System Analysis and Design

SAD Basics

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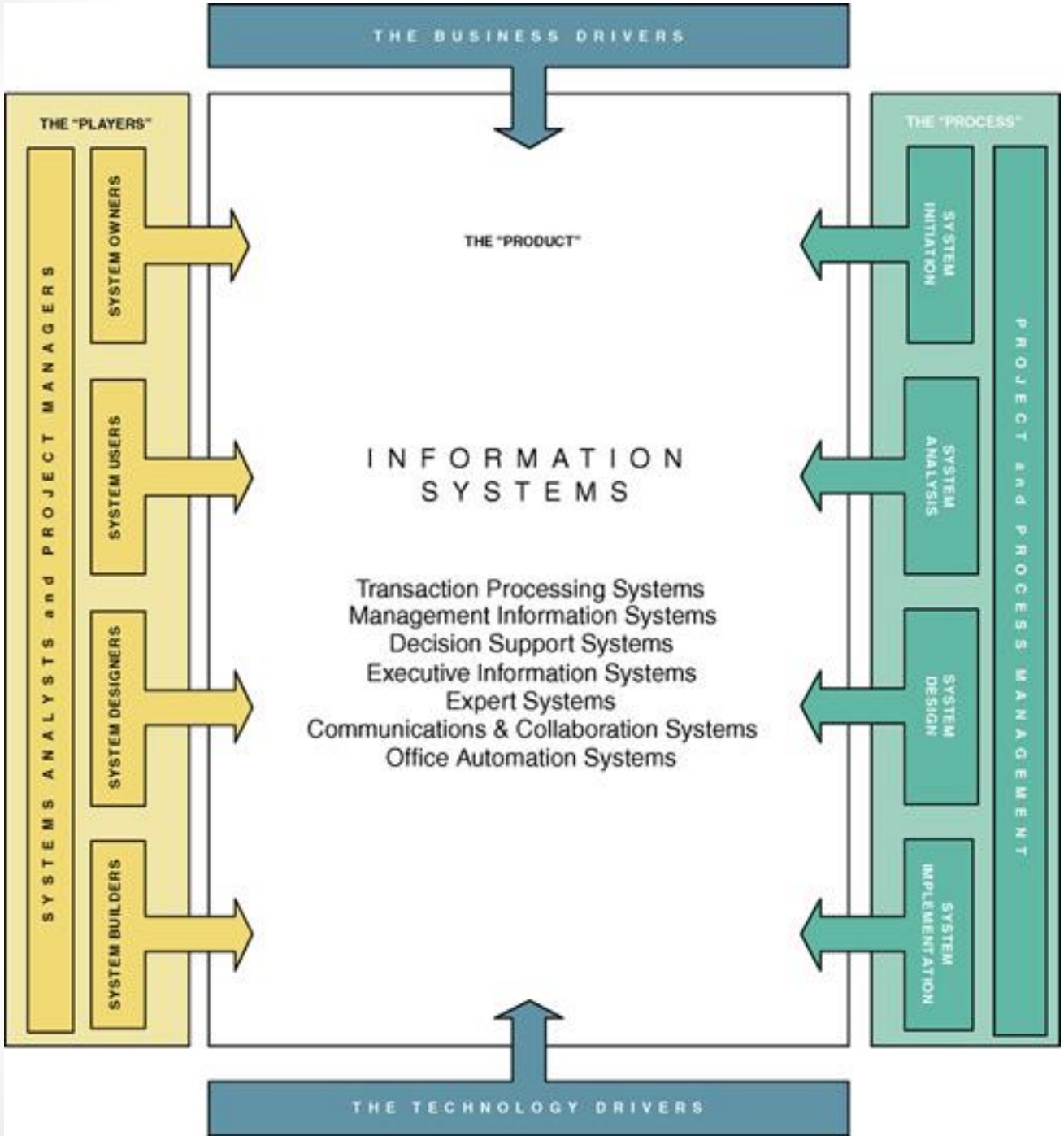

THE BUSINESS DRIVERS
THE "PLAYERS"
SYSTEMS ANALYSTS and PROJECT MANAGERS
SYSTEM OWNERS
SYSTEM USERS
SYSTEM DESIGNERS
SYSTEM BUILDERS
THE "PRODUCT"
INFORMATION SYSTEMS
Transaction Processing Systems
Management Information Systems
Decision Support Systems
Executive Information Systems
Expert Systems
Communications & Collaboration Systems
Office Automation Systems
THE "PROCESS"
SYSTEM INITIATION
SYSTEM ANALYSIS
SYSTEM DESIGN
SYSTEM IMPLEMENTATION
PROJECT and PROCESS MANAGEMENT
THE TECHNOLOGY DRIVERS

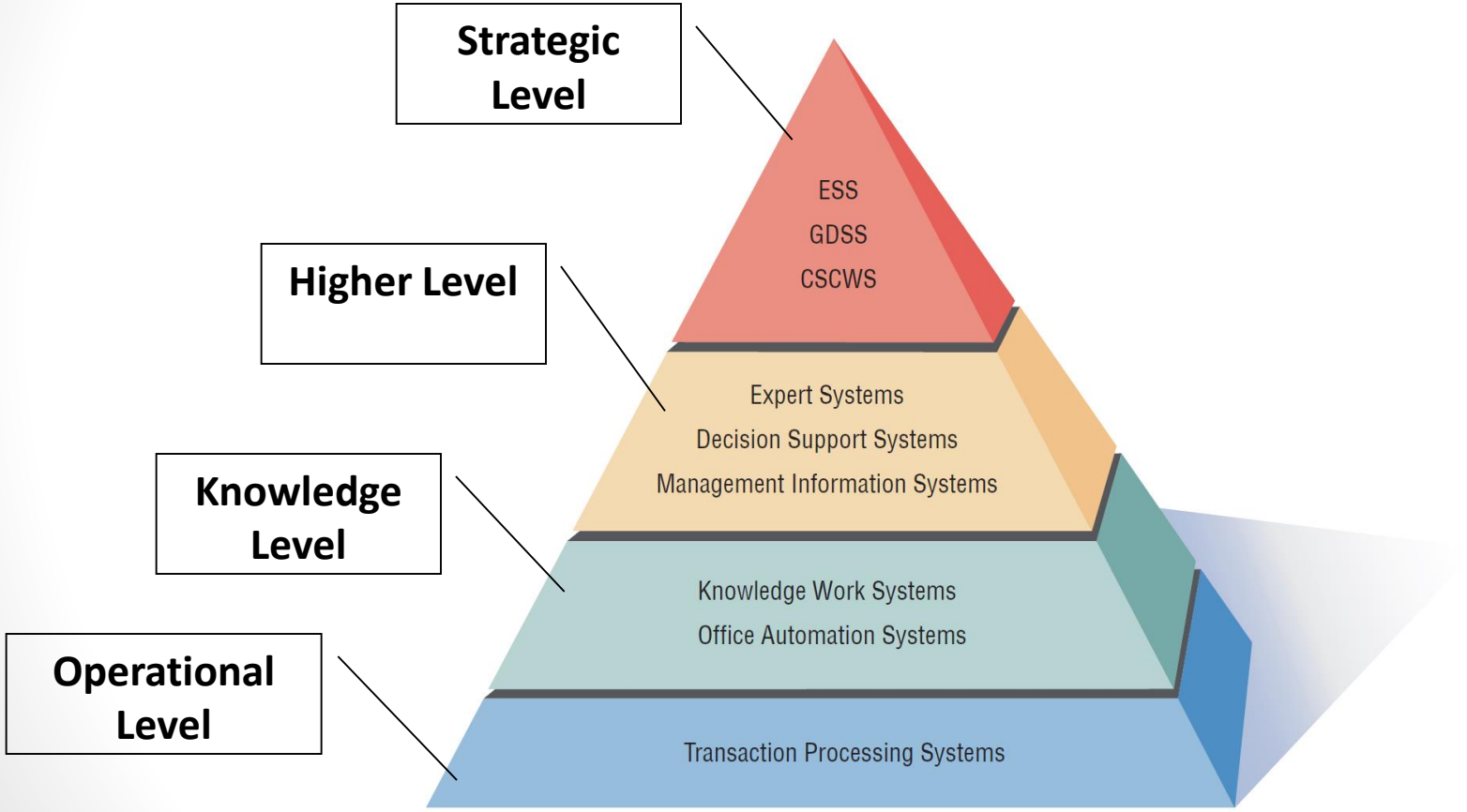
A Framework for Systems Analysis and Design

A **system** is a group of interrelated components that function together to achieve a desired result.

