Systems Analysis and Design

Prof. Anurag Srivastava

Department of Engineering Sciences

ABV-IIITM, Gwalior (M.P.) 474010

Syllabus:

Concepts and Information System Environment: System definition, characteristics of a system, organization, interaction, interdependence, integration, elements of a system, outputs and inputs, processors, control, feedback, boundaries and interface, types of system.

SDLC and System analyst: SDLC models, Role of the Systems Analyst, Organizational Style and its Impact on Information Systems, Feasibility and Managing Analysis and Design Activities.

Information Requirements Analysis: Sampling and Investigating Hard Data, Interviewing using Questionnaires, Decision-Maker Behavior and Office Environment, Prototyping.

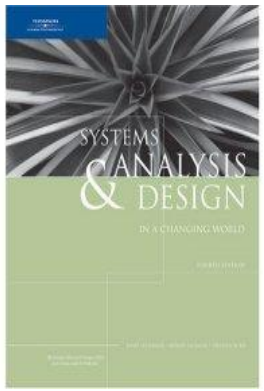
Analysis Process: Data Flow Diagrams, Data Dictionaries, Process Specifications and Structured Decisions, Semi structured Decision Support Systems, Systems Proposal.

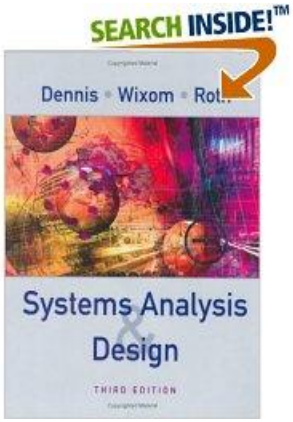
Essentials of Design and Automated Tools: Designing Effective Input and Output, File or Database, User Interface, Data-Entry Procedures, CASE definitions, Types of CASE tools, Benefits and Limitations of CASE tools, CASE support in SDLC, Software Maintenance.

Evaluation:

Component	Duration	Weightage (%)
Minor Test	One Hour	20
Assignment / Seminar / Project + Class Performance		30
Major Test	Two Hour	50

Books/References





- **System Analysis and Design in a Changing World** MIS Series
  John W. Satzinger, Robert B. Jackson, and Stephen D. Burd.
- **Systems Analysis and Design, Sixth Edition** by Gary B. Shelly, Thomas J. Cashman, and Harry J. Rosenblatt (**Paperback** - Mar 16, 2005)
- **Systems Analysis and Design** by Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth (**Hardcover** - Oct 14, 2005)
- **Systems Analysis and Design (6th Edition)** by Kenneth E. Kendall and Julie E. Kendall (**Hardcover** - Mar 1, 2004)

UNIT 1:
Systems Analysis Basics

Overview

- Information Systems
  - Crucial to the success of modern business organizations
  - Constantly being developed to make business more competitive
  - Impact productivity and profits
- Keys to successful systems development
  - Thorough systems analysis and design
  - Understanding what the business requires

Overview (continued)

- Systems analysis – what system should do
- Systems design – how components of information system should be physically implemented
- Systems analyst – uses analysis and design techniques to solve business problems with information technology

Definition:

- The term system is derived from the Greek word Systema, which means an organized relationship among functioning units or components.
- A system exists because it is designed to achieve one or more objectives.

Basic implications of the study

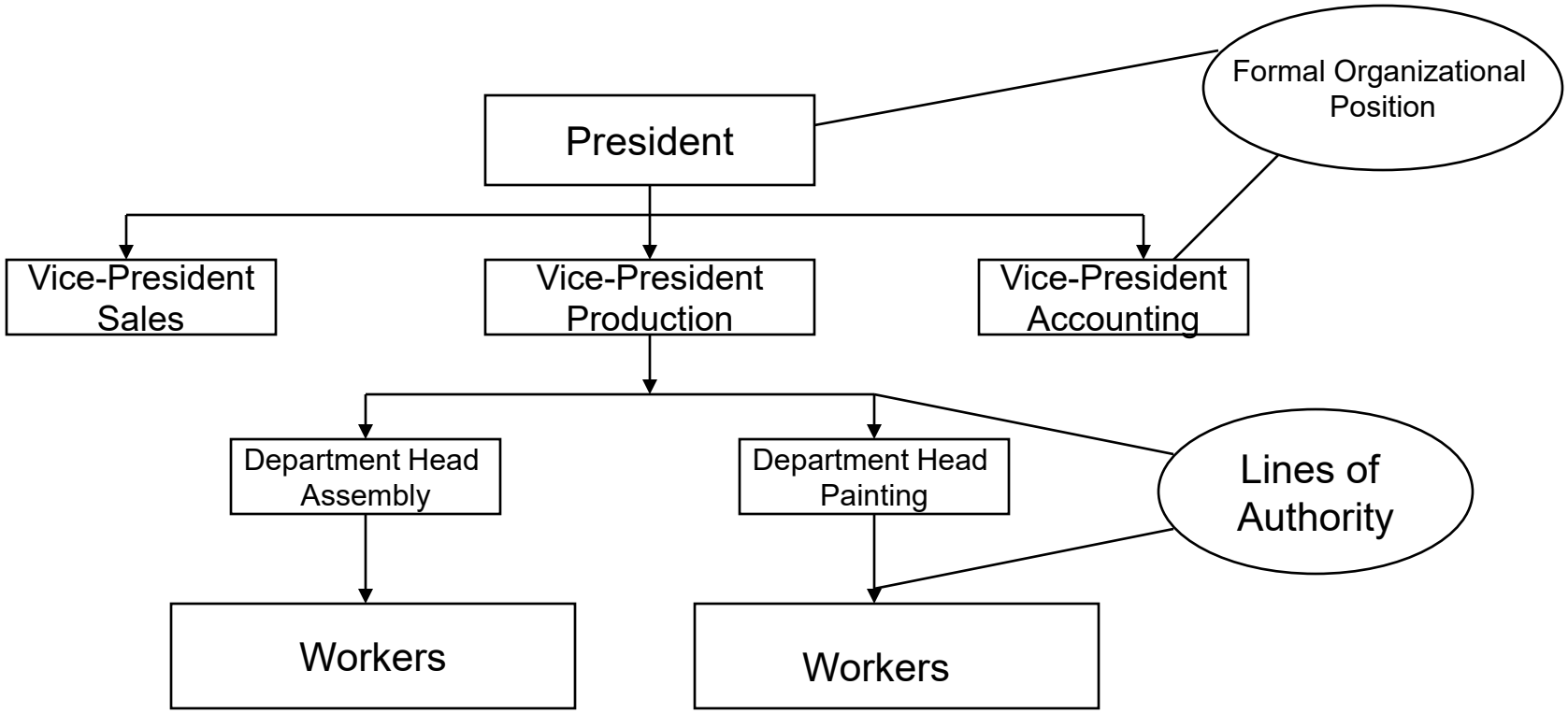
- A system must be designed to achieve a predetermined objective.
- Interrelationships and interdependencies must exist among the components.
- The objective of the organization as whole have a higher priority than the objective of its subsystems.
- Example: computerizing personnel applications must conform to the organizations policy on privacy, confidentiality, and security, as well as making selected data (e.g. pay roll) available to the accounting division on request.

