

Overview of Systems Integration: Challenges and Drives

Maham Khan

Lecture 6&7

Systems-Integration & Architecture

Systems Integration

- Systems integration means that you allow an heterogeneous Information System (IS) to communicate or integrate and share information (or data) **seamlessly** with one another.
- Systems integration is a key issue for an organization for its growth
 - Management needs to pay close attention to this issue.
- Enterprise Resource Planning (ERP) systems are a major kind of information system allowing organizations to integrate different systems into one organization-wide application with an integrated database management system.

Functional Silos

- Silos are basically compartmentalized operating units isolated from their environment.
- **Horizontal Silos**
 - Classification of organizations into departments like Accounting and Human Resources, reflects the breaking of complex tasks into smaller manageable tasks that could be assigned to a group of people who could then be held responsible.
- **Vertical Silos**
 - Organizations also divided roles in hierarchical layers from strategic planning to management control and operation control.
 - CEOs and Presidents plan long-term strategy, midlevel management focuses on tactical issues and on the execution of organizational policy whereas the lower-level management task is to focus on the day-to-day operations of the company.
- As organizations get big and complex they tend to break functions into smaller units and assign staff the responsibility for these activities allowing them to manage complexity as well as specialize in activities that enhance productivity and efficiency.

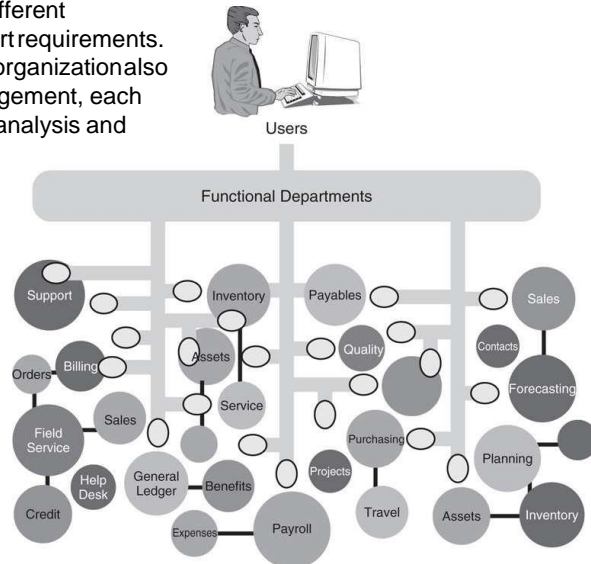
Information Systems in Organizations

- Information Systems are a critical component of a successful organization today.
- Information Systems play a major role in primary and secondary activities of an organization's value chain.
 - The evolution of IS suggests that its role has generally been to support evolving information needs of the organization.
- Information Systems provide a high level of computer automation to support business functions such as: Accounting, Finance, Marketing, Customer Service, Human Resource Management, Operations, Manufacturing
 - Supporting horizontal silos of organization
- Information systems provide analytical and decision making support for management, which is generally categorized into three levels- Strategic, Middle, and Operational.
 - Supporting vertical silos of organization
- Each business functions and management levels has different information requirements.