An **information system** (IS) is an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization.

Information technology is a contemporary term that describes the combination of computer technology (hardware and software) with telecommunications technology (data, image, and voice networks).

Types of Information Systems



Types of Information Systems

- A **transaction processing system** (TPS) is an information system that captures and processes data about business transactions.
- A **management information system** (MIS) is an information system that provides for management-oriented reporting based on transaction processing and operations of the organization.
- A **decision support system** (DSS) is an information system that either helps to identify decision making opportunities or provides information to help make decisions.

Types of Information Systems (cont.)

- An **expert system** is an information system that captures the expertise of workers and then simulates that expertise to the benefit of non-experts.

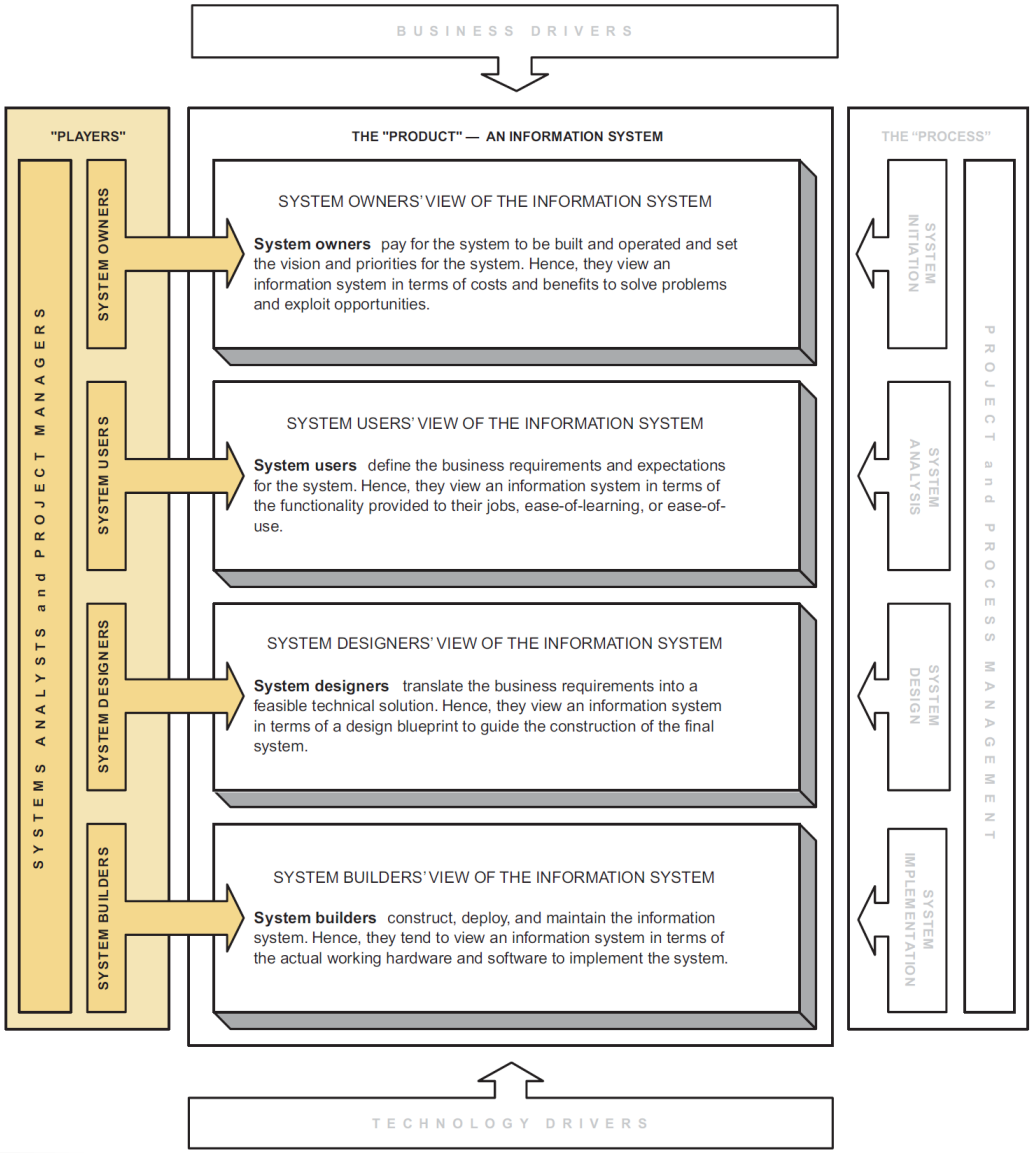
- A **communications and collaboration system** is an information system that enables more effective communications between workers, partners, customers, and suppliers to enhance their ability to collaborate.

- An **office automation system** is an information system that supports the wide range of business office activities that provide for improved work flow between workers.

Stakeholders: Players in the Systems Game

- A **stakeholder** is any person who has an interest in an existing or proposed information system. Stakeholders can be technical or nontechnical workers. They may also include both internal and external workers.
- **Information workers** are those workers whose jobs involve the creation, collection, processing, distribution, and use of information.
- **Knowledge workers** are a subset of information workers whose responsibilities are based on a specialized body of knowledge.

Stakeholders' Perspectives on an Information System



System Owners

System owners – an information system's sponsor and executive advocate, usually responsible for funding the project of developing, operating, and maintaining the information system.

System Users

System users – a “customer” who will use or is affected by an information system on a regular basis – capturing, validating, entering, responding to, storing, and exchanging data and information.

Internal System Users

- Clerical and service workers
- Technical and professional staff
- Supervisors, middle managers, and executive managers

External System Users

- Customers
- Suppliers
- Partners
- Employees

System Designers and System Builders

System designer – a technical specialist who translates system users' business requirements and constraints into technical solution. She or he designs the computer databases, inputs, outputs, screens, networks, and software that will meet the system users' requirements.

System builders – a technical specialist who constructs information systems and components based on the design specifications generated by the system designers.

Systems Analysts

Systems analyst – a specialist who studies the problems and needs of an organization to determine how people, data, processes, and information technology can best accomplish improvements for the business.

- A **programmer/analyst** (or **analyst/programmer**) includes the responsibilities of both the computer programmer and the systems analyst.
- A **business analyst** focuses on only the non-technical aspects of systems analysis and design.

The Systems Analyst as a Problem-Solver

- By "Problems" that need solving, we mean:
  - **Problems**, either real or anticipated, that require corrective action
  - **Opportunities** to improve a situation despite the absence of complaints
  - **Directives** to change a situation regardless of whether anyone has complained about the current situation

Where Do Systems Analysts Work?