Characteristics of a system

- System definition suggests that some characteristics that are present in all systems:
  - Organization (Order)
  - Interaction
  - Interdependence
  - Integration
  - Central objective

Organization

- Organization implies structure and order. It is the arrangement of the components that helps to achieve objectives.



Organizational Structure: Example

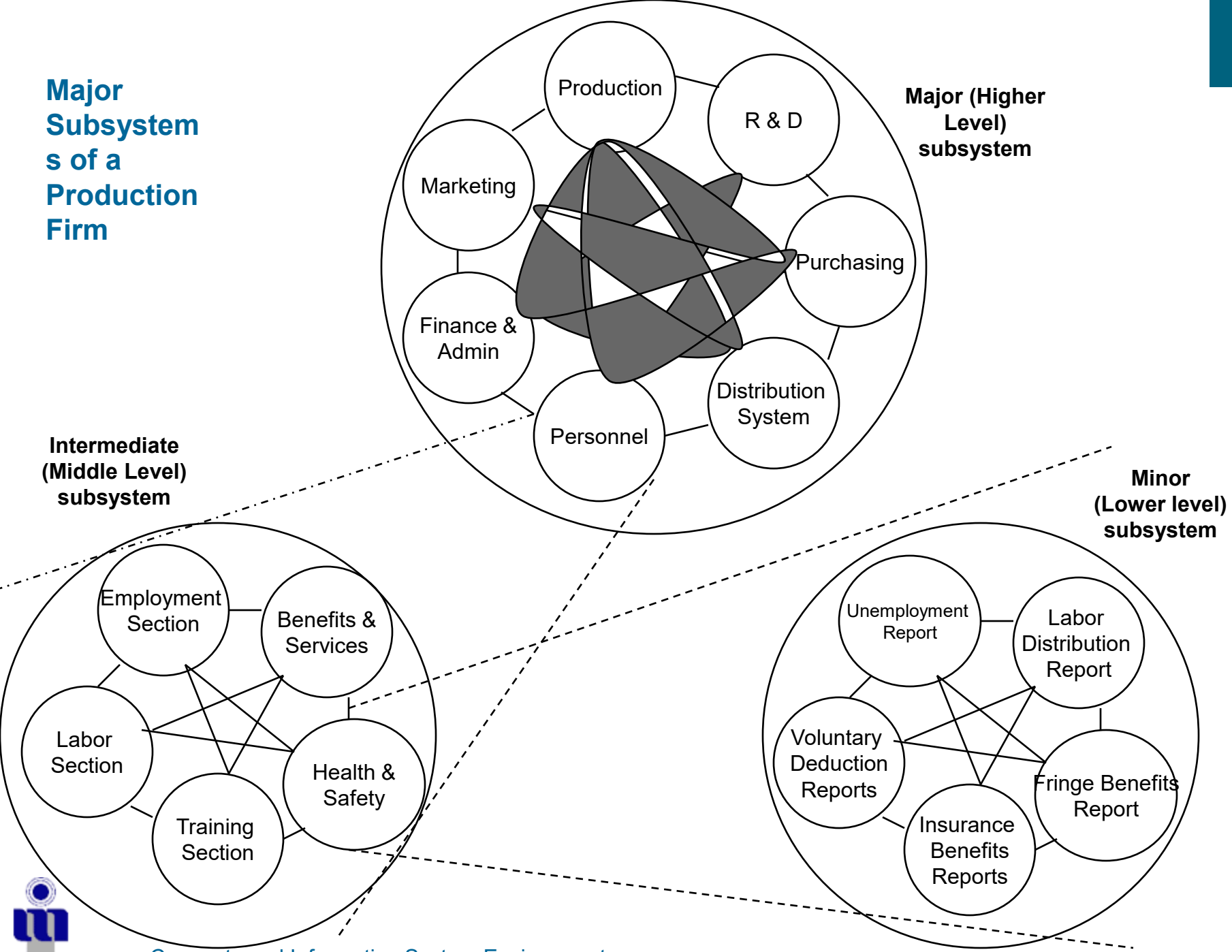
Interaction

- Interaction refers to the manner in which each component functions with other components of the subsystem.
- Example:
  - Purchasing – production
  - Advertising – sales
  - Pay roll – personnel
  - In computer system, CPU must interact with the input devices to solve a problem.