Functional Silos in Organization

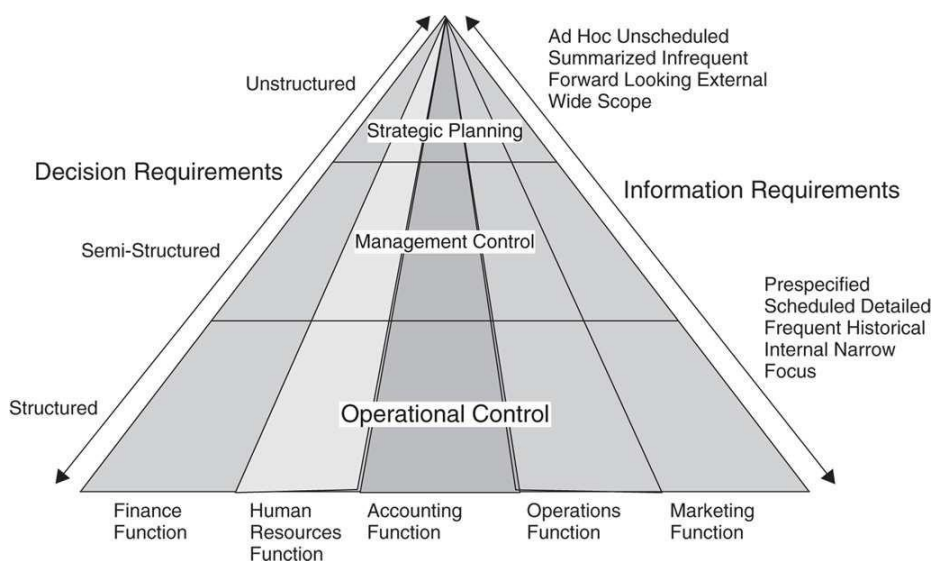
- Each functional area has different information needs and report requirements.
- Each functional area in an organization also has multiple levels of management, each requiring different levels of analysis and details of information.

To increase efficiency and productive, organizations developed various information systems to support each major activity and responsibility.

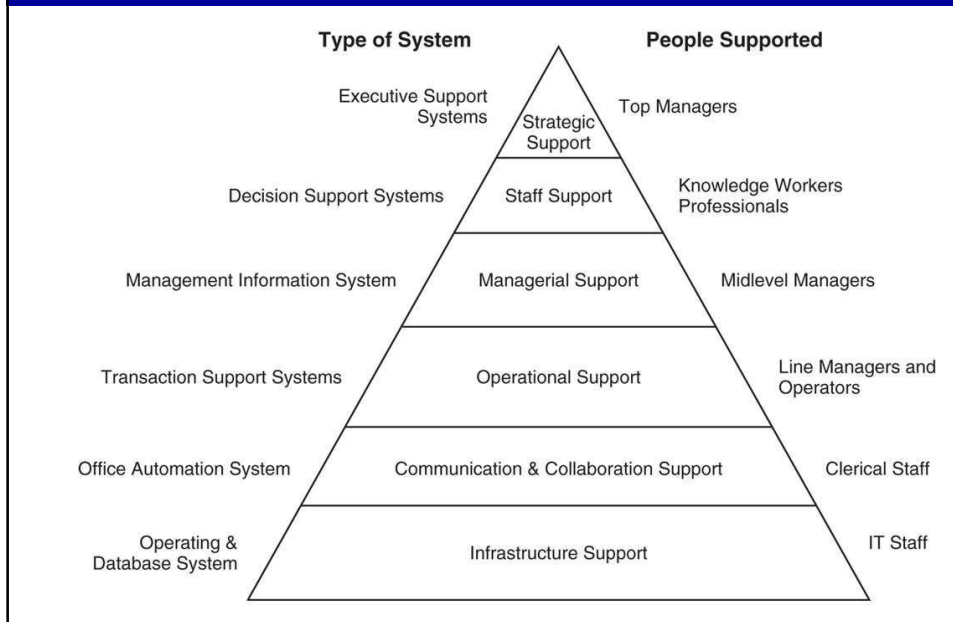


Management Pyramid with Information Requirements

Each management level has different information requirements.



IS as Categorized by Functional and Hierarchical Models



Information Silos and Systems Integration

- Over time, organizations created 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.
- A silo information system is inefficient, inaccurate, and expensive.
 - The system creates bottlenecks for everyone and information is not available in real-time.
- To compete effectively, organizations have to be customer focused.
 - This requires cross-functional integration among the accounting, marketing and other departments of the organization.
- The cross-functional integration can involve people and resources from various functional departments working together, sharing information at any level of the organization.
 - The cross-functional organizational structure breaks the functional silos by opening up the informational flows from one department to another.

