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SECOND EDITION
ENTERPRISE SYSTEMS FOR MANAGEMENT

CHAPTER 1

INTRODUCTION TO ENTERPRISE SYSTEMS FOR MANAGEMENT

Learning Objectives

- Understand the information systems evolution and its historical role in the organization leading to systems integration and Enterprise Resource Planning (ERP).

- Learn about ERP systems and evolution, components, and architecture; understand the benefits and drawbacks of implementing ERP systems and how they can help an organization improve its efficiency and worker productivity.

- Gain an overview of the implementation process (e.g., the ERP life cycle, business process reengineering project management, and change management). Understand the role of people, vendors, consultants, and the organization in making the ERP implementation process successful.

- Comprehend the ethical, global, and security challenges while implementing an ERP system, and look at the ERP vendors and industry trends.

Discussion:

CASE 1.1
Opening Case
Hershey's Enterprise 21 Project

Hershey Foods, Inc., completed an upgrade to their SAP/R3 enterprise software installation on schedule in September 2002, and they did it below their projected budget. This was considered a big achievement for a company that had experienced $150 million in lost sales due to problems associated with its new ERP system just a few years earlier in 1999. Hershey's CIO, George Davis, wondered why things went so smoothly with the upgrade compared with the original installation. Was it a technology problem? Or was it a people and organization change problem?

Hershey began its ERP journey with the Enterprise 21 Project late in 1996 when management approved the project in an effort to fix the Y2K problem and, at the same time, upgrade Hershey's IT environment to a twenty-first century system. This system was supposed to be an integrated system that used the client–server architecture and an SAP/R3 application suite. This was a complete overhaul of existing legacy enterprise system involving replacements of current Information Systems (IS) with packaged software solutions with the following goals:

- Establish a single company-wide supply chain strategy across all divisions.
- Streamline entire business process by reengineering all the functional areas throughout the company.
- Use new supply chain efficiencies to help increase gross margin.
- Maintain sales growth of at least 3–4 percent per year.
- Save $75–80 million by the end of 2002 through corporate restructuring and the closing of older distribution sites.
- Replace existing legacy software due to Y2K date-related problems.
- Replace legacy mainframe IS with an enterprise client–server architecture.

The initial plan of implementation was for four years with a budget of $112 million. Although Hershey's management vision was excellent, they lacked the necessary people at the top management level to make proper decisions on the implementation plan. Hershey did not have any high-ranking IT executive before hiring George Davis sometime in early 2000. They had lower-level managers making decisions that were aligned to their functional areas of business with no one at the top integrating these decisions to create a system that would work for the whole business. They had lots of committees with little or no oversight. As a result, Hershey's confectionary manufacturing and distribution operations' entire supply chain system ground to a halt in 1999, making it impossible to fulfil $100 million worth of orders.

The initial implementation was riddled with several problems from the beginning. First, Hershey tried to implement too many changes too fast. The Enterprise 21 project went for a complete discarding of the older mainframe legacy system used at Hershey and replacing it with the following three new software applications at the same time:

- SAP/R3 enterprise application suite
- Manugistics (demand planning and transportation) Systems
- Siebel Systems (CRM and sales tools)

The complexity of integrating SAP with Manugistics software and Seibel software was so overwhelming even with the help of an experienced consulting firm that this integration was dropped. In addition, due to project delays and Y2K, the Hershey's IT department decided to go with a direct cut over strategy (Big-Bang implementation) instead of a phased-in approach during their peak sales season right before Halloween.

Data entry in the new ERP system was another problem. SAP is very rigid software in terms of how, when, and where the data must be entered into the system for inventory tracking and management. Hershey's employees were not trained for this rigid data entry because their legacy system was flexible in terms of how the data were stored. This created a major crisis when the new system was used during the Halloween season. Customer orders were missed despite sufficient inventory on hand. System workarounds caused many headaches for workers. Extra capacity in warehouse space was not recorded into the SAP system, which caused communication failure between logistics and IT.

Finally, a lack of top management support and involvement also played a role in the Enterprise 21 project. In addition to lacking a CIO at the top decision-making level, Hershey's management took a hands-off approach by not getting involved in the decision-making process. For example, some managers recommended supplementing the major consultants for this project, IBM Global Services, with another consulting firm that had more experience with SAP–Manugistics. Top management stayed away from making any decision in this area. In general, Hershey's management did not understand the amount of effort necessary for both the technical and organizational change issues for this project.

Question: *What do you think about Hershey's ERP strategy? What lessons can be learned from the Hershey experience?*

Enterprise Systems in Organizations

- Business organizations have become very complex and their business needs can no longer be supported by one single information system.

- Information Systems are a critical component of a successful organization today.

- Management is generally categorized into three levels: Strategic, Mid-Management and Operational.

- Information Systems provide a high level of computer automation to support business functions such as:

•Accounting

•Finance

•Human Resource Management

•Customer Service

•Marketing

•Operations

Figure 1-1 Management Pyramid with Information Requirements
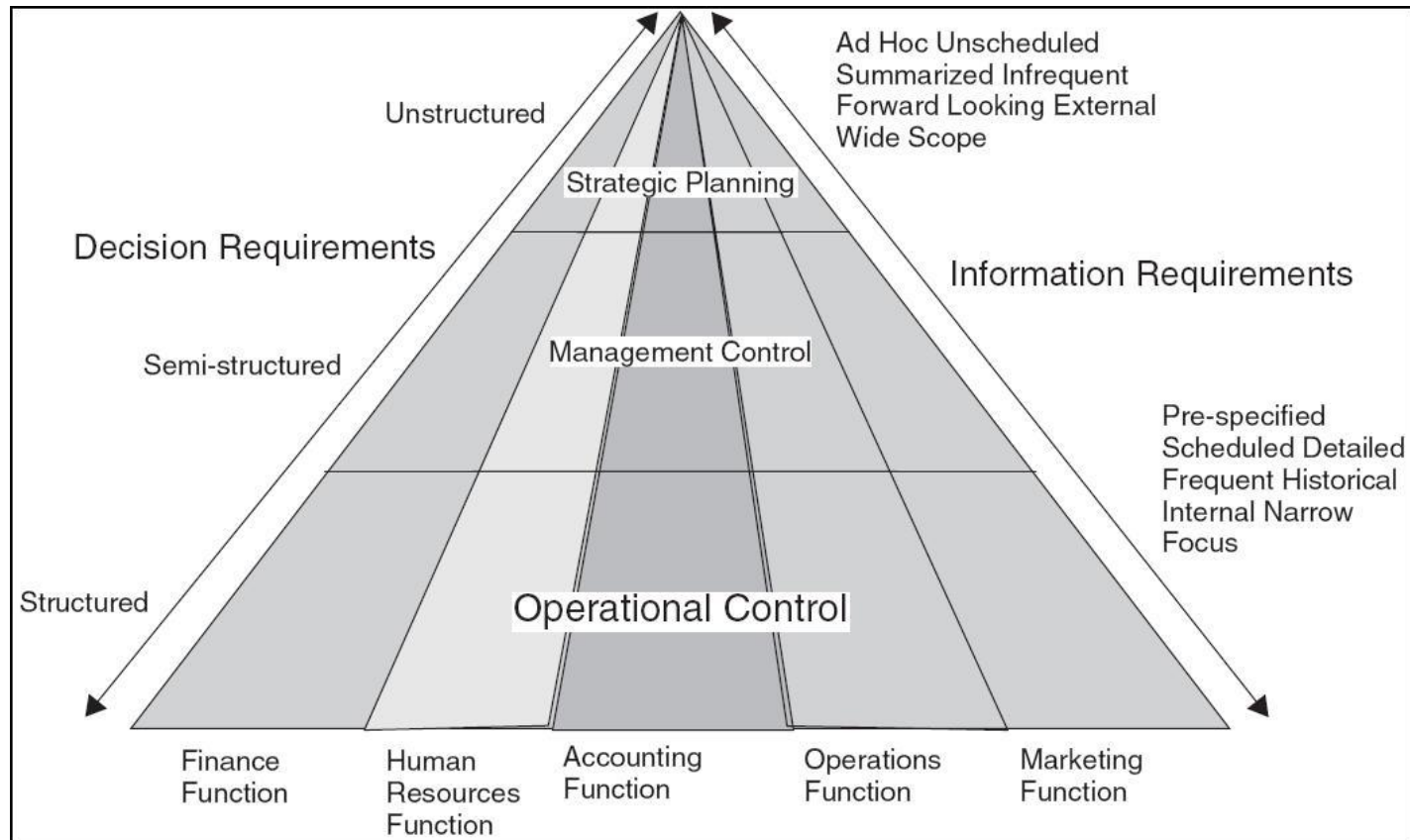
Information Silos and Systems Integration

