 year sales forecast

Information Systems

- **Functional Perspective**

  Manufacturing

  - Control Equipment and machinery
  - Design new products
  - When and quantity of products to produce
  - New production facilities
  - Generate the work order

Information Systems

- **Functional Perspective**

  Purchasing

  - Which vendors
  - Quantity to purchase
  - Coop, rebate tracking
  - Handle delivery discrepancies
  - Generate the purchase order

Information Systems

- **Functional Perspective**

  Finance

  - Financial Assets
  - Investment management
  - Banking
  - Long term budgets

Information Systems

- **Functional Perspective**

  Accounting

  - Accounts Receivable
  - Disbursement(payment)
  - Payroll
  - Depreciation
  - Earned Coop and Rebates

Information Systems

- **Functional Perspective**

  Human Resources

  - Employee wages, salaries & benefits
  - Long term labor requirements
  - Tracking vacation, sick,
  - Track employee skills
  - Interview and review employees

Sales and Marketing Systems

Major functions of systems:

- Sales management, market research, promotion, pricing, new products

Major application systems:

- Sales order info system, market research system, pricing system

Sales and Marketing Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
ORDER PROCESSING	ENTER, PROCESS, TRACK ORDERS	OPERATIONAL
MARKET ANALYSIS	IDENTIFY CUSTOMERS & MARKETS	KNOWLEDGE
PRICING ANALYSIS	DETERMINE PRICES	MANAGEMENT
SALES TRENDS	PREPARE 5-YEAR FORECASTS	STRATEGIC

Manufacturing and Production Systems

Major functions of systems:

- Scheduling, purchasing, shipping, receiving, engineering, operations

Major application systems:

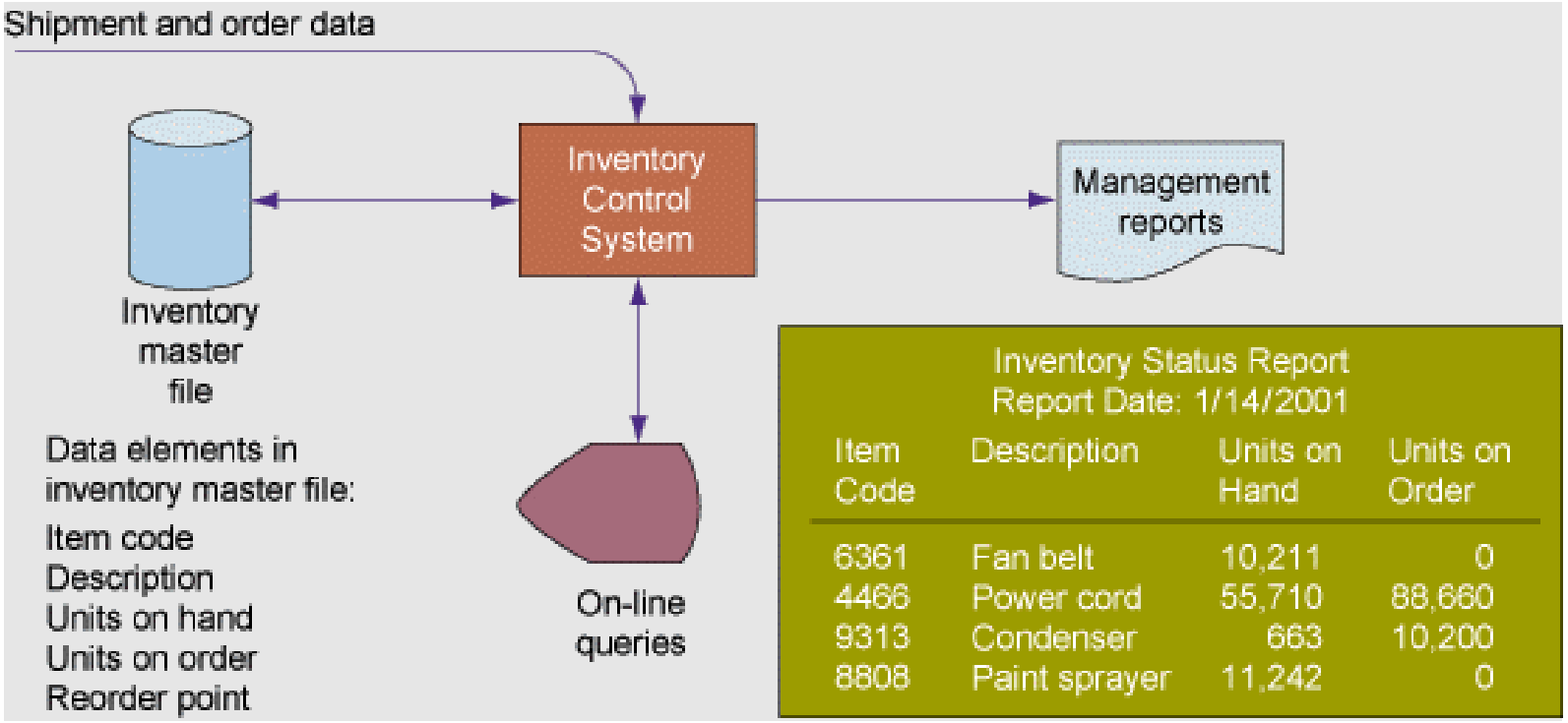
- Materials resource planning systems, purchase order control systems, engineering systems, quality control systems