Interdependence:

- Interdependence means that parts of the organization or computer system depends on one another. They are coordinated and linked together according to a plan.
- One subsystem depends on input of another subsystem for proper functioning; i.e. the o/p of one sub system is the required i/p for another subsystem

Major Subsystems of a Production Firm



The Analyst as a Business Problem Solver

- Has computer technology knowledge and programming expertise
- Understands business problems
- Uses logical methods for solving problems
- Has fundamental curiosity
- Wants to make things better
- Is more of a business problem solver than technical programmer

Analyst's Approach to Problem Solving

- Research and understand the problem
- Verify that the benefits of solving the problem outweigh the costs
- Define the requirements for solving the problem
- Develop a set of possible solutions (alternatives)
- Decide which solution is best, and make a recommendation
- Define the details of the chosen solution
- Implement the solution
- Monitor to make sure that you obtain the desired results

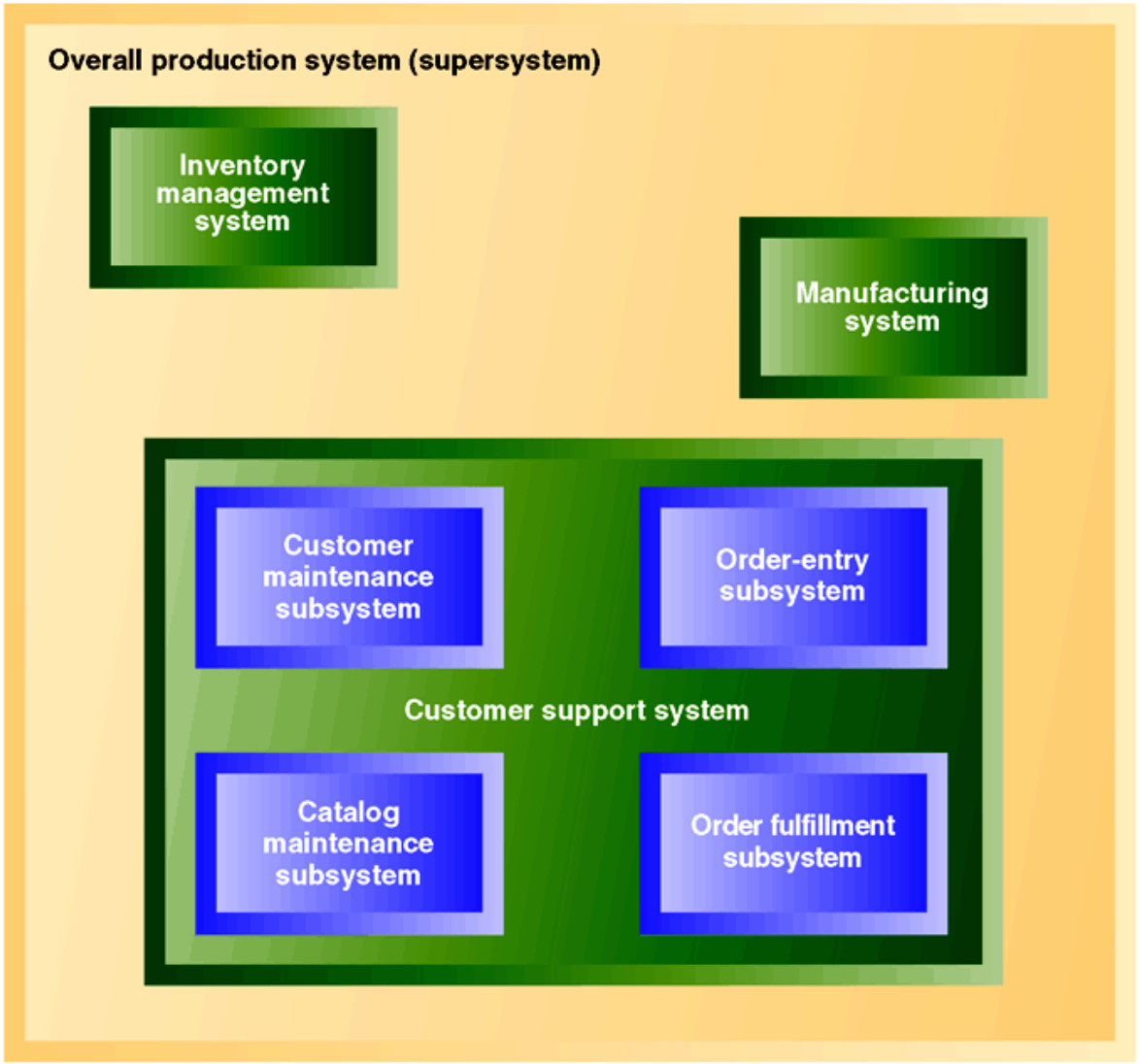
Systems That Solve Business Problems

- System – interrelated components functioning together to achieve an outcome
- Information systems – a collection of interrelated components that collect, process, store, and provide as output information needed to complete tasks
- Subsystems – part of a larger system
- Supersystem – a larger system contains subsystems
- Functional decomposition – dividing the system into smaller subsystems and components

Information Systems and Subsystems

FIGURE 1-2

Information systems and subsystems.