- Over time, Information Systems create a hodgepodge of independent nonintegrated systems ultimately creating bottlenecks and interfering with productivity.

- Organizations need to be agile and flexible and will require their information systems to have integrated data, applications, and resources from across the organization.

- To compete effectively, organizations have to be customer focused.
  - This requires cross-functional integration among the accounting, marketing and other departments of the organization.
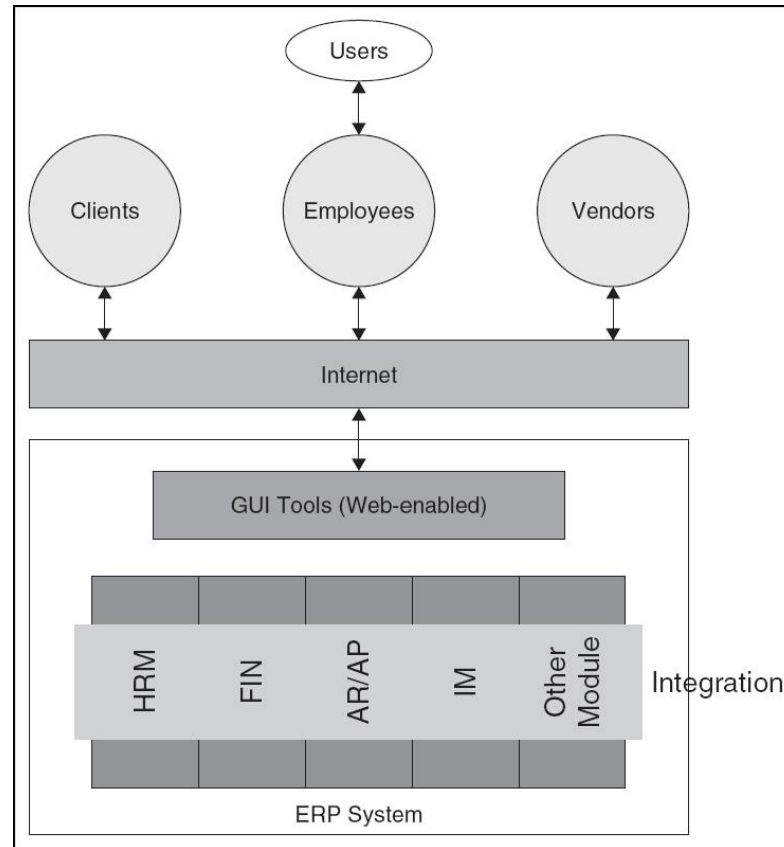
Enterprise Resource Planning (ERP) Systems

WHAT IS AN ERP SYSTEM?

- Enterprise Resource Planning Systems are the first generation of enterprise systems meant to integrate data and support all the major functions of organizations.

- ERP systems integrate various functional aspects of the organization as well as systems within the organization of its partners and suppliers.

- The goal of an ERP system is to make the information flow dynamic and immediate, therefore, increasing its usefulness and value.

Figure 1-2 Integrated Systems - ERP

Enterprise Resource Planning (ERP) Systems (Cont'd)

- Another goal of ERP is to integrate departments and functions across an organization into a single infrastructure that serves the needs of each department.

- ERP systems replace an assortment of systems that typically existed in organizations. (Accounting, HR, Materials Planning, Transaction Processing, etc.).

- ERP solves the critical problem of integrating information from different sources and makes it available in real-time.

Evolution of ERP

Timeline	System	Platform
1960s	Inventory Management & Control	Mainframe legacy systems using third generation software-(Cobol, Fortran)
1970s	Materials Requirements Planning (MRP)	Mainframe legacy systems using third generation software-(Cobol, Fortran)
1980s	Materials Requirements Planning (MRP-II)	Mainframe legacy systems using fourth generation database software and manufacturing applications.
1990s	Enterprise Resource Planning	Mainframe client-server systems using fourth generation database software and package software.
2000s	Extended ERP or ERP-II	Client-server systems using Web platform, open source with integration to fifth generation applications like SCM, CRM, SFA.

Business Processes and ERP

- A crucial role of ERP in business is to better position the organization to change its business processes.

- ERP software have hundreds of business processes built into the logic of the system which may or may not agree with current processes of an organization.

- When implementing an ERP system, organizations have two choices:
  - Change business processes to match the software functionality.
 - Modify the ERP software to match the business processes.

ERP Systems Components

An ERP system consists of:

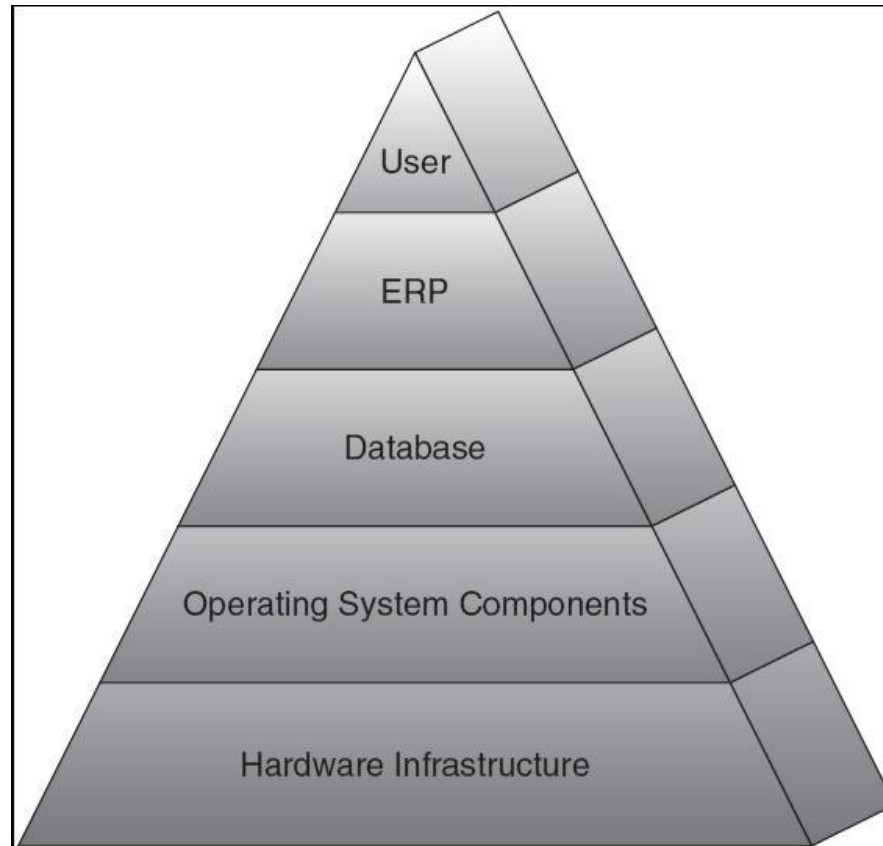|	
Hardware	Servers and peripherals
Software Process	Operating systems and database
Information	Organizational data from internal and external sources
Process	Business processes, procedures, and policies
People	End users and IT staff