SYSTEMS FROM A FUNCTIONAL PERSPECTIVE

Manufacturing and Production Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
MACHINE CONTROL	CONTROL ACTIONS OF EQUIPMENT	OPERATIONAL
COMPUTER-AIDED-DESIGN	DESIGN NEW PRODUCTS	KNOWLEDGE
PRODUCTION PLANNING	DECIDE NUMBER, SCHEDULE OF PRODUCTS	MANAGEMENT
FACILITIES LOCATION	DECIDE WHERE TO LOCATE FACILITIES	STRATEGIC

Overview of Inventory Systems



Financing and Accounting Systems

Major functions of systems:

- Budgeting, general ledger, billing, cost accounting

Major application systems:

- General ledger, accounts receivable, accounts payable, budgeting, funds management systems

Financing and Accounting Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
ACCOUNTS RECEIVABLE	TRACK MONEY OWED TO FIRM	OPERATIONAL
PORTFOLIO ANALYSIS	DESIGN FIRM'S INVESTMENTS	KNOWLEDGE
BUDGETING	PREPARE SHORT TERM BUDGETS	MANAGEMENT
PROFIT PLANNING	PLAN LONG-TERM PROFITS	STRATEGIC

Human Resource Systems

Major functions of systems:

- Personnel records, benefits, compensation, labor relations, training

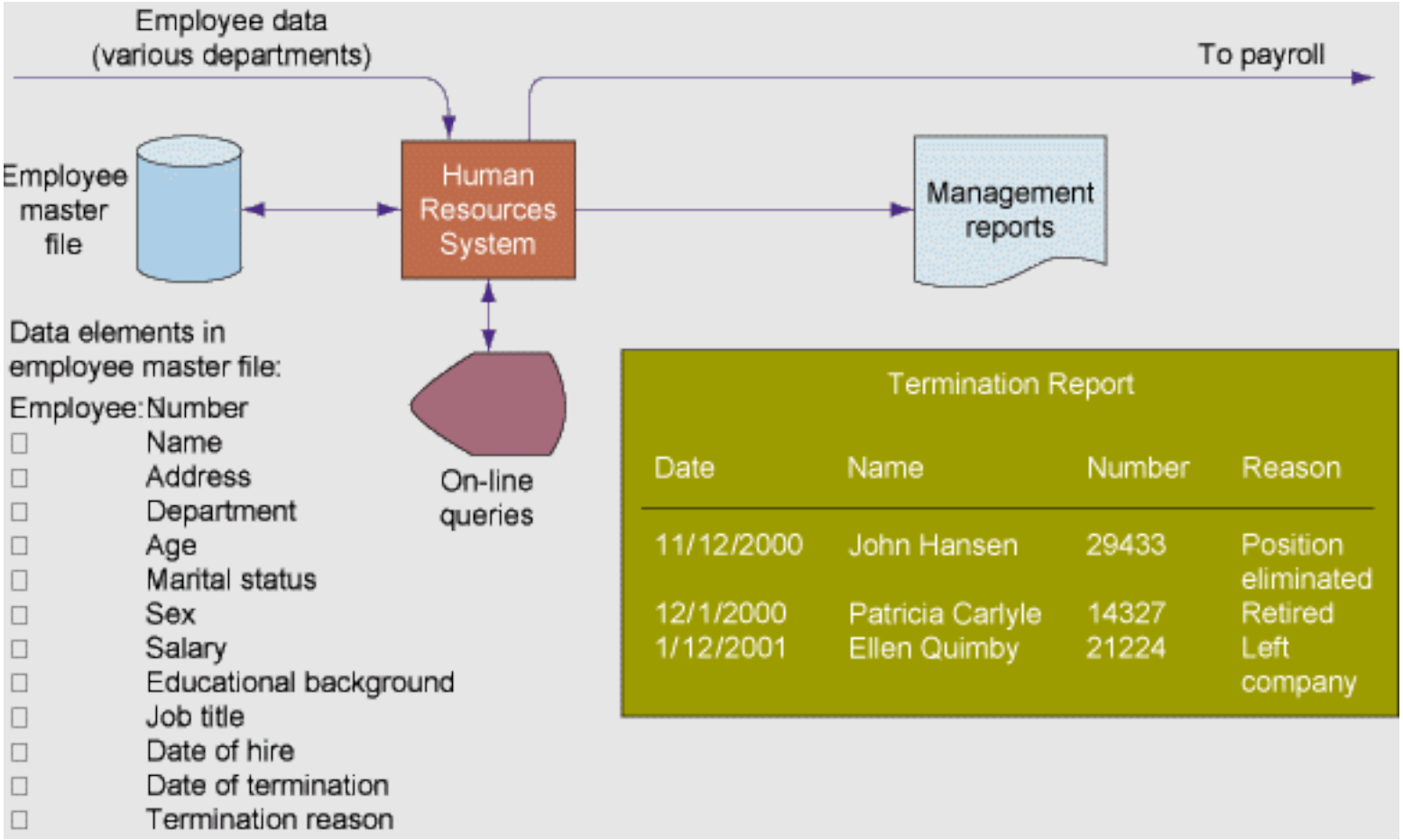
Major application systems:

- Payroll, employee records, benefit systems, career path systems, personnel training systems

Human Resource Systems

SYSTEM	DESCRIPTION	ORGANIZATIONAL LEVEL
TRAINING & DEVELOPMENT	TRACK TRAINING, SKILLS, APPRAISALS	OPERATIONAL
CAREER PATHING	DESIGN EMPLOYEE CAREER PATHS	KNOWLEDGE
COMPENSATION ANALYSIS	MONITOR WAGES, SALARIES, BENEFITS	MANAGEMENT
HUMAN RESOURCES PLANNING	PLAN LONG-TERM LABOR FORCE NEEDS	STRATEGIC

Human Resource Systems



Business processes

- Manner in which work is organized, coordinated, and focused to produce a valuable product or service
- Concrete work flows of material, information, and knowledge—sets of activities

Business Processes and Information Systems

- Unique ways to coordinate work, information, and knowledge
- Ways in which management chooses to coordinate work

Business Processes and Information Systems

Information systems help organizations

- Achieve great efficiencies by automating parts of processes
- Rethink and streamline processes

Examples of Business Processes

- Manufacturing and production: Assembling product, checking quality, producing bills of materials

- Sales and marketing: Identifying customers, creating customer awareness, selling

Examples of Business Processes

- Finance and accounting: Paying creditors, creating financial statements, managing cash accounts

- Human Resources: Hiring employees, evaluating performance, enrolling employees in benefits plans