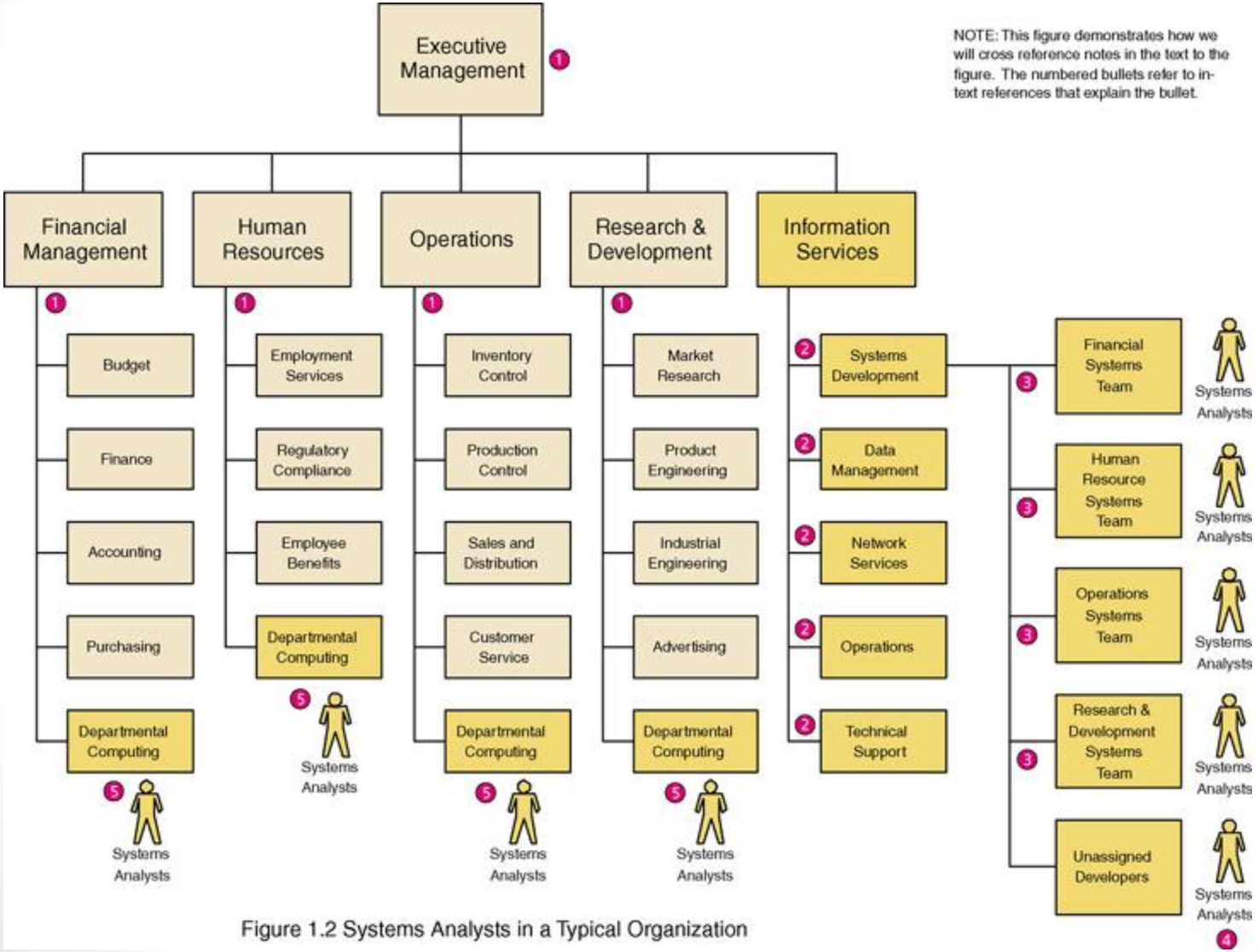
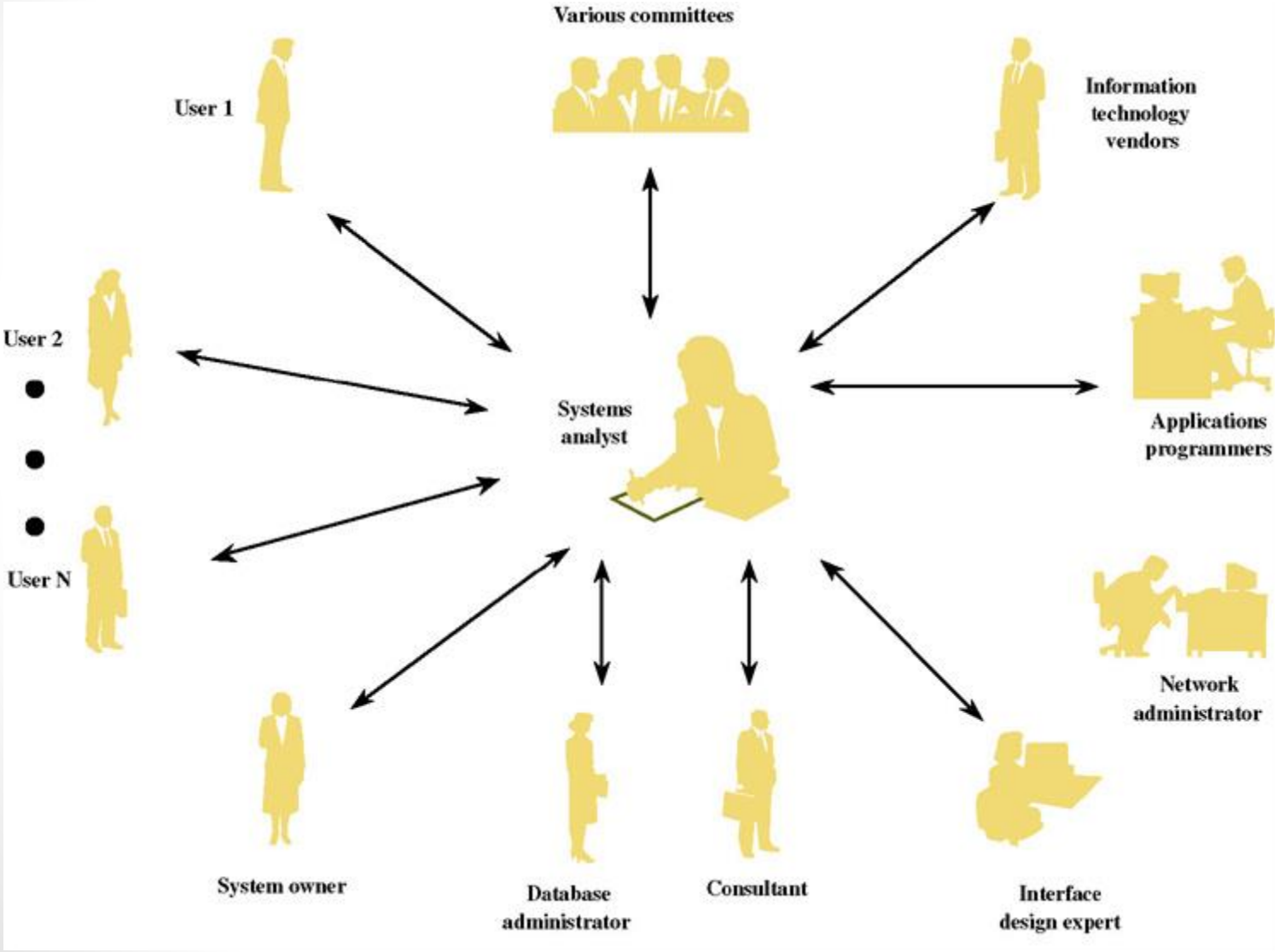


Figure 1.2 Systems Analysts in a Typical Organization

Skills Needed by the Systems Analyst

- Working knowledge of information technology
- Computer programming experience and expertise
- General business knowledge
- General problem-solving skills
- Good interpersonal communication skills
- Good interpersonal relations skills
- Flexibility and adaptability
- Character and ethics

The Systems Analyst as a Facilitator



Other Stakeholders

External Service Provider (ESP) – a systems analyst, system designer, or system builder who sells his or her expertise and experience to other businesses to help those businesses purchase, develop, or integrate their information systems solutions; may be affiliated with a consulting or services organization.

Project Manager – an experienced professional who accepts responsibility for planning, monitoring, and controlling projects with respect to schedule, budget, deliverables, customer satisfaction, technical standards, and system quality.