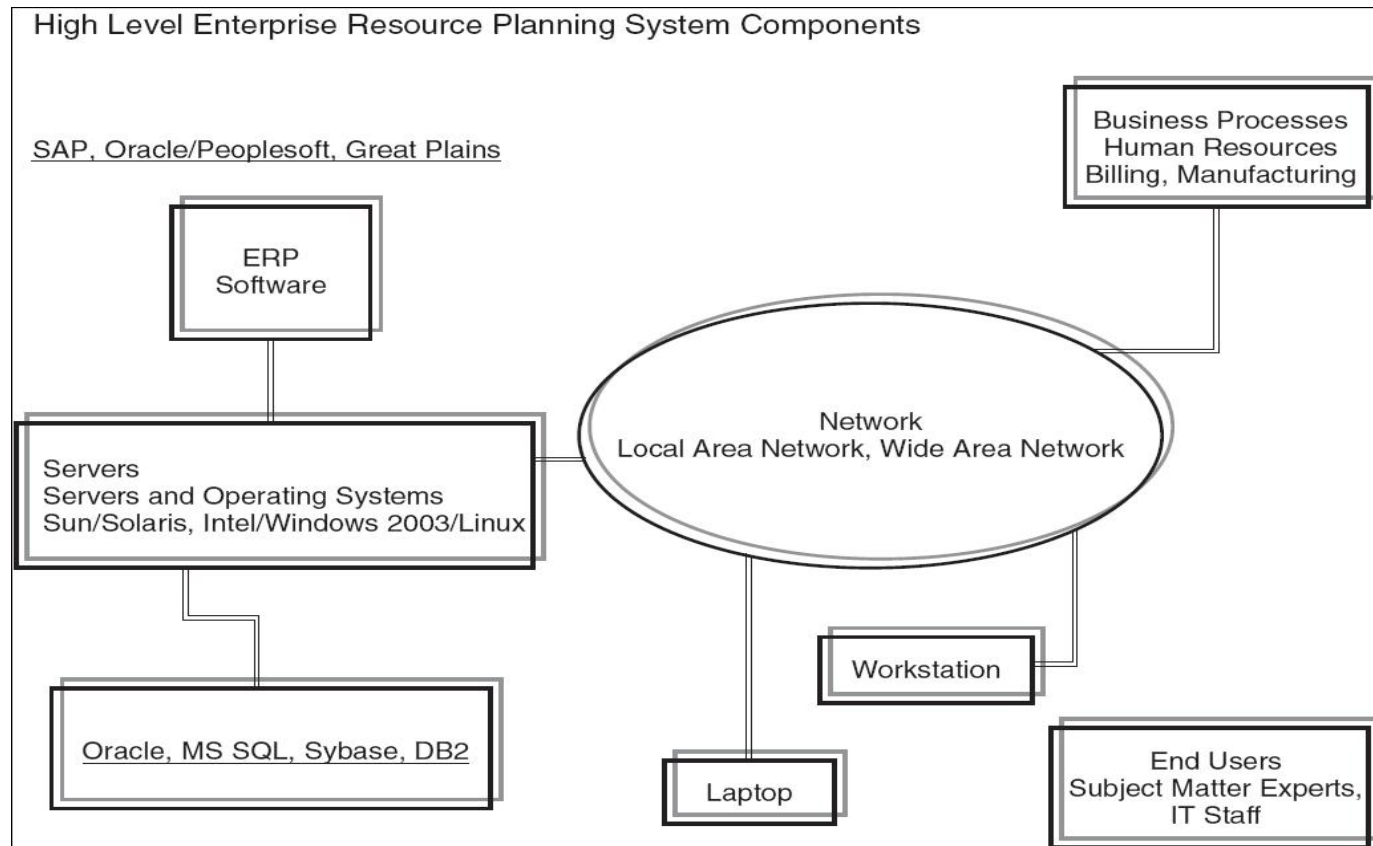# Figure 1-3 ERP Components
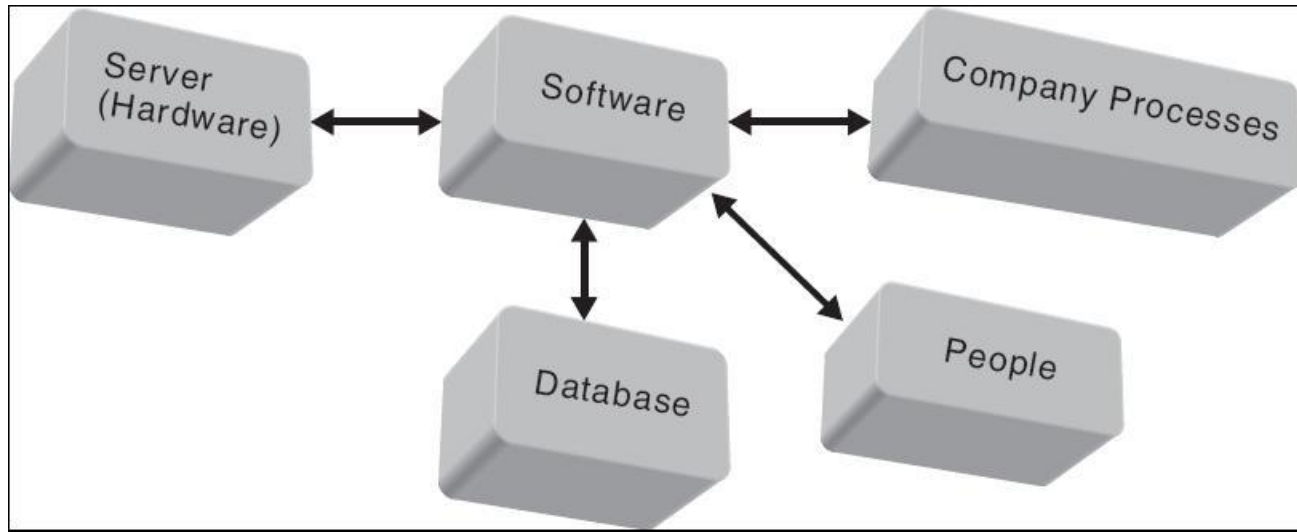
Figure 1-4 ERP Components Integration
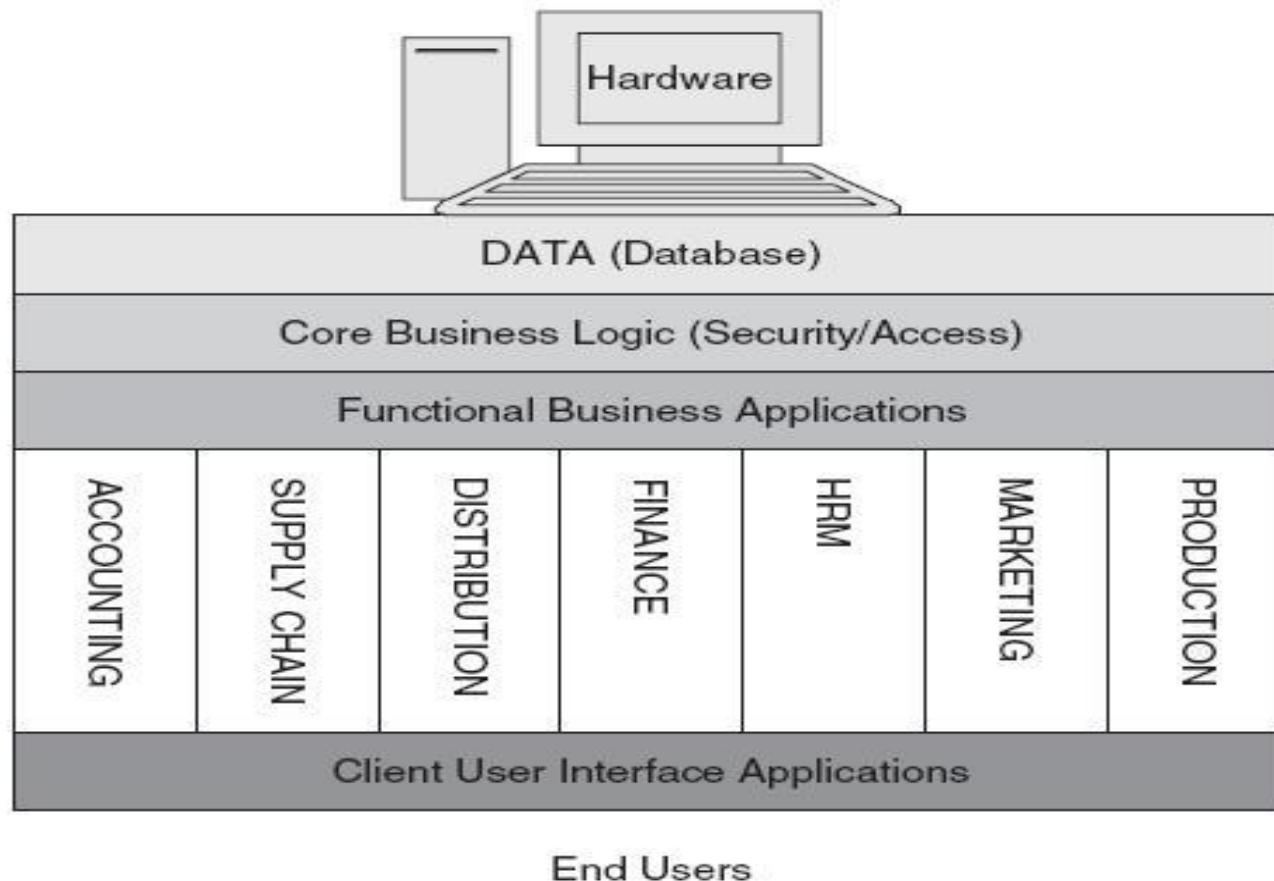
ERP Architecture