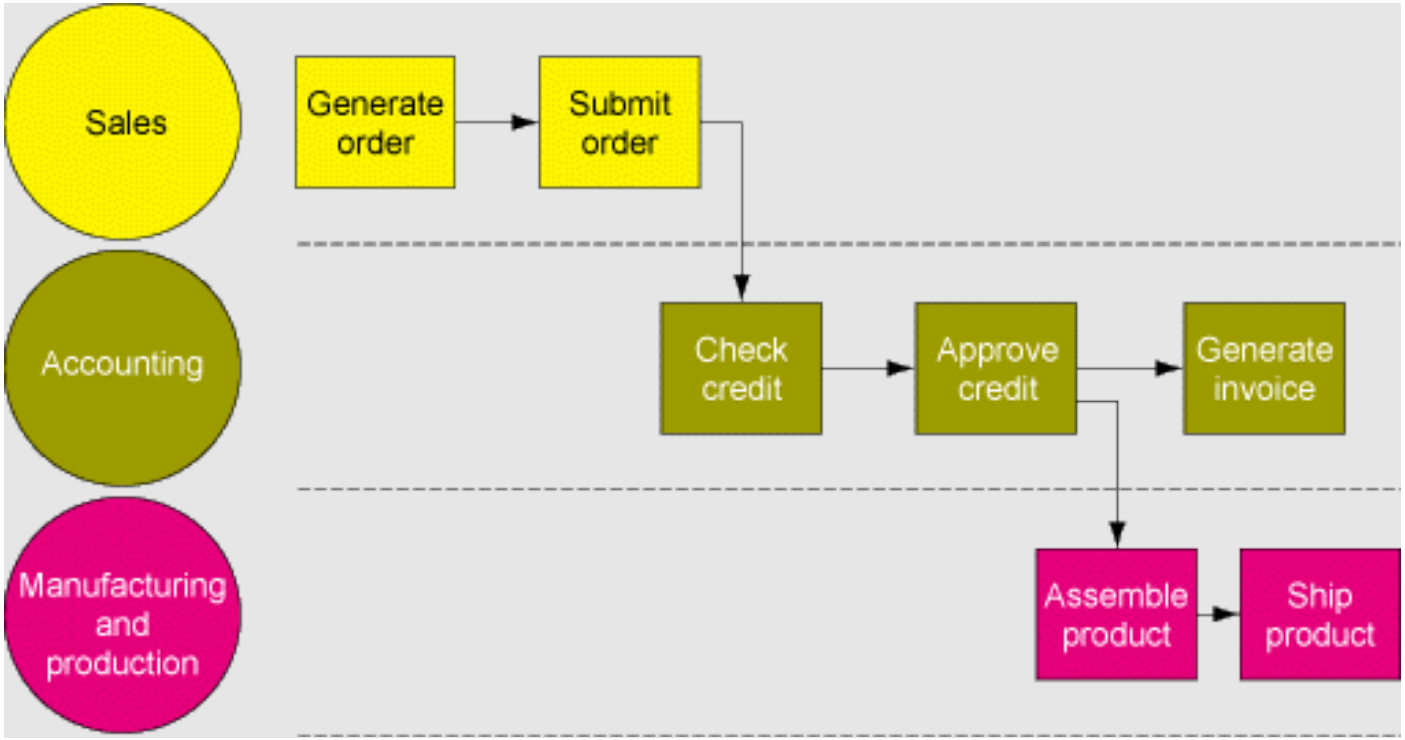
Cross-Functional Business Processes

- Transcend boundary between sales, marketing, manufacturing, and research and development

- Group employees from different functional specialties to a complete piece of work

Example: Order Fulfillment Process

The Order Fulfillment Process



Supply Chain Management (SCM)

- Close linkage and coordination of activities involved in buying, making, and moving a product
- Integrates supplier, manufacturer, distributor, and customer logistics time
- Reduces time, redundant effort, and inventory costs

Supply Chain Management (SCM)