Business Drivers for Today's Information Systems

- Globalization of the Economy
- Electronic Commerce and Business
- Security and Privacy
- Collaboration and Partnership
- Knowledge Asset Management
- Continuous Improvement and Total Quality Management
- Business Process Redesign

Globalization of the Economy

Global Economy brings

- New and expanded international markets
- New international competitors

Impact on information systems

- Require support of multiple languages, currency exchange rates, business cultures
- Require consolidation of international data
- Demand for players who can communicate, orally and in writing, with management and users that speak different languages

Electronic Commerce and Business

E-Commerce – the buying and selling of goods and services by using the Internet.

E-Business – the use of the Internet to conduct and support day-to-day business activities.

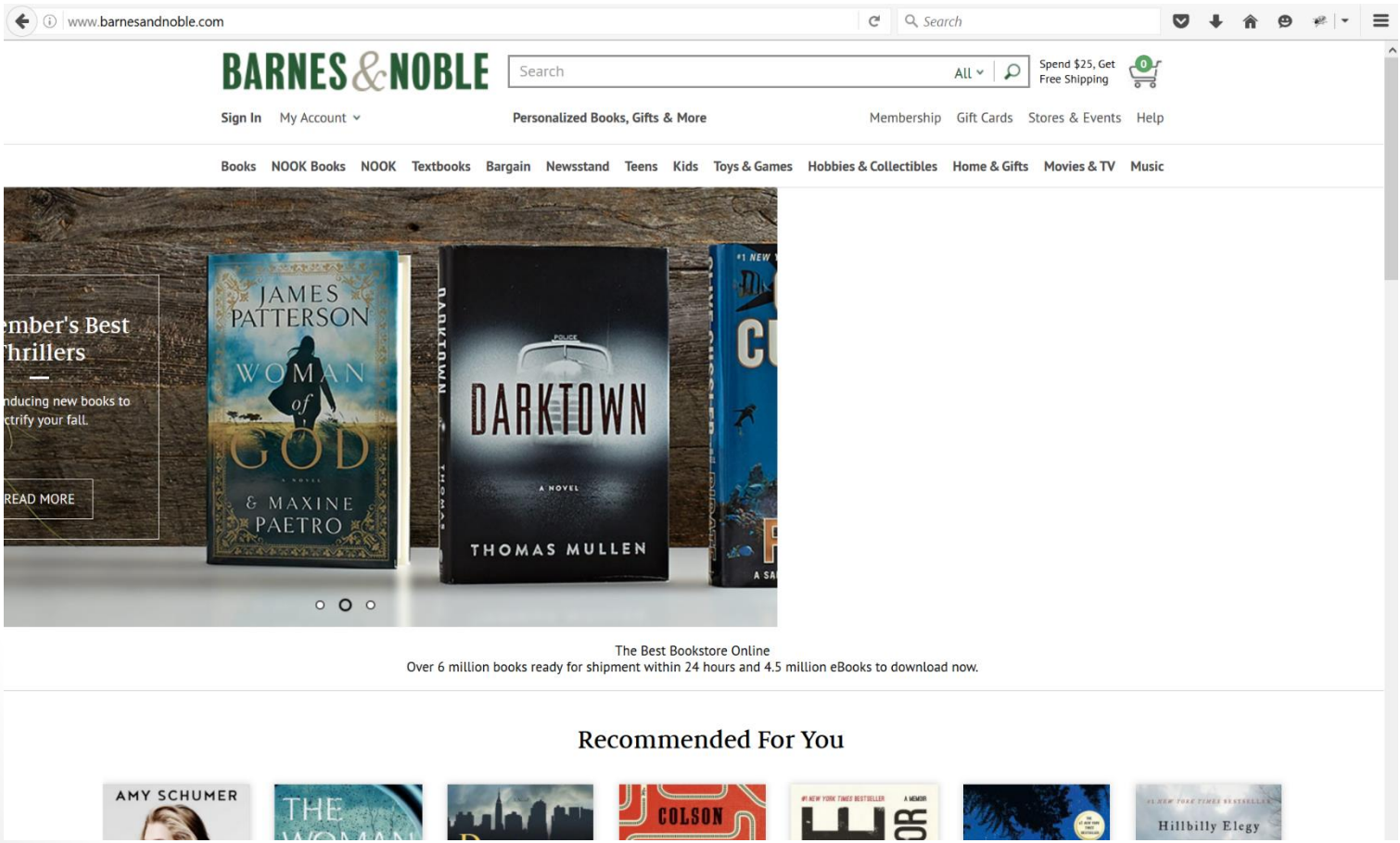
Types of e-commerce and e-business

- Marketing of corporate image, products, and services
- Business-to-consumer (B2C)
- Business-to-business (B2B)

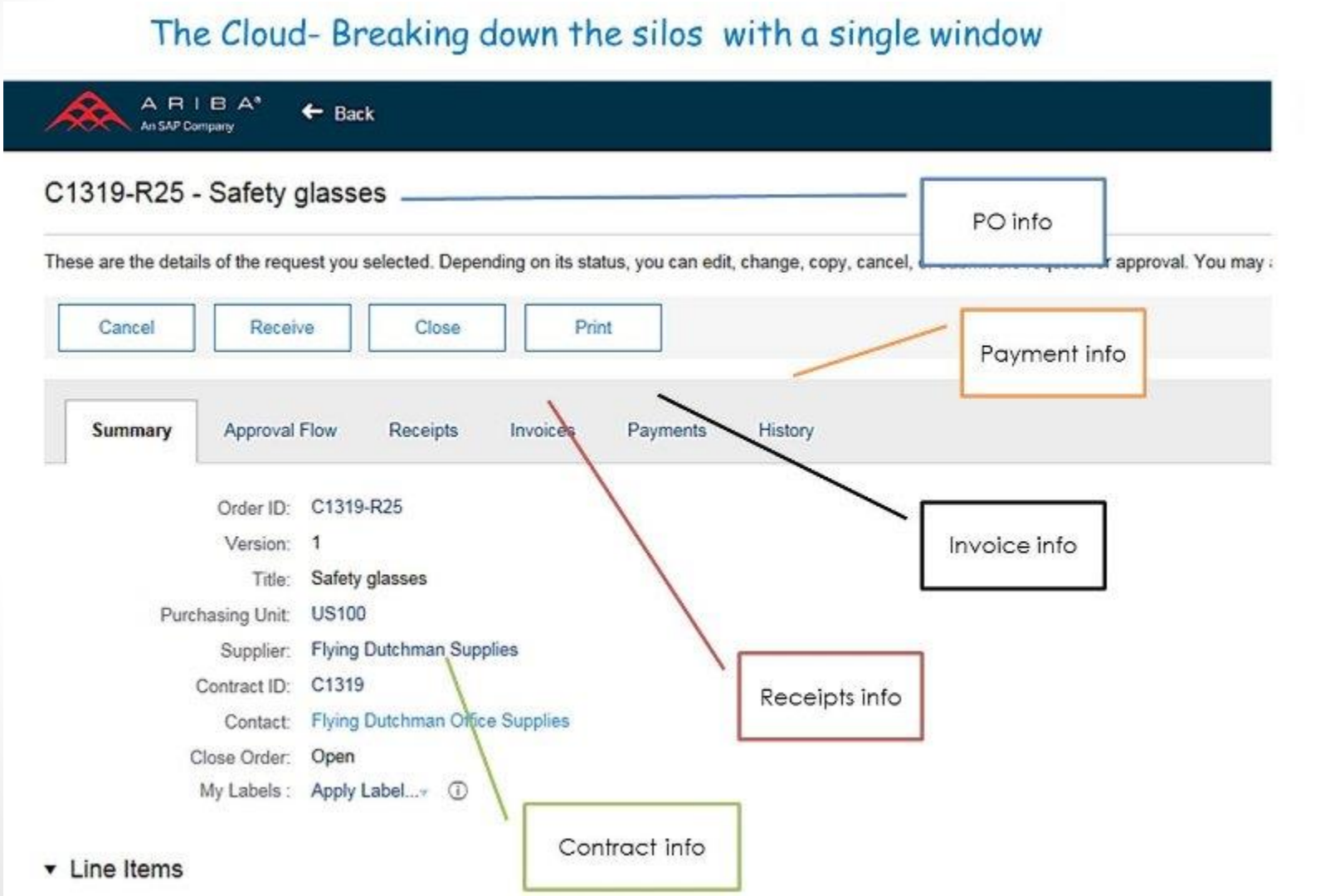
Impact on information systems

- Most new information systems are being designed for an Internet (or intranet) architecture
- Since the only client-side software is a web browser, the choice of client operating system is becoming less important

An Electronic Commerce Storefront



An Electronic Commerce Procurement Storefront



Security and Privacy

Security

- How will the business continue in the even of a security breach, terrorist attack, or disaster?
- How can the business protect its digital assets from outside threats?