Information Systems and Component Parts

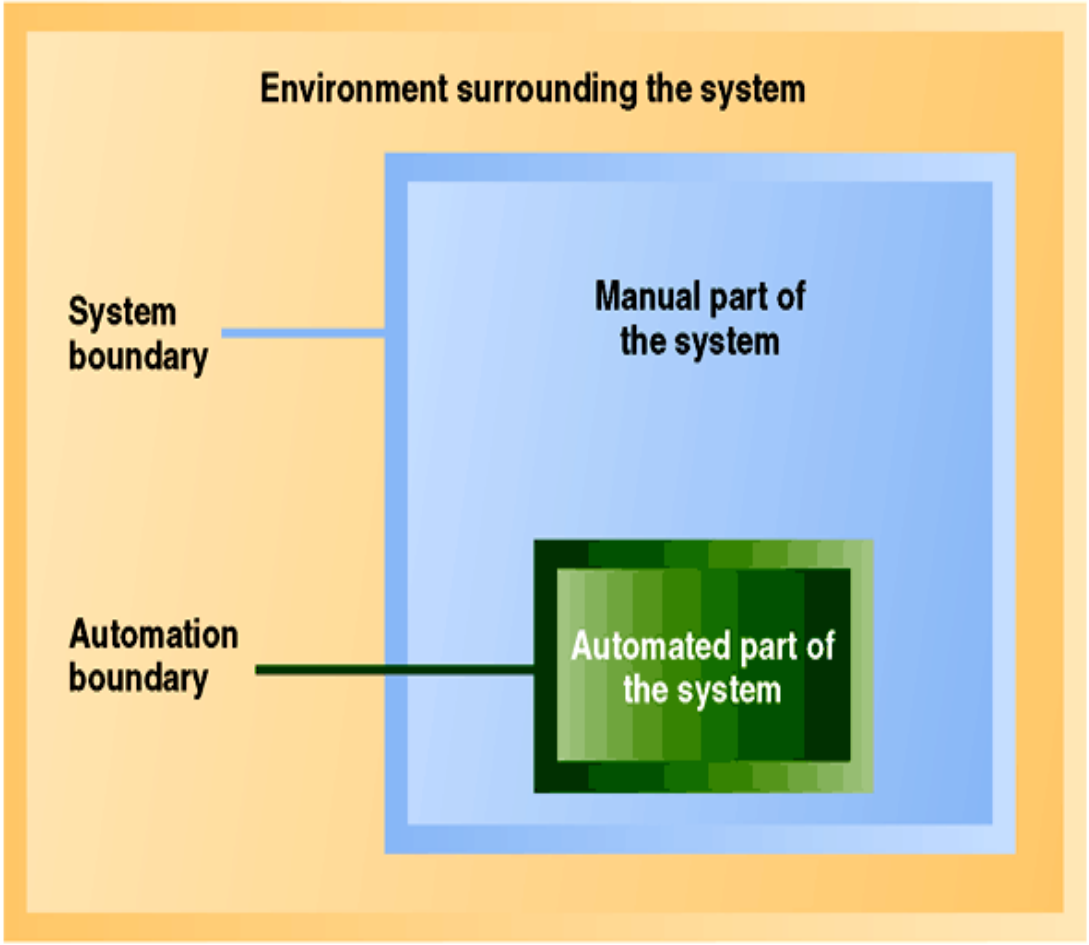
FIGURE 1-3

Information systems and component parts.

System Boundary vs. Automation Boundary

FIGURE 1-4

The system boundary versus the automation boundary.



Types of Information Systems

- Transaction processing systems (TPS)
  - Capture and record information about organization's transactions
- Management information systems (MIS)
  - Take information captured by TPS
  - Produce reports for planning and control
- Executive information systems (EIS)
  - Monitoring competitive environment and strategic planning

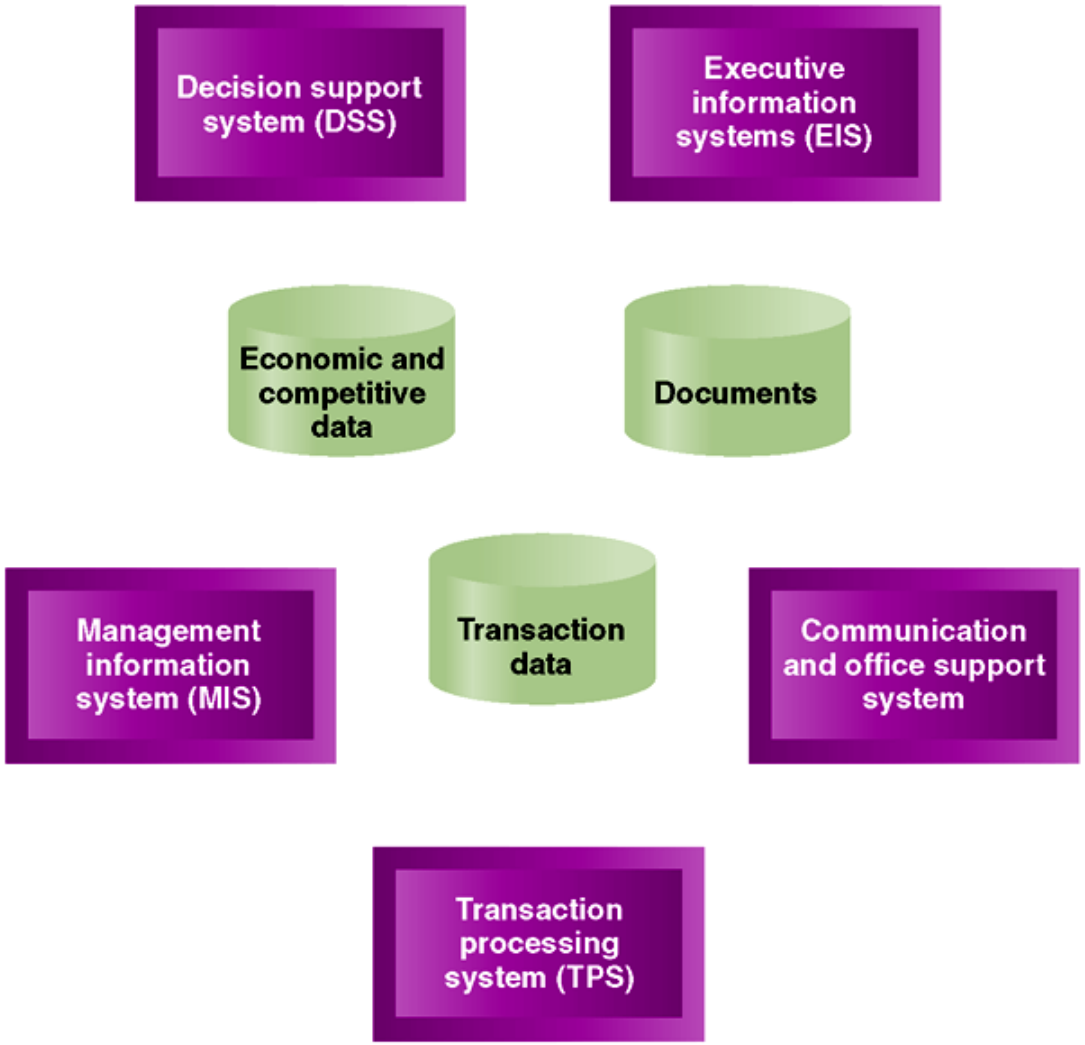
Types of Information Systems (continued)

- Decision support systems (DSS)
  - Explore impact of available options or decisions (What-if scenarios)
- Communication support systems
  - Facilitate communication internally and with customers and suppliers
- Office support systems
  - Help employees create and share documents

Types of Information Systems (continued)

FIGURE 1-5

Types of information systems.