- The architecture of an ERP system influences the cost, maintenance, and the use of the system.

- A flexible architecture is best – it allows for scalability as needs change and grow.

- A system's architecture is a blueprint of the actual ERP system and helps the implementation team build the ERP system.

- If purchased, ERP architecture is often driven by the vendor but other IT architectures are driven by organizational strategy and business processes.
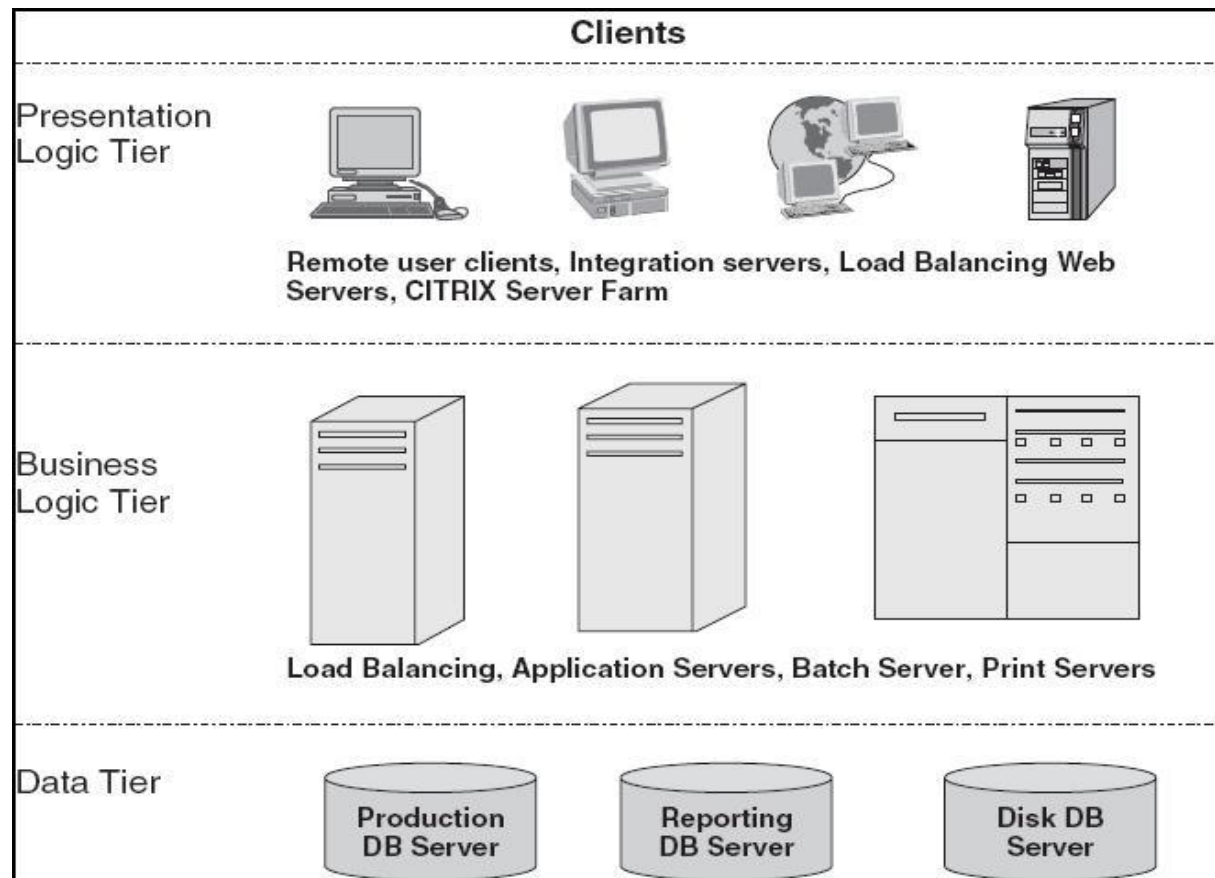
Figure 1-5 Example of Architecture of ERP at Large University