Systems Integration

Logical or human level

- Develop information systems that allow organizations to share data with all of its stakeholders based on need and authorization.
- Management needs to change organizational structures, processes, and employee roles and responsibilities.

Physical or technical level

- Provide seamless connectivity between heterogeneous systems.
- Business process reengineering involves changing the mindset of the employees in the organization, encouraging and enabling them to do their tasks in a new way.

Benefits and Limitations of Systems Integration

Benefits	Limitations
Increased Revenue and Growth	High Initial Set-up Costs
Leveling the Competitive Environment	Power and Interdepartmental Conflicts (due to the sharing of information)
Enhanced Information Visibility	Long-term and Intangible ROI (Usually several years)
Increased Standardization	Creativity Limitations (Restricts Creativity and Independence)

Implications for Management

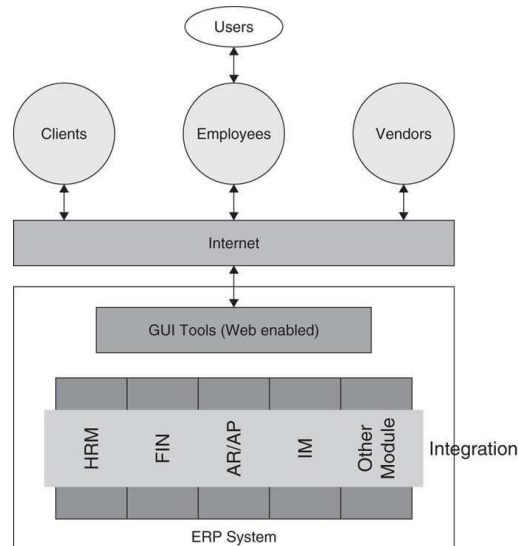
- **Silos do not work.**
 - Most organizations lose out in the long-term when information is not shared in real time across the functional boundaries within the company.
- **System integration has many hidden benefits.**
 - Allows decision making to be cascaded to all departments
 - Allows employees at lower-levels to make better decisions while interacting with clients or partners.
- **System integration has many challenges.**
 - Replacing old hardware and software
 - Working with IT consultants
 - Human challenges, such as impact on IT staff, department heads losing control of data, and rumors of layoffs

Implications for Management

- **Systems integration raises many new ethical issues.**
 - Possibility of some employees exploiting information for personal advantage and illegal access of information.
- Remedies can consist of:
 - Develop policies on ethical usage of information.
 - Install proper security software and hardware (like firewalls).
 - Allocate resources for training and education on accessing information.

Integrated Systems - Enterprise Resource Planning (ERP)

- Goal of ERP is to integrate departments and functions across an organization into a single infrastructure sharing a common database and serving the needs of each department.
- ERP systems replace an assortment of systems that typically existed in organizations. Moreover, ERP solves critical problem of integrating information from different sources and makes it available in real-time.



ERP and Systems Integration

- ERP systems are integrated, multi-module application software packages designed to serve and support several business functions across an organization.
- ERP systems are typically commercial software packages that facilitate collection and integration of information related to various areas of an organization.
- ERP systems enable the organization to standardize and improve its business processes to implement best practices for its industry.
- ERP 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.

ERP's Role in Logical Integration

- ERP systems require organizations to focus on business process rather than on functions.
- ERP systems come with built-in processes for a wide variety of common business functions.
- An ERP system implements best practices via specific built-in steps for processing a customer order in terms of:
 - order entry.
 - routing through departments.
 - communication of output to various parties.

ERP's Role in Physical Integration

- Before installing the ERP system, an organization may have to upgrade or install middleware or get rid of their legacy system's hardware and software.
- Integration is also required at the Data level, Client level, and at the Application level.
- A good ERP implementation improves operational efficiency with better business processes that focuses on organizational goals rather than on individual departmental goals.
- Improved efficiency with a paperless flow and electronic data interchange (EDI) or business-to-business (B2B) commerce environment with partners.