Required Skills of the Systems Analyst

- An analyst should have fundamental technology knowledge of:
  - Computers / peripheral devices (hardware)
  - Communication networks and connectivity
  - Database and database management systems (DBMS)
  - Programming languages (for example: VB.NET or Java)
  - Operating systems and utilities

Technical Knowledge and Skills

- Analyst uses tools:
  - Software productivity packages (MS Office)
  - Integrated development environments (IDEs) for programming languages
  - CASE tools / coding, testing, and documentation support packages
- Analyst understands SDLC phase techniques:
  - Project planning
  - Systems analysis, systems design
  - Construction, implementation, systems support

Business Knowledge and Skills

- Analyst must understand:
  - Business functions performed by organization
  - Organizational structure
  - Organization management techniques
  - Functional work processes
- Systems analysts typically study business administration in college

People Knowledge and Skills

- Systems analysts need to understand how people:
  - Think
  - Learn
  - React to change
  - Communicate
  - Work (in a variety of jobs and levels)

People Knowledge and Skills (continued)

- Interpersonal and communication skills are crucial to:
  - Obtaining information
  - Motivating people
  - Getting cooperation
  - Understanding the complexity and workings of an organization in order to provide necessary support

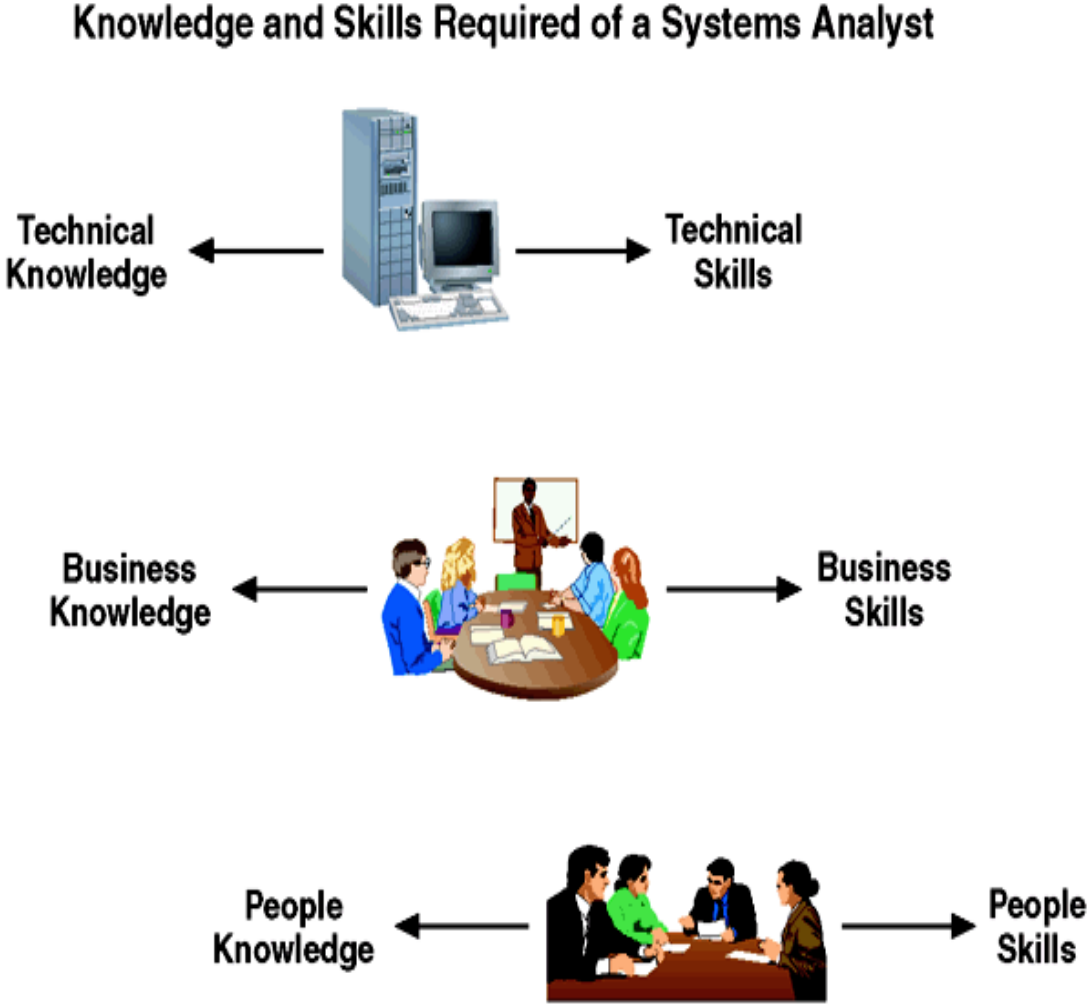
Integrity and Ethics

- Analyst has access to confidential information such as salary, an organization's planned projects, security systems, etc.
  - Must keep information private
  - Any impropriety can ruin an analyst's career
  - Analyst plans security in systems to protect confidential information

Required Skills of the Systems Analyst

FIGURE 1-6

Required skills of the systems analyst.



The Environment Surrounding the Analyst

- Types of Technology Encountered
  - Desktop
  - Networked desktops
  - Client-server
  - Mainframe
  - Internet, intranet, and extranet
  - Wireless, PDAs, Cell Phones (mobile workers)

Typical Job Titles and Places of Employment

- Job titles of systems analyst vary greatly, but entail same thing
- Places of employment vary from small businesses to large corporations
- Analysts can be internal employees or outside consultants
- Analysts can be developing solutions for internal business managers or for external clients and customers