High Level Enterprise Resource Planning System Components

SAP, Oracle/Peoplesoft, Great Plains

ERP Software

Servers
Servers and Operating Systems
Sun/Solaris, Intel/Windows 2003/Linux

Oracle, MS SQL, Sybase, DB2

Business Processes
Human Resources
Billing, Manufacturing

Network
Local Area Network, Wide Area Network

Workstation

Laptop

End Users
Subject Matter Experts,
IT Staff

Figure 1-6 Logical Architecture of an ERP System

Hardware

DATA (Database)

Core Business Logic (Security/Access)

Functional Business Applications

ACCOUNTING | SUPPLY CHAIN | DISTRIBUTION | FINANCE | HRM | MARKETING | PRODUCTION

Client User Interface Applications

End Users

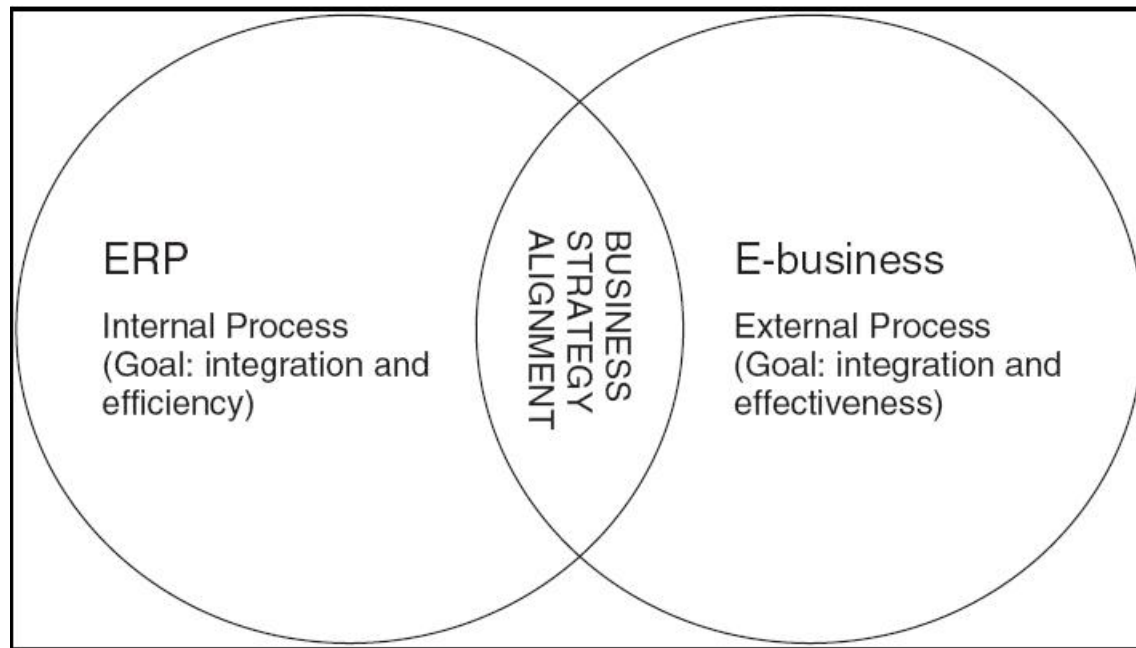# Figure 1-7 Tiered Architecture Example of ERP System

E-Business and ERP

E-Business	ERP
Focuses on linking a business with its external partners and stakeholders	Focuses on integrating the internal functional silos of the organization into an enterprise application
Disruptive technology—Totally transformed the way a business operates in terms of buying and selling, customer service, and relationships with suppliers	Adaptive technology—Merged the early data processing and integration efforts within an organization
Early focus of e-Business was on communication (e-mail), collaboration (calendaring, scheduling, group support), marketing and promotion (Web sites), and E-commerce (*Front office functions)*	Focus of ERP systems was mainly on data sharing, systems integration, business process change, and improving decision making through the access of data from a single source (*Back office functions*)

Figure 1-8 e-Business and ERP

ERP

Internal Process
(Goal: integration and
efficiency)

BUSINESS
STRATEGY
ALIGNMENT

E-business

External Process
(Goal: integration and
effectiveness)

System Benefits of an ERP System

- Integration of data and applications across functional areas (i.e., data can be entered once and used by all applications; thus improving accuracy and quality of the data).

- Improvements in maintenance and support as IT staff is centralized.

- Consistency of the user interface across various applications means less employee training, better productivity, and cross-functional job movements.

- Security of data and applications is enhanced due to better controls and centralization of hardware.

System Limitations of an ERP System

- Complexity of installing, configuring, and maintaining the system increases, thus requiring specialized IT staff, hardware, and network facilities.

- Consolidation of IT hardware, software, and people resources can be cumbersome and difficult to attain.

- Data conversion and transformation from an old system to a new one can be a tedious and complex process.

- Retraining of IT staff and end users of the new system can produce resistance and reduce productivity.

Business Benefits of an ERP System

- Increasing agility of the organization in terms of responding to changes in environment for growth and maintaining market share.

- Information sharing helps collaboration between units.

- Linking and exchanging information in real-time with supply-chain partners improves efficiency.

- Better customer service due to quicker information flow across departments.

- Efficiency of business processes are enhanced due to the re-engineering of business processes.

Business Limitations of an ERP System

- Retraining of all employees with the new system can be costly and time consuming.

- Change of business roles and department boundaries can create upheaval and resistance to the new system.

# ERP Implementation (Business Process Management)

- Business process management is the understanding, visibility, and control of business processes.

- BPM has a prescribed methodology that should be followed to help document business processes and understand their use throughout the business.

- Improved business processes may result in:
  - Improved customer satisfaction.
  - Reductions in cost.
  - Increased productivity by allocating resources to more value-added activities.

ERP Implementation (ERP Life Cycle)

- The key to a successful implementation is to use a proven methodology, take it one step at a time, and begin with the planning and understanding the ERP life cycle.

- ERP system implementations are very risky, and using a well-defined project plan with a proven methodology will assist in managing those risks.