Implications for Management

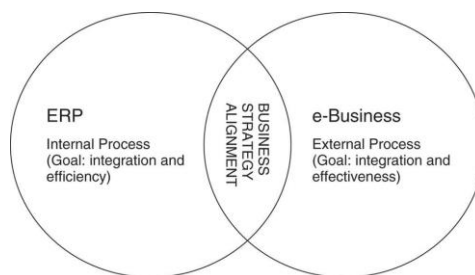
- In the early days of ERP implementation most management did not understand the magnitude of issues an organization has to consider before, during, and after implementation.
 - ERP systems are very different from conventional packaged software, such as Microsoft Office and others.
- ERP systems implementation is a complex organizational activity.
 - There are no shortcuts when it comes to implementing an enterprise system.
- It is important to evaluate and learn from the successes and failures.
- ERP systems implementation requires strong project management oversight.

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.

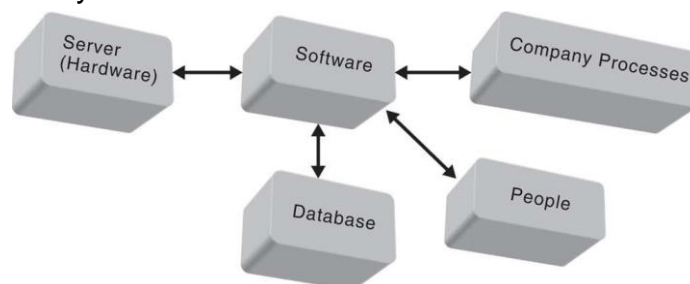
E-Business and ERP

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



ERP Systems Components

- An ERP system consists of:

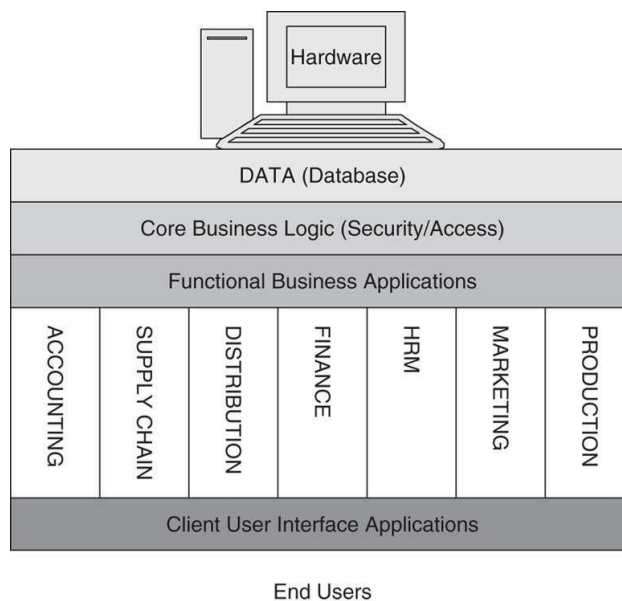


Hardware	Servers and peripherals
Software Process	Operating systems and database
Information	Organizational data from internal and external sources
Process	Business processes, procedures, and policies
People	End users and IT staff