Privacy

- Consumer demands for privacy in e-commerce transactions
- Government requirements

Impact on information systems

- Need to incorporate stringent security and privacy controls

Collaboration and Partnership

Organizations seek to break down the walls that separate organizational departments and functions.

Organizations collaborate with outside business partners and even competitors.

Impact on information systems

- Need to provide secure, external access
- Need to pass data between different information systems

Knowledge Asset Management

Data – raw facts about people, places, events, and things that are of importance in an organization.

Information – data that has been processed or reorganized into a more meaningful form for someone.

Knowledge – data and information that is further refined based on the facts, truths, beliefs, judgments, experiences, and expertise of the recipient.

Knowledge Asset Management

- Recognizes that data, information, and knowledge are critical business resources
- Asks: “How can the organization manage and share knowledge for competitive advantage?”
- Strives to integrate the data and information that can create and preserve knowledge

Continuous Improvement and Total Quality Management

Business Processes – Tasks that respond to business events (e.g., an order). Business processes are the work, procedures, and rules required to complete the business tasks, independent of any information technology used to automate or support them.

Continuous process improvement (CPI) – The continuous monitoring of business processes to effect small but measurable improvements in cost reduction and value added.

Total quality management (TQM) – a comprehensive approach to facilitating quality improvements and management within a business.

Business Process Redesign

Business process redesign (BPR) is the study, analysis, and redesign of fundamental business processes to reduce costs and/or improve value added to the business.

- More substantial changes and improvements than CPI
- Usually complemented by CPI

Technology Drivers for Today's Information Systems

- Networks and the Internet
- Mobile and Wireless Technologies
- New Programming Paradigms
  - Object Oriented Programming
  - Functional Programming
- Collaborative Technologies
  - Social Networks

Technology Drivers for Today's Information Systems

- Internet of Things
- Cloud Computing
  - IaaS, PaaS and SaaS
- Big Data
- Ambient User Experience
- Advanced Machine Learning

Technology Drivers for Today's Information Systems

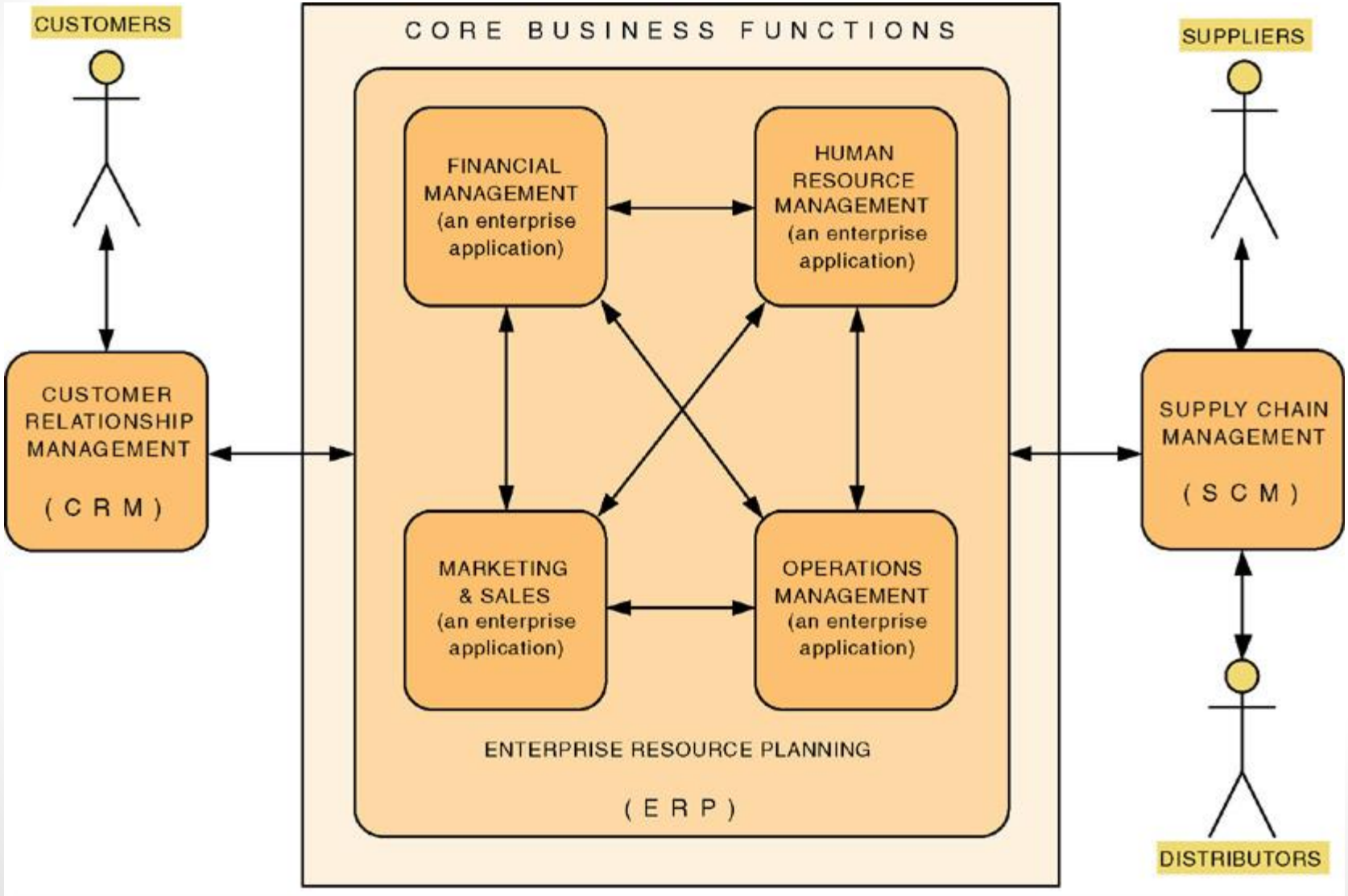
- New Security Architectures
- Development Paradigms
  - Object Oriented Analysis and Design
  - Agile Methodologies
  - DevOps
- Enterprise Applications

Enterprise Applications

- Virtually all organizations require a core set of enterprise applications
  - Financial mgmt, human resources, sales, etc.
  - Frequently purchased
  - Frequently need to have custom elements added

- **Systems Integration** - the process of building a unified information system out of diverse components of purchases software, custom-built software, hardware, and networking.

Enterprise Applications



Enterprise Applications - ERP

Enterprise Resource Planning (ERP) – a software application that fully integrates information systems that span most or all of the basic, core business functions.

An ERP solution is built around a common database shared by common business functions.