- There must be a strong well-communicated need to make the change from the existing information systems/applications to an ERP system.
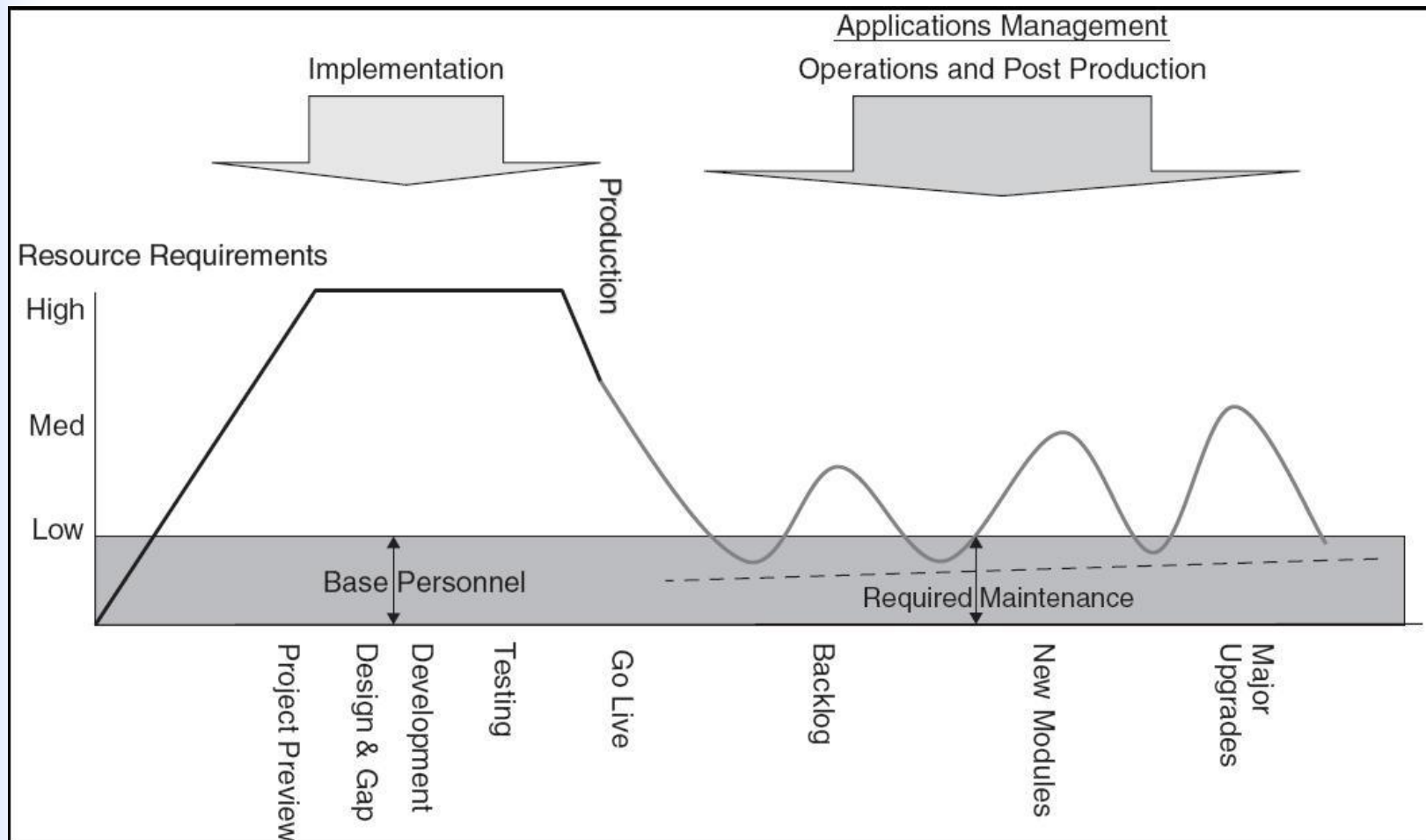
Figure 1-9 ERP Life Cycle
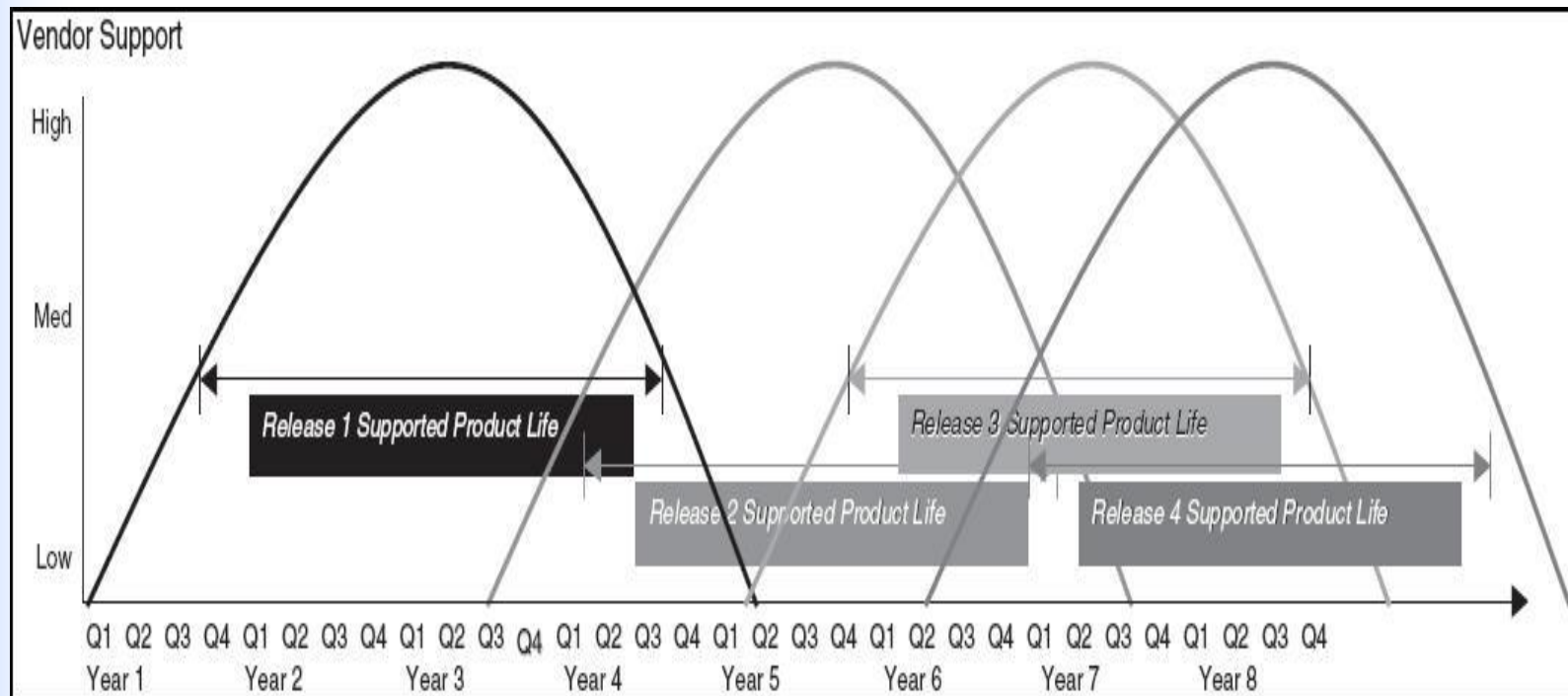
Figure 1-10 ERP Implementation Methodology
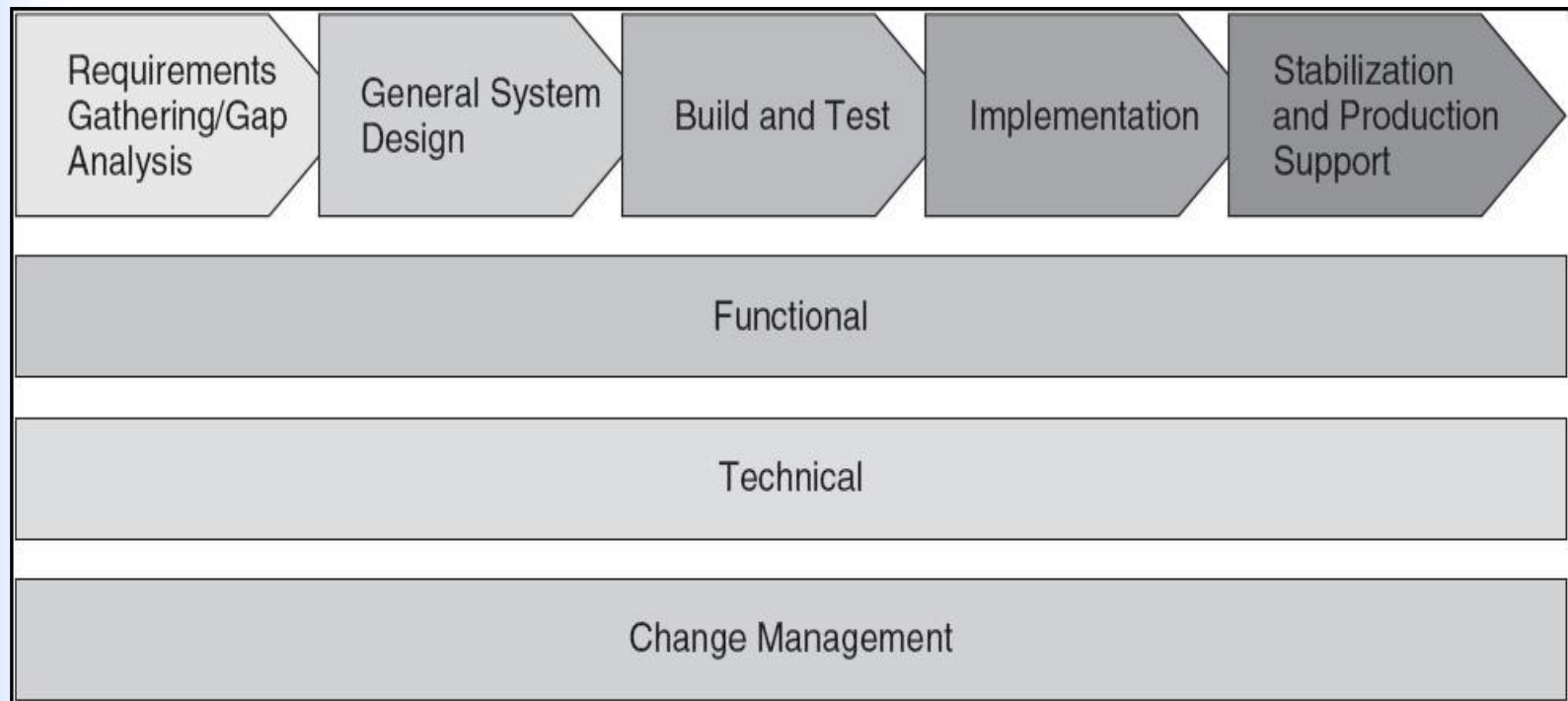
Figure 1-11 Product Life Cycle