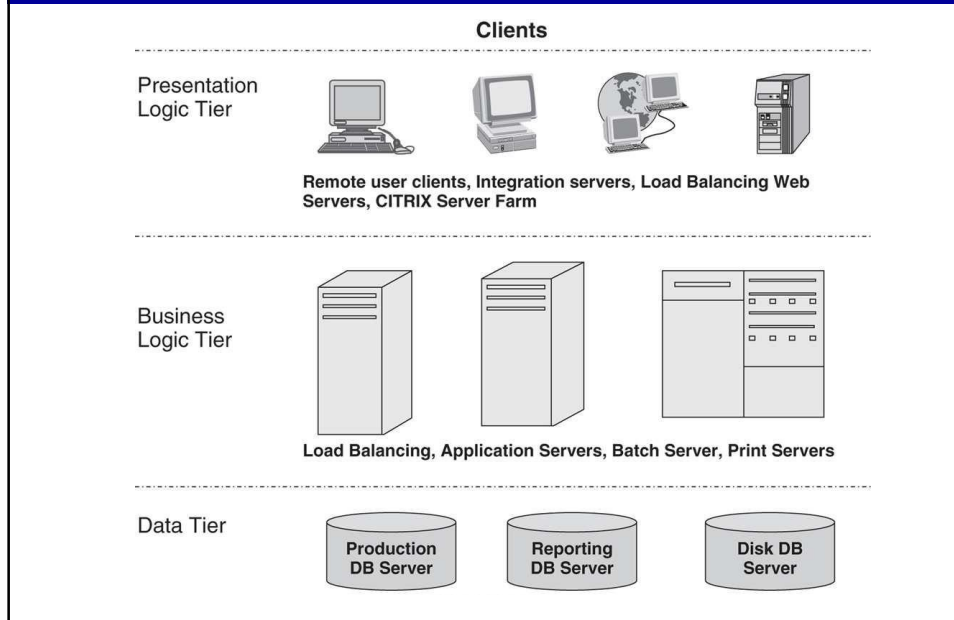
ERP Architecture

- The architecture of an ERP system influences the cost, maintenance, and the use of the system.
- The ERP architecture helps the implementation team build the ERP system for the organization.
- If purchased, ERP architecture is often driven by the vendor (Package-Driven Architecture).
- There are two types of architectures.
 - Logical focuses on the supporting needs of the end users.
 - Physical focuses on the efficiency of the system.

Logical Architecture of an ERP System



Tiered Architecture Example of ERP System



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 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

- Agility of the organization in terms of responding to changes in environment for growth and maintaining market share
- Sharing of information across functional areas helps collaboration between employees.
- Linking and exchanging information in real-time with supply-chain partners improves efficiency leading to lower costs.
- Better customer service due to quicker information flow across departments.
- Efficiency of business processes are enhanced due to the re-engineering of business processes.