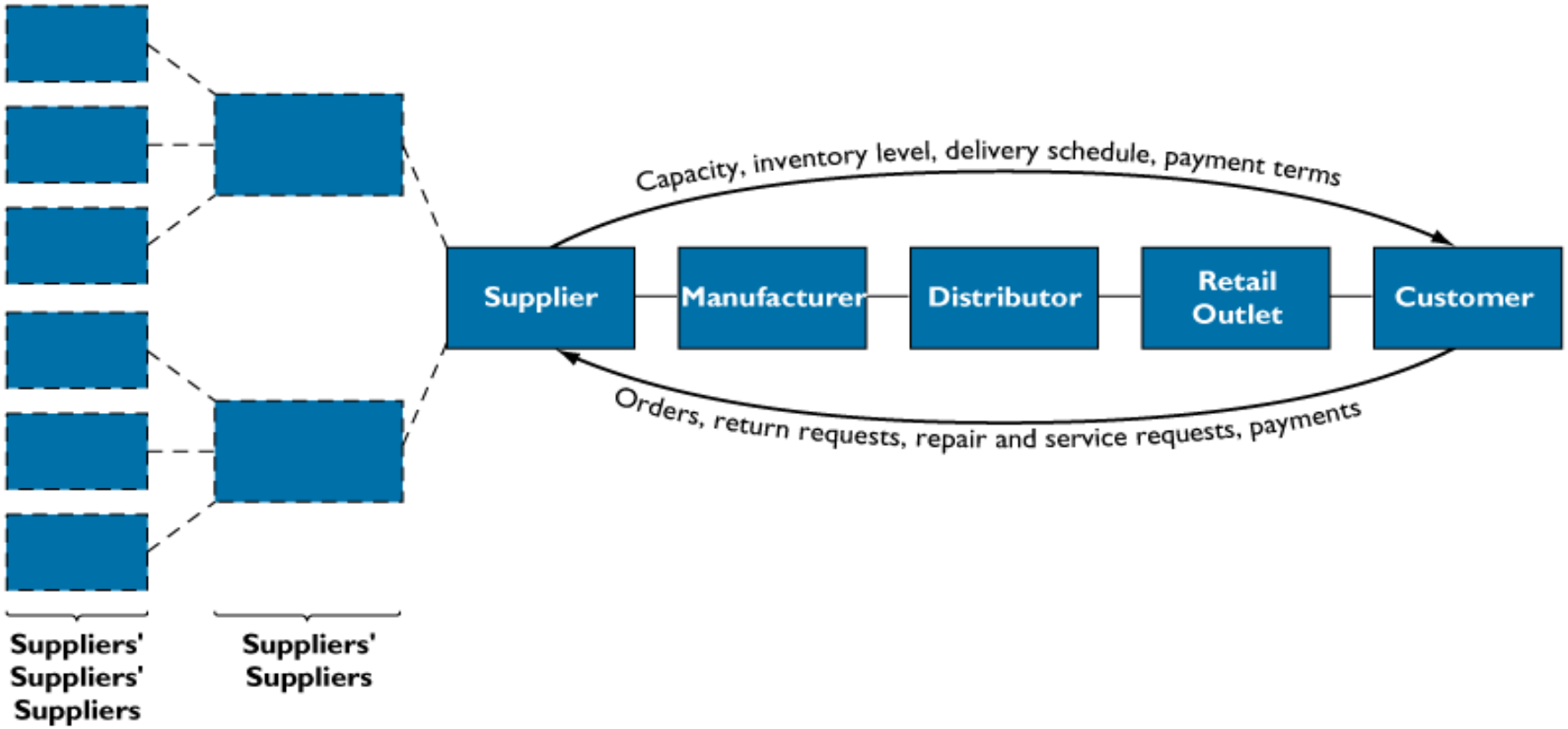
Supply Chain

- Network of organizations and business processes
- Helps in procurement of materials, transformation of raw materials into intermediate and finished products

Supply Chain Management (SCM)

- Helps in distribution of the finished products to customers
- Includes reverse logistics - returned items flow in the reverse direction from the buyer back to the seller

Supply Chain Management



How Information Systems Facilitate Supply Chain Management

- Decide when, what to produce, store, move
- Rapidly communicate orders
- Communicate orders, track order status
- Check inventory availability, monitor levels
- Track shipments
- Plan production based on actual demand
- Rapidly communicate product design change
- Provide product specifications
- Share information about defect rates, returns

Supply Chain Management (SCM)

- **Supply chain planning system:**
  Enables firm to generate forecasts for a product and to develop sourcing and a manufacturing plan for the product