Software and Vendor Selection

- It is best for an organization that does not have the experience in developing ERP systems to purchase one on the market.

- Before selecting a vendor, the organization must carefully evaluate its current and future needs in enterprise management systems.

- Review the organization's existing hardware, network, and software infrastructure, and the resources available for the implementation.

Vendor Evaluation

- Business functions or modules supported by their software.

- Features and integration capabilities of the software.

- Financial viability of the vendor as well as length of time they have been in business.

- Licensing and upgrade policies.

- Customer service and help desk support.

Vendor Evaluation (Cont'd)

- Total cost of ownership.

- IT infrastructure requirements.

- Third-party software integration.

- Legacy systems support and integration.

- Consulting and training services.

- Future goals and plans for the short and long term.

Operations and Post-Implementation

- Going live ("Go-live") is one of the most critical points in a project's success.

- It is vital to focus the efforts of all project teams to ensure that task and activities are completed before going live.

  ◦ This allows project management to address any outstanding issues that may jeopardize the Go-live date.

  ◦ This involves a readiness process that needs to include as many team members and appropriate users and managers as possible.

Five Areas of Stabilization are Important:

- Training for end-users.

- Reactive support (i.e., help desk for troubleshooting).

- Auditing support to make sure data quality is not compromised by new system.

- Data fix to resolve data migration and errors revealed by audits.

- New features and functionalities to support the evolving needs of the organization.