Representative ERP vendors:

- SSA
- Oracle/Peoplesoft
- SAP AG

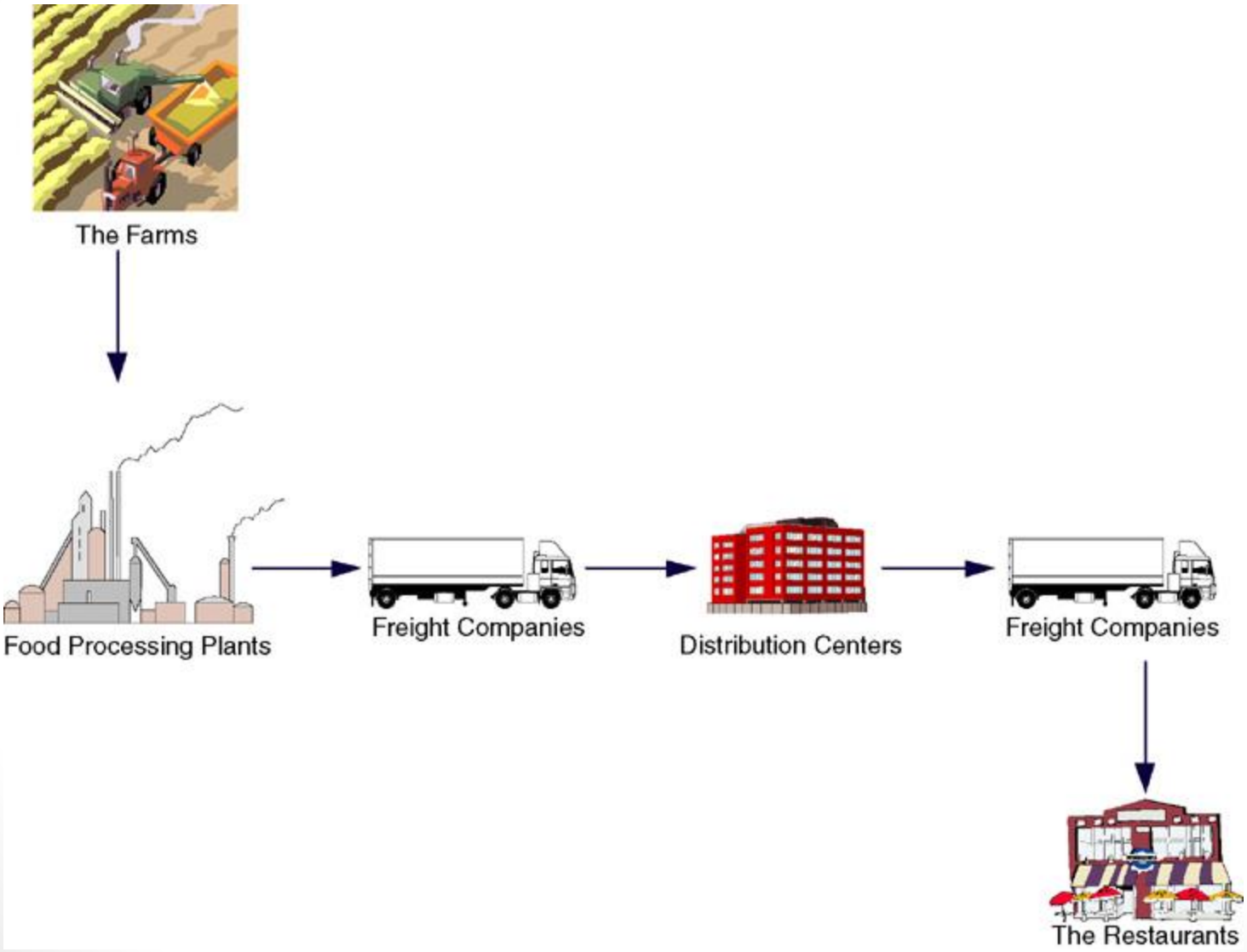
Enterprise Applications - SCM

Supply Chain Management (SCM) – a software application that optimizes business processes for raw material procurement through finished product distribution by directly integrating the logistical information systems of organizations with those of their suppliers and distributors.

Representative SCM vendors:

- i2 Technologies
- Manugistics
- SAP
- SCT

Supply Chain



Enterprise Applications - CRM

Customer Relationship Management (CRM) – a software application that provides customers with access to a business's processes from initial inquiry through postsale service and support.

Representative CRM vendors:

- SAP
- BroadVision
- E.piphany
- Kana
- Amdocs
- Oracle/Peoplesoft
- Siebel

Enterprise Applications - EAI

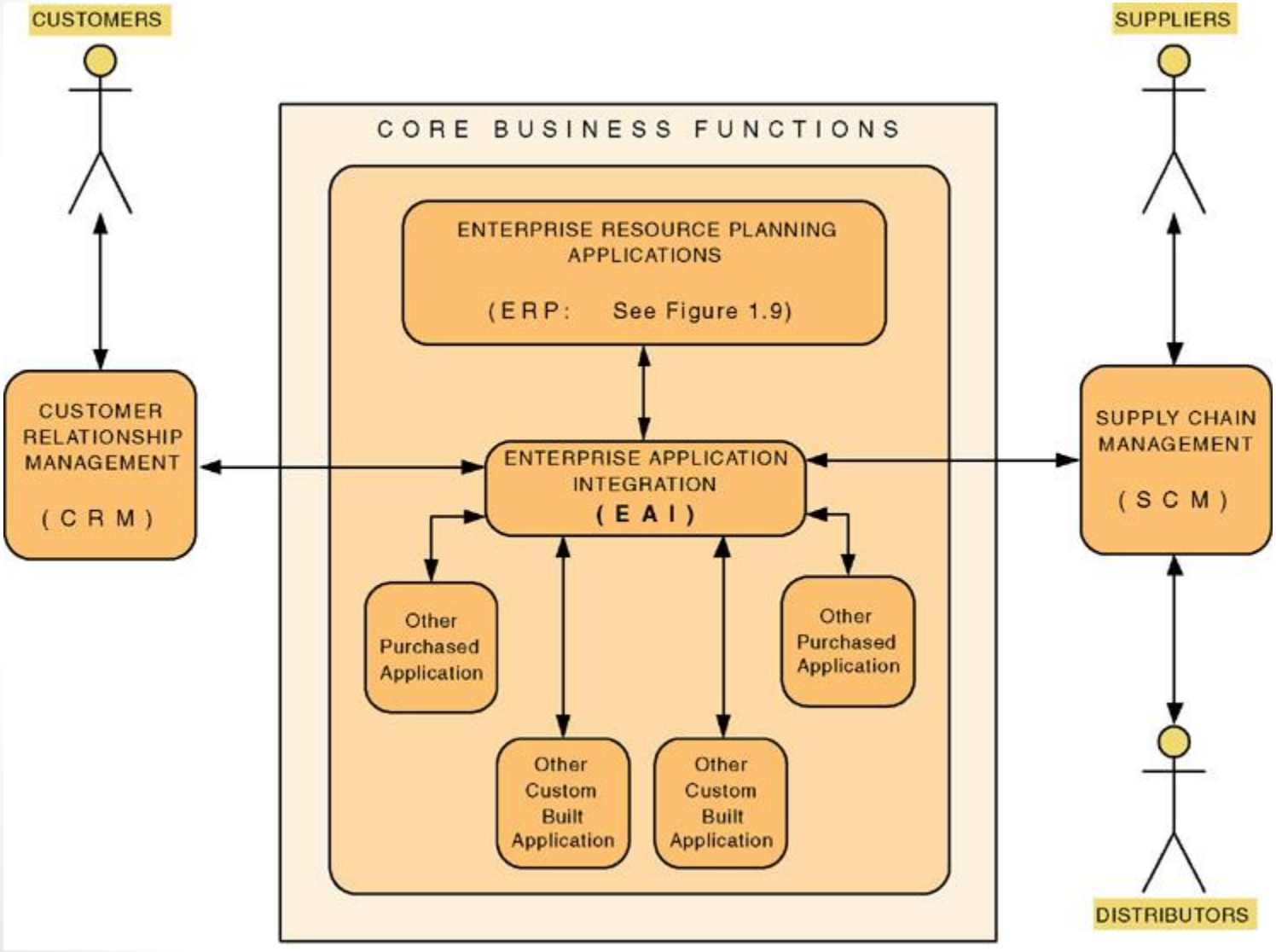
Enterprise Application Integration (EAI) – the process and technologies used to link applications to support the flow of data and information between those applications.