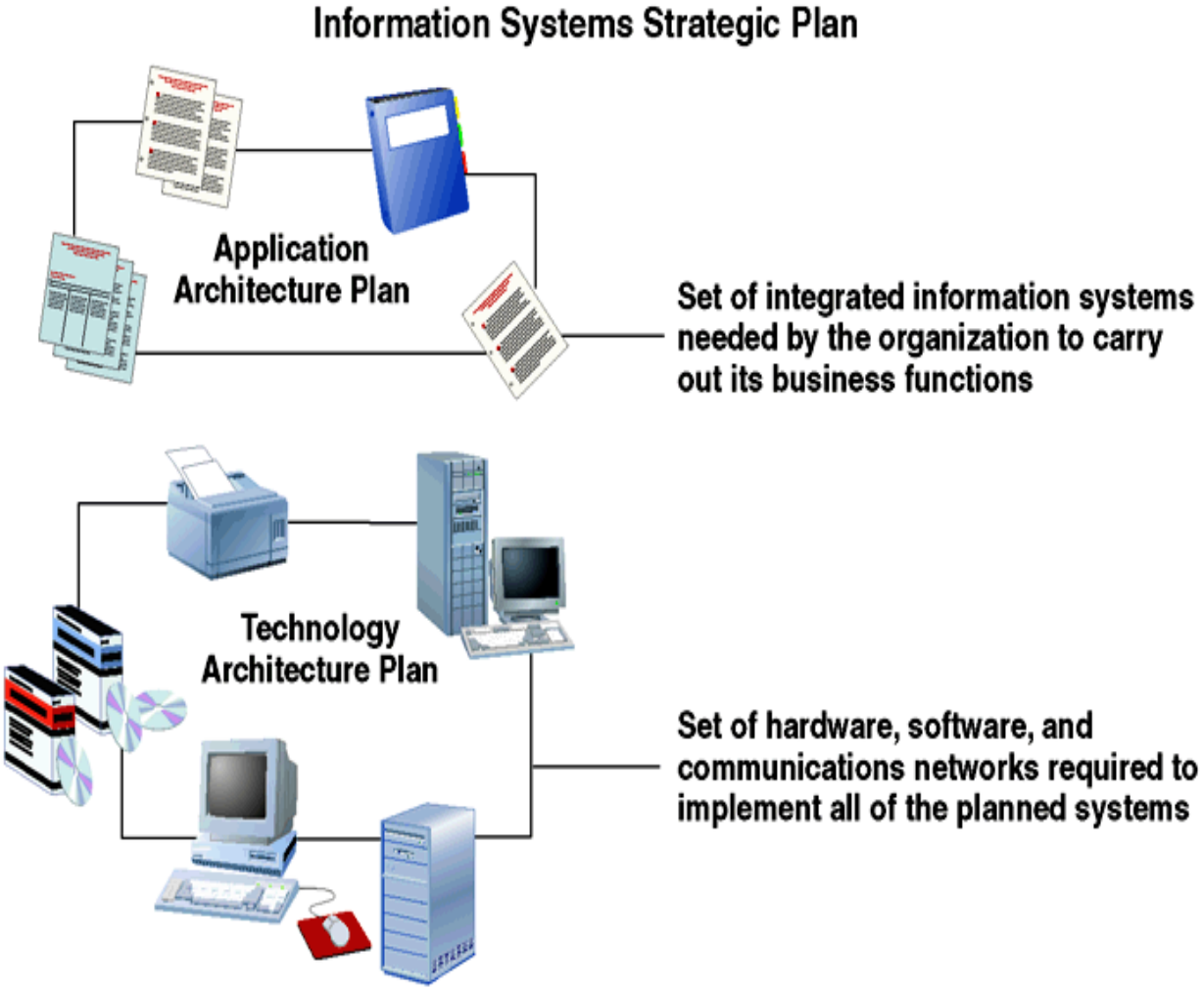
The Analyst's Role in Strategic Planning

- Special projects affecting executives
  - Business process reengineering – radical improvements to existing processes
- Strategic planning development process
- Information systems strategic planning
  - Application architecture plan (business focus)
  - Technology architecture plan (infrastructure focus)
- Enterprise resource planning (ERP) integrated systems

Components of an information systems strategic plan

FIGURE 1-7

Components of an information systems strategic plan.



Rocky Mountain Outfitters (RMO) and Its Strategic Information Systems Plan

- RMO sports clothing manufacturer and distributor about to begin customer support system project
- First understand: nature of the business, approach to strategic planning, and objectives for customer support system
- RMO systems development project used to demonstrate analysis and design concepts
- Reliable Pharmaceutical Service (RPS) is a second case study for classroom purposes

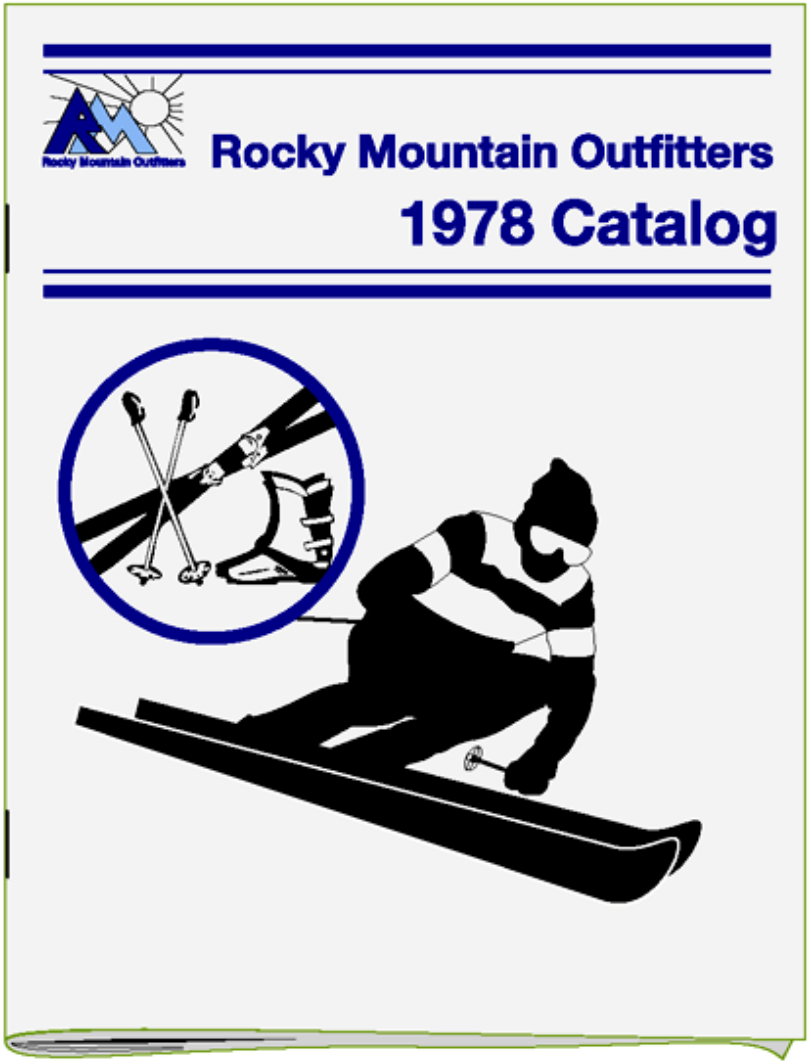
Introduction to Rocky Mountain Outfitters (RMO) business