Figure 1-12 Project Management
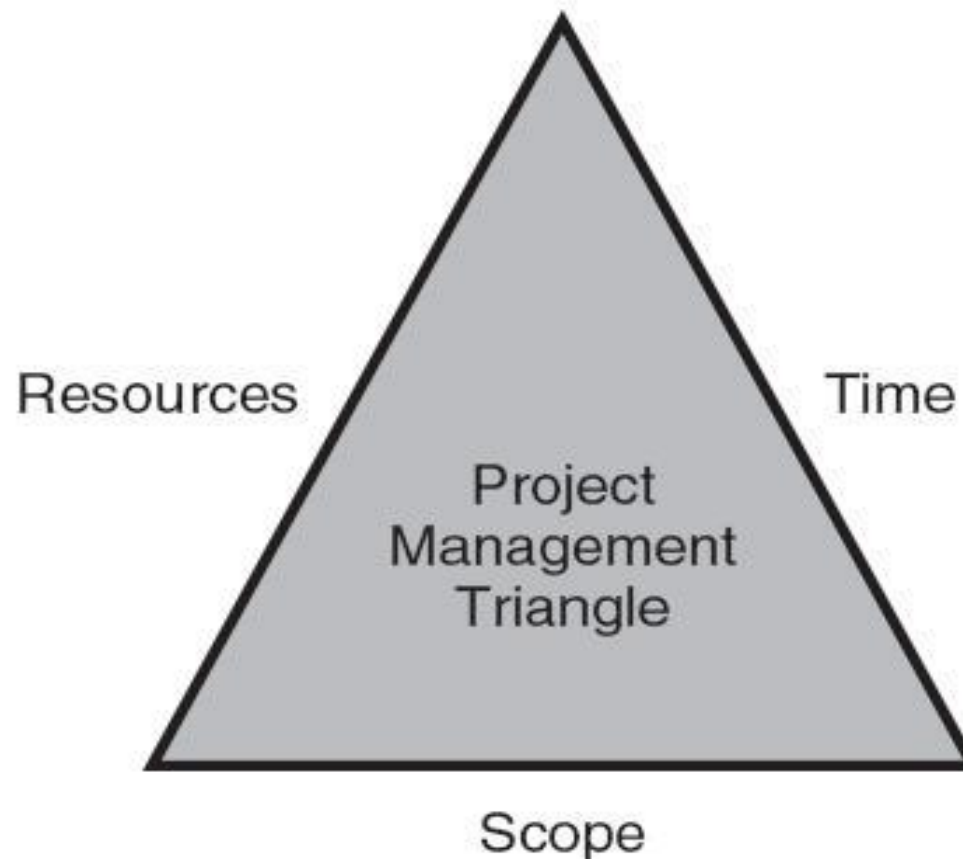
Figure 1-13 Project Life Cycle
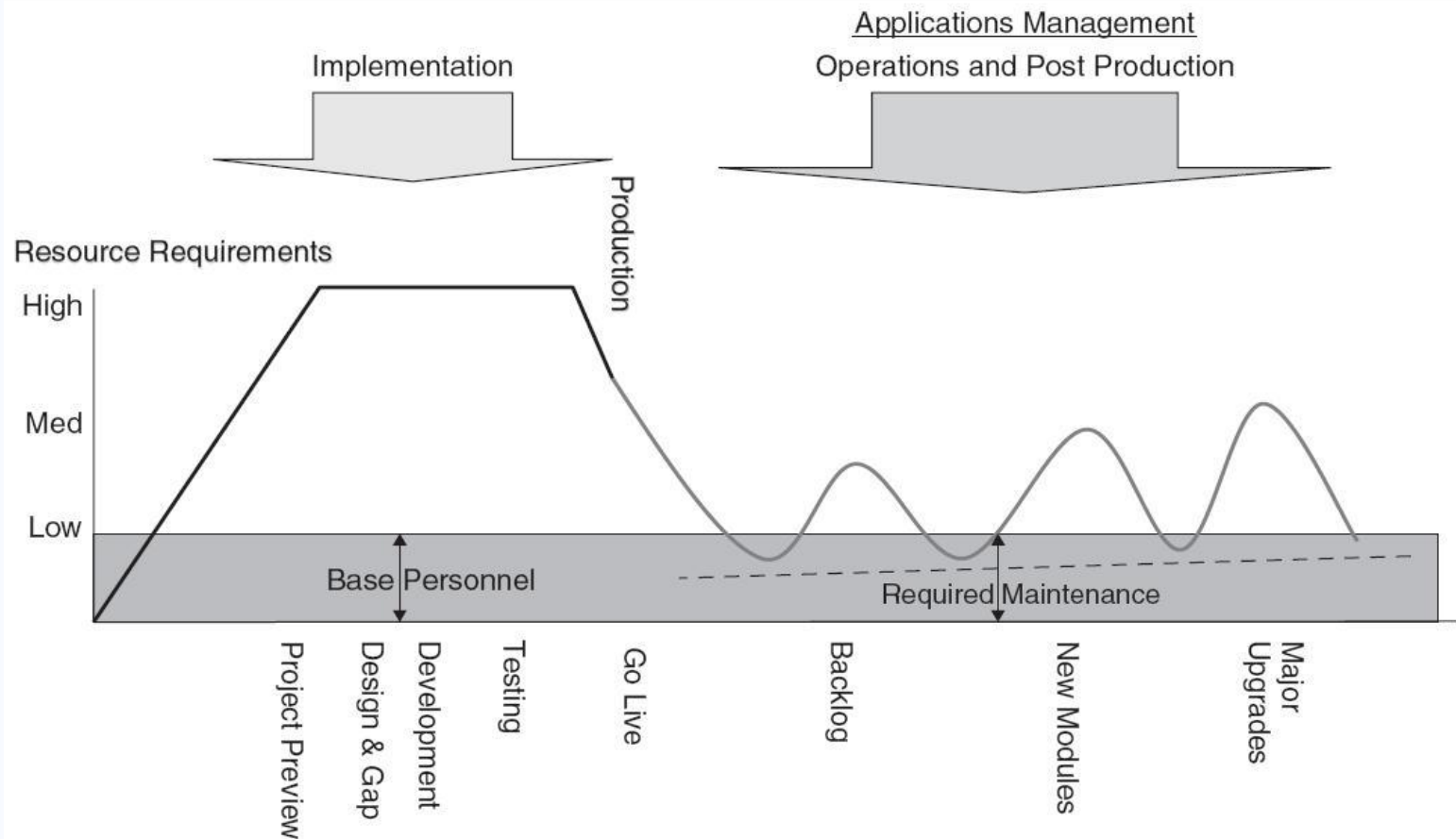
People and Organization

- **Project Management**
  - For an ERP system to be implemented successfully, project management must provide strong leadership, a clear and understood implementation plan, and close monitoring of the budget.

- **Consultants**
  - It is often the case for organizations without much ERP implementation experience to use implementation partners such as consultants.

People and Organization (Cont'd)

- **Change Management**
  - This helps prepare for changes to how business is done. In implementing new systems, communicating, preparing, and setting expectations is as important as providing training and support.

- **Business Process Re-engineering**

  - Business processes will need to be changed, adjusted, or adapted to the new system to use the functionality of an ERP system fully.

- **Global, Ethical and Security Management**

  - Outsourcing overseas, ethical issues, and problems with system security have also attracted a lot of attention in ERP implementation.

ERP Market Tiers

Activity:

- Identify the top 10 ERP vendors
- Identify the top 10 ERP software – provide appropriate description for each software

Software Extensions and Trends

- As e-Business firms started growing bigger with advanced needs in HR, accounting, and warehousing, non-ERP vendors were unable to support their requirements.

- ERP vendors were starting to expand their functionality to the Internet and *e-Business.*

- Intense competition and fluctuating sales have forced the ERP vendors to expand functionality to add value.

- The saturation of the demand in big business and the lucrative nature of the small and midsized business markets have led vendors like SAP and Oracle to enter the small business market.

Software Extensions and Trends

- SOA (Service Oriented Architecture) implementation will continue to grow as a factor in ERP purchase decisions because vendors are using creative marketing around product strategies versus buying what is currently available.

- Another shift is toward recurring and variable revenue models - Maintenance charges driving industry growth.

- The other major revenue shift is toward software as a service or hosted subscription-based applications.

- Social networking and open-source software solutions are also poised for significant growth.

Implications for Management

- ERP systems implementation is a complex organizational activity.

  ◦ Important to evaluate and learn from the successes and failures.

  ◦ Managing risk is all about keeping project focus and clear communications throughout the organization.

- ERP systems implementation requires strong project management oversight.

- ERP systems provide improved and added functionality for an organization.

- ERP systems are set to proliferate globally.

Summary

- Whereas the risks for implementing an ERP are greater, the payoff is very high for organizations.

- The integration of data helps an organization to better meet the demands of a fast and dynamic business world.

- The use of ERP systems provides for integrated data and business processes, thereby creating opportunities for organizations to expand and change as their business changes.

Summary (Cont'd)

- ERP components consist of hardware, software, information, process, and people to perform the fundamental phases of an information system: input, process, and output.

- ERP system architecture is a blueprint of the actual ERP system. There are two types of architecture: physical and logical.

- The selection of a system must be based on the needs of the organization and how well a vendor meets those needs now or in the future.

Summary (Cont'd)

- To be successful in implementing an ERP system, an organization and its management must clearly understand the implementation process.

  ◦ The key to this is the application of an ERP life cycle and methodology throughout an implementation.

- People and organizations are an important part of the implementation process. Without in-house experts, either the software vendor or a third party should be hired and used to assist or lead the project.

- Whereas ERP implementations are costly in time and resources, the greater costs are in process change, system maintenance, and remaining current.

Review Questions

1. How is the role of ERP system different from traditional TPS, MIS, DSS, and others? Can an ERP system support all levels of management?

2. Discuss the evolution of information systems in an organization. How can the use of ERP systems remove information or functional silos in organizations?

3. Among all the ERP components listed in the chapter, which component is most critical in the implementation process and why?

4. Discuss the role of ERP in organizations. Are ERP tools used for business process reengineering (BPR) or does BPR occur due to ERP implementation?

Review Questions (Cont'd)

5. Why is the design and selection of ERP architecture crucial for the implementation project? What are the long-term implications of selecting a wrong architecture?

6. Discuss the criteria for selecting ERP vendors. Which is the most important criteria and why?

7. From the examples provided in the chapter on ERP success and failure stories, what are the critical success failures?

8. What are the critical steps of the ERP project cycle? Discuss the critical success factors?