Middleware – software (usually purchased) used to translate and route data between different applications.

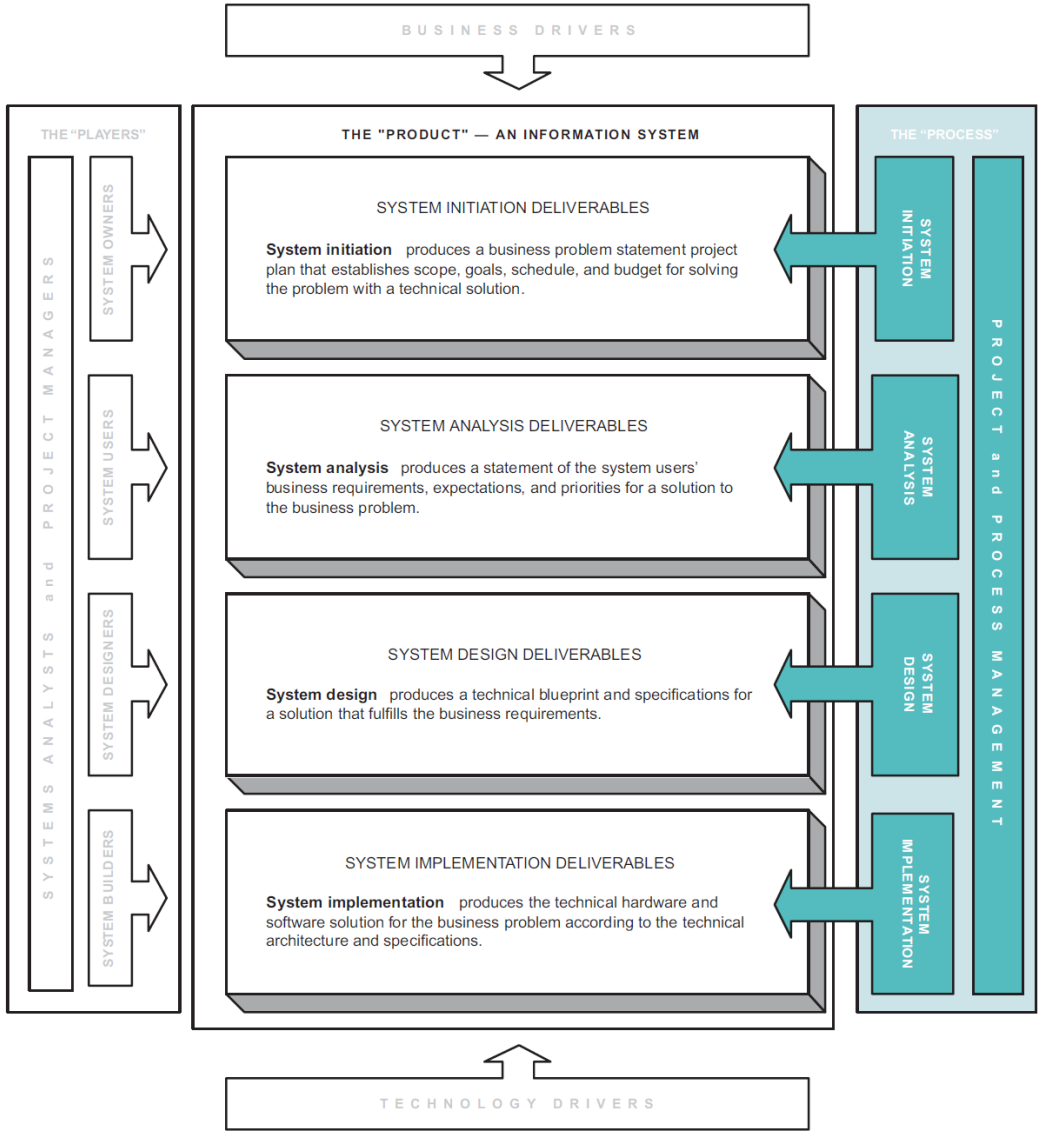
Representative EAI vendors:

- BEA Systems
- IBM (MQSeries)
- Mercator Software
- TIBCO Software

Enterprise Application Integration



Systems Development Process Overview



System Development Process

System development process – a set of activities, methods, best practices, deliverables, and automated tools that stakeholders use to develop and maintain information systems and software.

A general problem-solving approach

1. Identify the problem.
2. Analyze and understand the problem.
3. Identify solution requirements or expectations.
4. Identify alternative solutions and choose the “best” course of action.
5. Design the chosen solution.
6. Implement the chosen solution.
7. Evaluate the results. If the problem is not solved, return to step 1 or 2 as appropriate.

A Simple System Development Process

Our Simplified System Development Process	General Problem-Solving Steps
System initiation	1. Identify the problem.
System analysis	2. Analyze and understand the problem. 3. Identify solution requirements or expectations.
System design	4. Identify alternative solutions and choose the “best” course of action. 5. Design the chosen solution.
System implementation	6. Implement the chosen solution. 7. Evaluate the results. If the problem is not solved, return to step 1 or 2 as appropriate.

System Development Process Overview

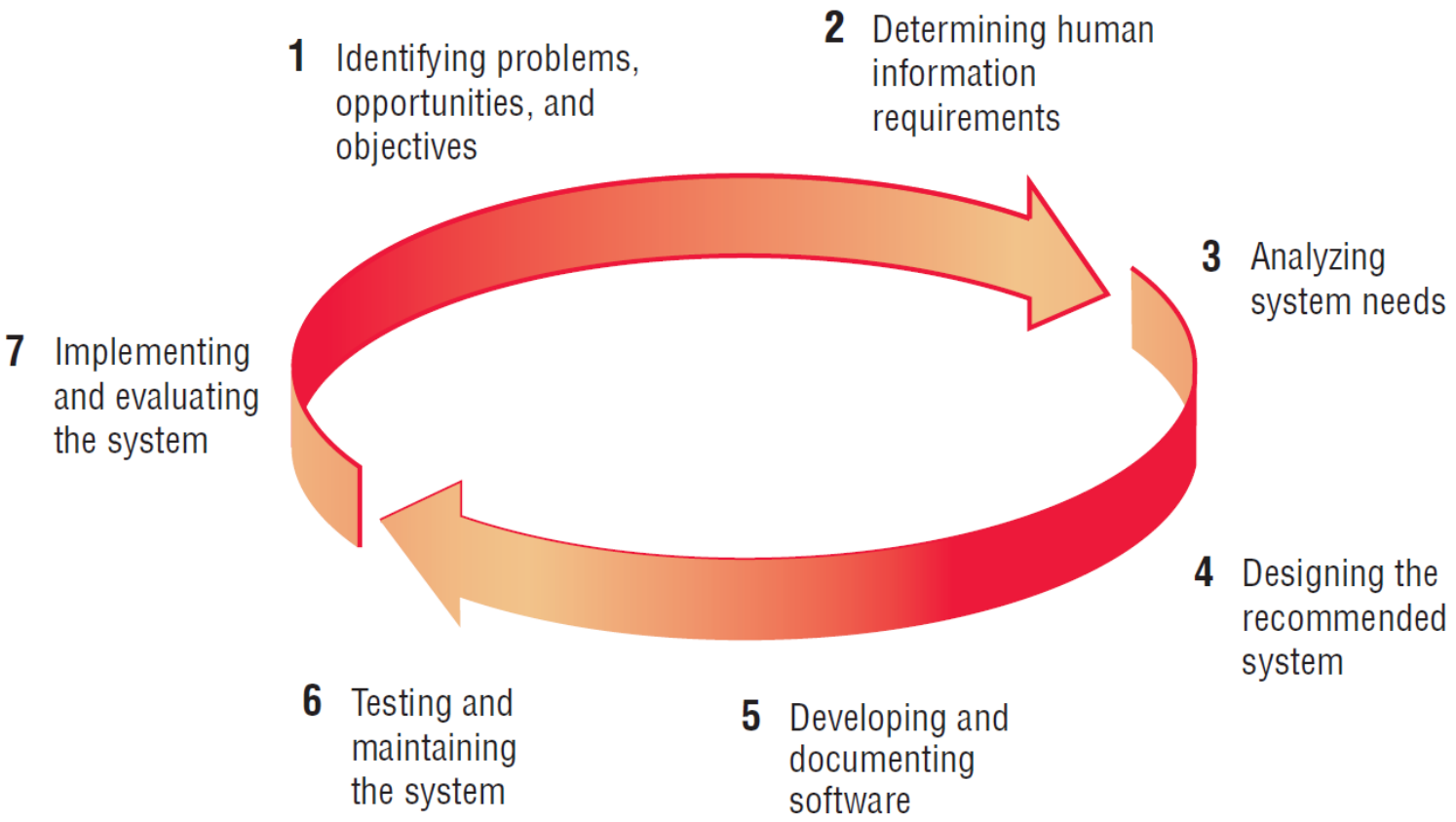
System initiation – the initial planning for a project to define initial business scope, goals, schedule, and budget.