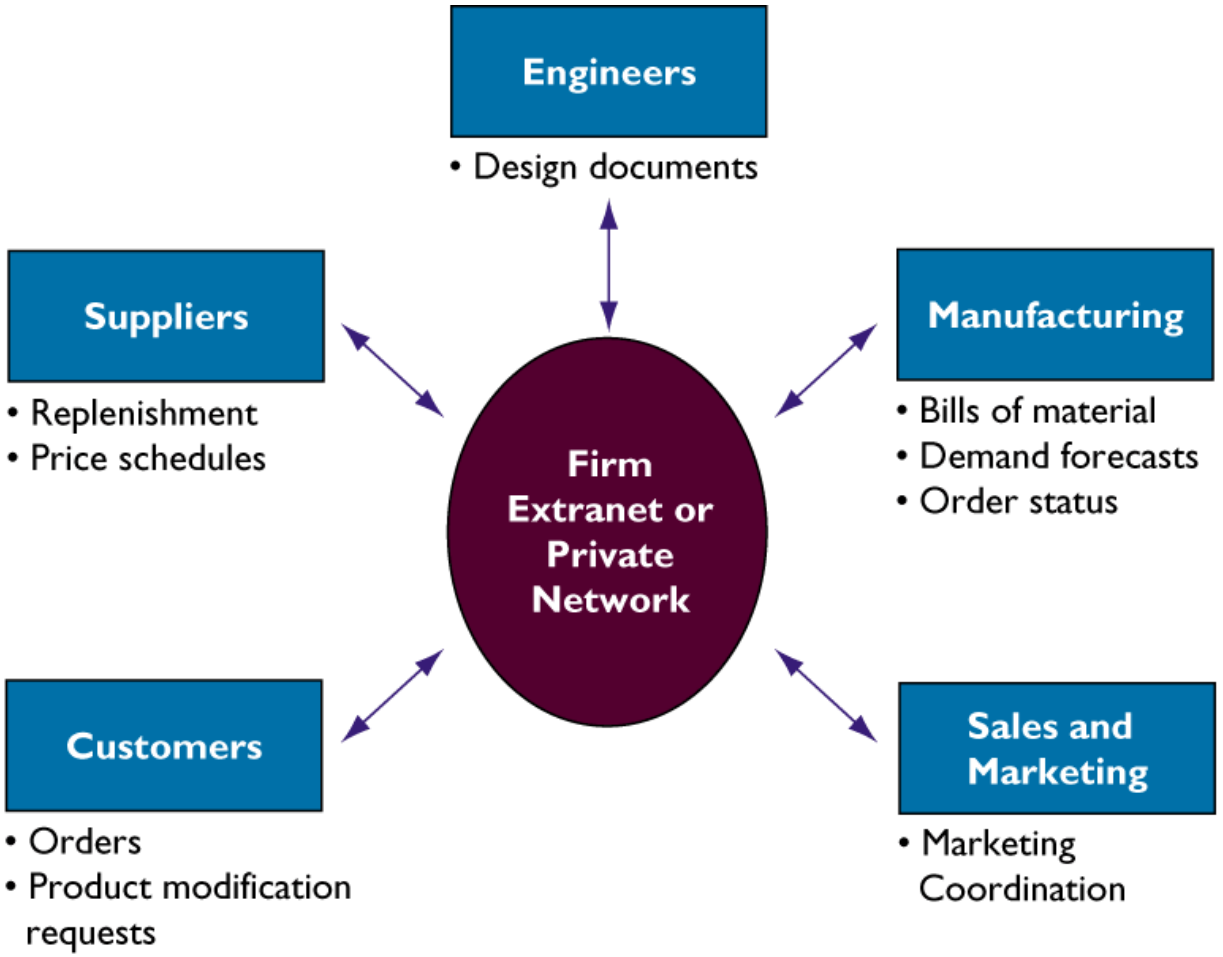
- **Supply chain execution system:**
  Manages flow of products through distribution centers and warehouses

Collaborative Commerce

- Uses digital technologies to enable multiple organizations to collaboratively design, develop, build, move, and manage products

- Increases efficiencies in reducing product design life cycles, minimizing excess inventory, forecasting demand, and keeping partners and customers informed

Collaborative Commerce



1.3 Information System Architecture