- Began Park City, Utah in 1978 supplying winter sports clothes to local ski shops
- Expanded into direct mail-order sales with small catalog – as catalog interest increased, opened retail store in Park City
- Became large, regional sports clothing distributor by early 2000's in Rocky Mountain and Western states
- Currently $100 million in annual sales and 600 employees and two retail stores
- Mail-order revenue to $60 million, phone-order revenue is $30 million

Early RMO Catalog Cover (Spring, 1978)

FIGURE 1-8

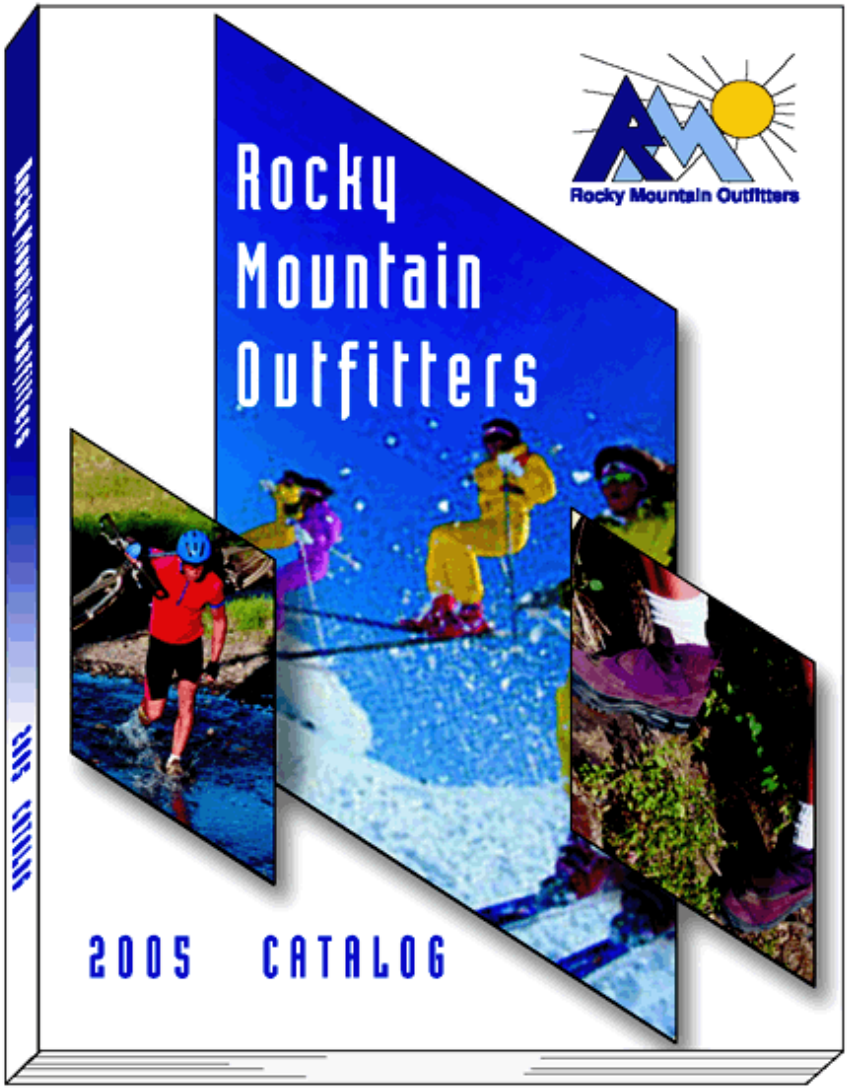
Early RMO catalog cover (Fall 1978).



Current RMO Catalog Cover (Fall 2005)

FIGURE 1-9

Current RMO catalog cover (Fall 2005).



RMO Strategic Issues

- Innovational clothing distributor, featured products on Web site ahead of competitors
- Original Web site functions:
  - Enhance image, request copy of catalog, portal to Outdoor sports Web sites
- Enhanced Web site functions:
  - Add specific product information, weekly specials, and all product offerings
- Detailed IS strategic plan
  - Supply chain management
  - Customer relationship management

RMO's Organizational Structure

- Managed by original (married) owners
  - John Blankens – President
  - Liz Blankens – Vice president of merchandising and distribution
- William McDougal – Vice president of marketing and sales
- JoAnn White – Vice president of finance and systems
  - Background in finance and accounting

RMO Locations

FIGURE 1-11

Rocky Mountain Outfitters' locations.