System analysis – the study of a business problem domain to recommend improvements and specify the business requirements and priorities for the solution.

System design – the specification or construction of a technical, computer-based solution for the business requirements identified in a system analysis.

System implementation – the construction, installation, testing, and delivery of a system into production.

Systems Development Life Cycle (SDLC)



Identifying Problems, Opportunities, and Objectives

- **Activity:**
  - Interviewing user management
  - Summarizing the knowledge obtained
  - Estimating the scope of the project
  - Documenting the results
- **Output:**
  - Feasibility report containing problem definition and objective summaries from which management can make a decision on whether to proceed with the proposed project

Determining Human Information Requirements

- **Activity**:
  - Interviewing
  - Sampling and investing hard data
  - Questionnaires
  - Observe the decision maker's behavior and environment
  - Prototyping
  - Learn the who, what, where, when, how, and why of the current system
- **Output**:
  - understand how users accomplish their work
  - to know how to make the new system usable.
  - To know the business functions
  - complete information on the people, goals, data and procedure involved

Analyzing System Needs

- Activity:
  - Create data flow diagrams.
  - Complete the data dictionary.
  - Analyze the structured decisions made.
  - Prepare and present the system proposal.

- Output:
  - Recommendation on what, if anything, should be done.

Designing the New System

- **Activity:**
  - Design procedures for data entry
  - Design the human-computer interface
  - Design system controls
  - Design files and/or database
  - Design backup procedures

- **Output:**
  - Model of the actual system

Developing and Documenting Software

- **Activity:**
  - System analyst works with programmers to develop any original software
  - Works with users to develop effective documentation
  - Programmers design, code, and remove syntactical errors from computer programs
  - Document software with help files, procedure manuals, and Web sites with Frequently Asked Questions
- **Output:**
  - Computer programs
  - System documentation

Testing and Maintaining the System

- **Activity:**
  - Test the information system
  - System maintenance
  - Maintenance documentation

- **Output:**
  - Problems, if any
  - Updated programs
  - Documentation

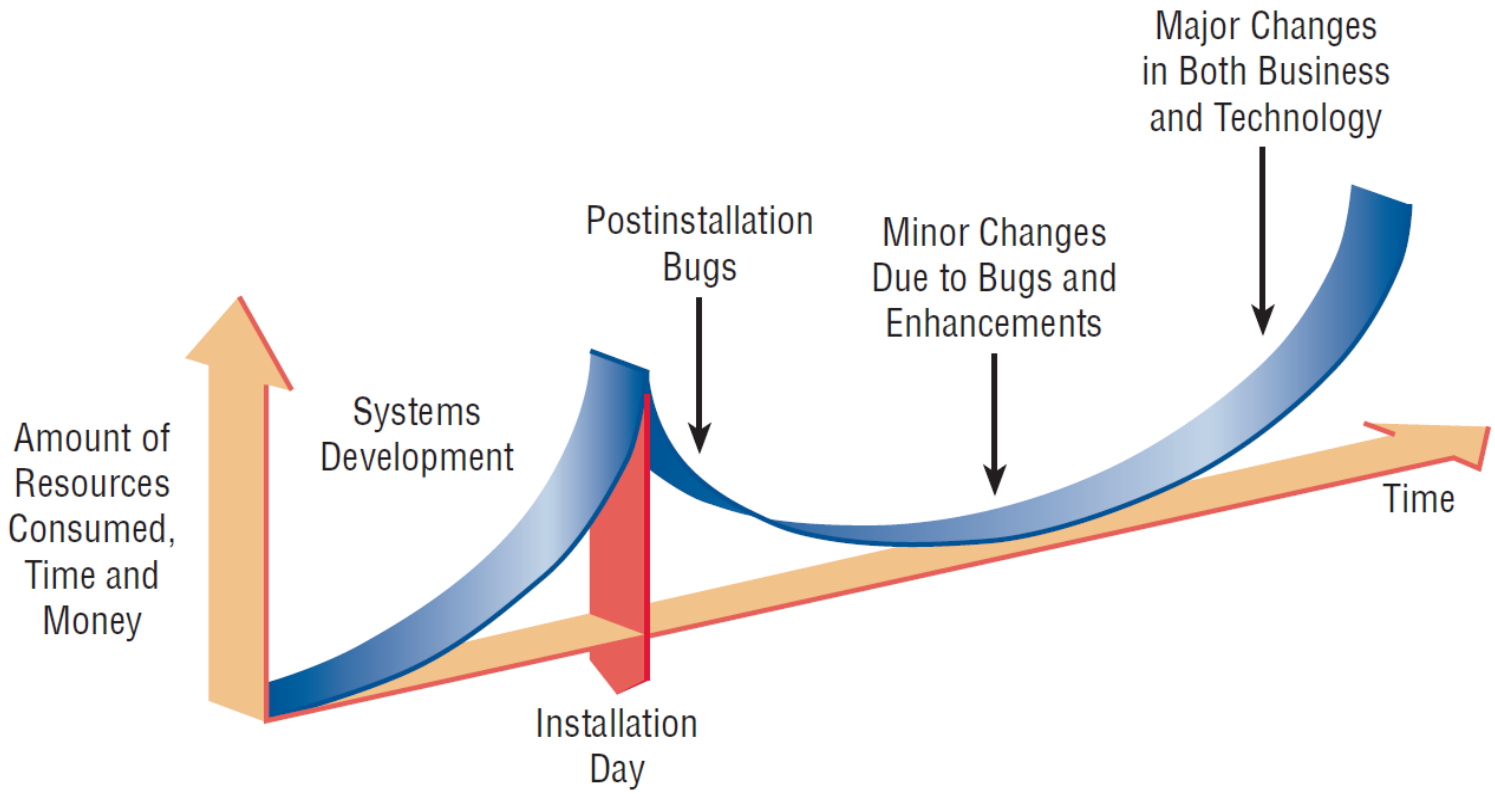
Implementing and Evaluating the System

- **Activity:**
  - Train users
  - Analyst plans smooth conversion from old system to new system
  - Review and evaluate system
- **Output:**
  - Trained personnel
  - Installed system

Maintenance

- Removing software errors
- Enhancing existing software

Resource consumption over the system life



Project and Process Management

Project management – the activity of defining, planning, directing, monitoring, and controlling a project to develop an acceptable system within the allotted time and budget.

Process management – the ongoing activity that defines, improves, and coordinates the use of an organization's chosen methodology (the "process") and standards for all system development projects.

Any Questions?

The man who asks a question is a fool for a minute, the man who does not ask is a fool for life

Confucius