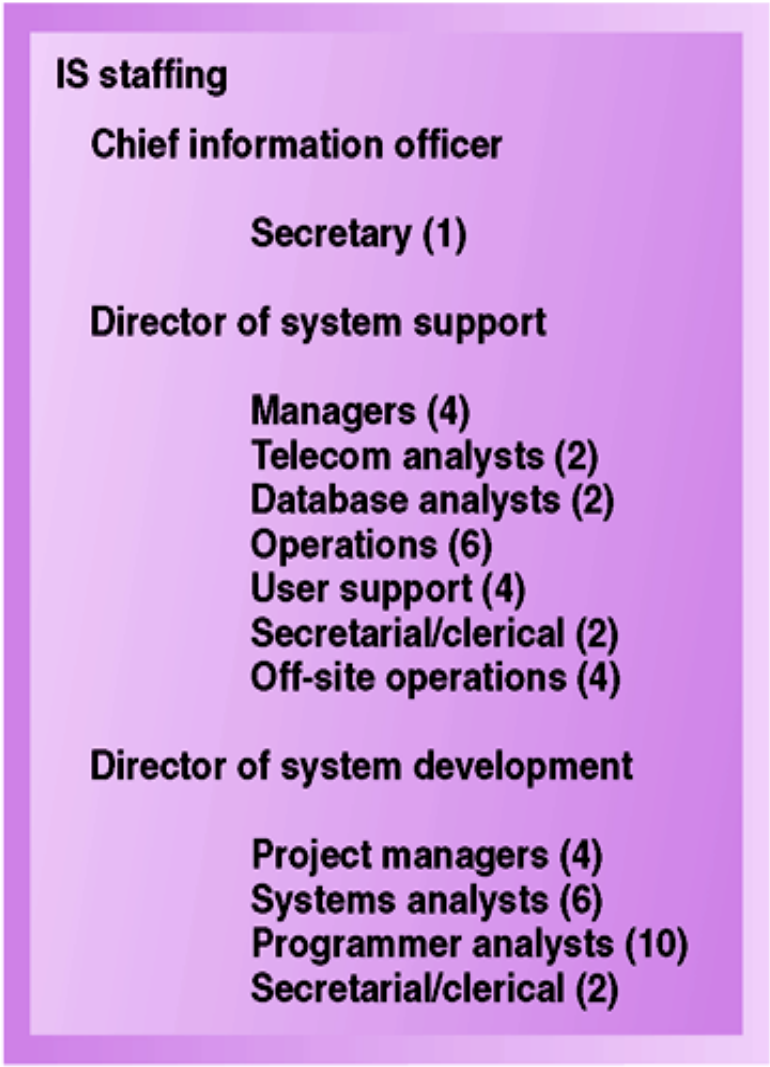
RMO Information Systems Department

- Mac Preston: Assistant vice-president and chief information officer (CIO)
  - Recent promotion made after IS strategic plan created
  - CIO reports to finance and systems VP
  - CIO is Increasingly important to future of RMO
  - IS department will report directly to the CEO … if CIO can successfully implement new strategic IS plan

RMO IS Department Staffing

FIGURE 1-12

RMO information systems department staffing.



Existing RMO Systems

- Small mainframe-based system
  - Supports inventory, mail-order, accounting and human resources
  - Has dedicated connectivity to distribution and mail-order sites
- LANs and file servers
  - Supports central office functions, distribution centers, and manufacturing centers
  - Manufacturing has dial-up capability

RMO Systems in 2010 (continued)

- RMO informational Website
  - Hosted by Internet service provider (ISP)
- Merchandising/Distribution
  - 12 year old mainframe COBOL/CICS (Customer Information Control System) , DB2, VSAM (Vitrual Storage Access Method) application
- Mail order
  - 14 year old mainframe COBOL application
- Phone order
  - Oracle and Visual Basic system built 6 years ago

RMO Systems in 2010(continued)

- Retail store systems
  - 8 Year old point-of-sale and batch inventory package, overnight update with mainframe
- Office systems
  - LAN with office software, Internet, email
- Human resources
  - 13 year old mainframe-based payroll and benefits
- Accounting/Finance
  - Mainframe package bought from leading vendor

The Information Systems Strategic Plan

- Supports RMO strategic objectives
  - Build more direct customer relationships
  - Expand marketing beyond Western states
- Plan calls for a series of information system development and integration projects over several years
- Project launch: new customer support system to integrate phone orders, mail orders, direct customer orders via Internet

RMO Technology Architecture Plan

- Distribute business applications
  - Across multiple locations and systems
  - Reserve mainframe for Web server, database, and telecommunications
  - Allow incremental and rapid growth in capacity
- Strategic business processes via Internet
  - Supply chain management (SCM)
  - Direct customer ordering via dynamic Web site
  - Customer relationship management (CRM)
  - Web-based intranet for business functions

RMO Application Architecture Plan

- Supply chain management (SCM)
  - Product development, product acquisition, manufacturing, inventory management
- Customer support system (CSS)
  - Integrate order-processing and fulfillment system with SCM
  - Support customer orders (mail, phone, web)
- Strategic information management system
  - Extract and analyze SCM and CSS information for strategic and operational decision making and control

RMO Application Architecture Plan (continued)

- Retail store system (RSS)
  - Replace existing retail store system with system integrated with CSS
- Accounting/Finance system
  - Purchase intranet application to maximize employee access to financial data for planning and control
- Human resource (HR) system
  - Purchase intranet application to maximize employee access to human resource forms, procedures, and benefits information

Timetable for RMO Application Architecture Plan

2004–2005: Project under way. Consulant-assisted new development to integrate seamlessly product development, product acquisition, manufacturing, and inventory management in anticipation of rapid sales growth.	Supply Chain Management (SCM)
2005–2006: Project beginning now. New development to implement an order-processing and fulfillment system that seamlessly integrates with the supply chain management system to support the three order-processing requirements: mail order, phone order, and direct customer access via the Web.	Customer Support System (CSS)
2006: Package solution that can extract and analyze supply chain and customer support information for strategic and operational decision making and control.	Strategic Information Management System (SIMS)
2006: Package solution that can integrate with customer support system.	Retail Store System (RSS)
2007: Package intranet solution.	Accounting/ Finance System
2008: Package intranet solution.	Human Resource System

FIGURE 1-13
The timetable for RMO's application architecture plan.

The Customer Support System

- RMO core competency is their ability to develop and maintain customer loyalty
- Supply chain management (SCM) must be defined before CSS can begin
- CSS is a core system supporting customer relationship management
- Systems analysis phase will define system requirements in detail
- Strategic plan's stated objectives will form guidelines as project proceeds

Summary

- Systems analyst solves business problems using information systems technology
- Problem solving means looking into business problem in great detail, completely understanding problem, and choosing best solution
- Information systems development is much more than writing programs

Summary (continued)

- System - collection of interrelated components that function together to achieve some outcome
- Information systems outcome: solution to a business problem
- Information systems, subsystems, and components interact with and include hardware, software, inputs, outputs, data, people, and procedures

Summary (continued)

- Systems analyst has broad knowledge and variety of skills, including technical, business, and people
- Integrity and ethical behavior are crucial to success for the analyst
- Systems analyst encounters a variety of rapidly changing technologies
- System analyst works on strategic plans and then systems development projects