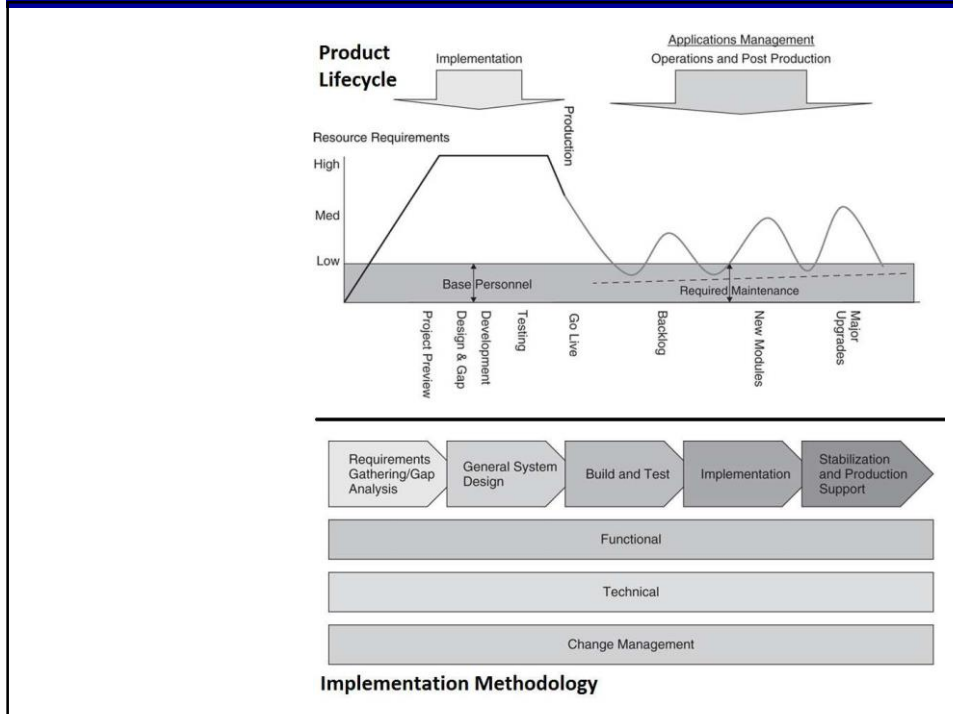
Business Limitations of an ERP System

- 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

- Before implementing ERP, an organization has to plan and understand the life cycle of these systems.
- The key to a successful implementation is to use a proven methodology, take it one step at a time, and begin with an understanding of 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.

ERP Implementation



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
- 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.

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

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

Change Management

Role is essential because it prepares for changes to how business is done. In implementing new systems, communicating, preparing, and setting expectations is as important as providing training and support.

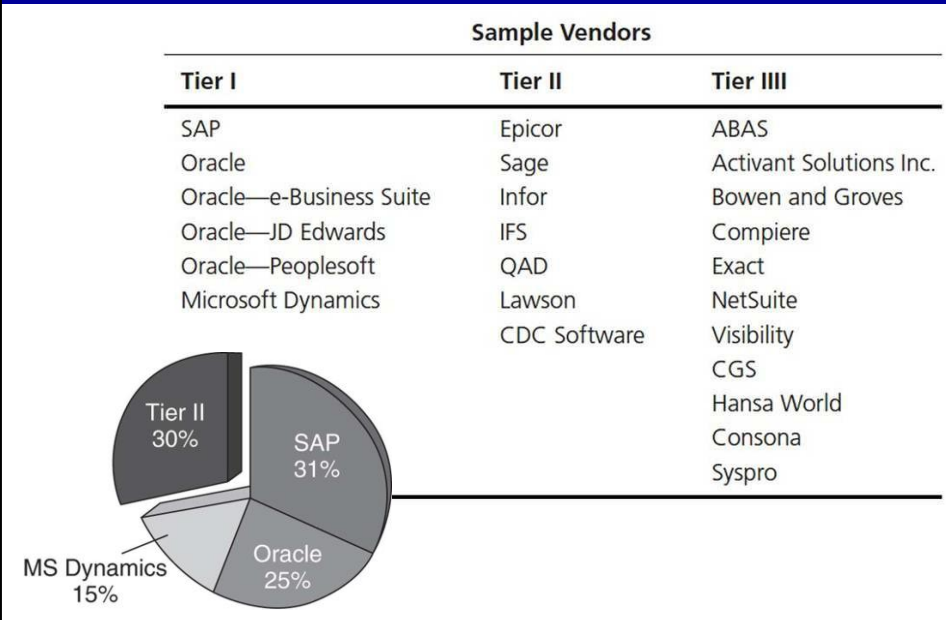
Business Process Re-engineering

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 Vendors



ERP Vendors

SAP

SAP is the recognized global leader among ERP vendors with over 12 million users. Its solutions are for all types of industries and for every major market. www.sap.com

Oracle/Peoplesoft

As the second largest ERP vendor, Oracle provides solutions divided by industry category and promises long-term support for customers of PeopleSoft- (acquired in 2004). www.oracle.com

Microsoft Dynamics

Formerly Microsoft Business Solutions or Great Plains, Microsoft Dynamics is a comprehensive business-management solution built on the Microsoft platform.

ERP Vendors

Infor

The world's third largest provider of enterprise software. It delivers integrated enterprise solutions in supply chain, customer relationship and suppliers management.

Lawson

Industry-tailored software solutions that include enterprise performance management, distribution, financials, human resources, procurement, and retail operations.

www.Lawson.com

Summary

- Functional silos categorize an organization's tasks and activities into groups to improve efficiency and responsibility of work in the organization.
- Silos can improve productivity, but they often lead employees to achieve departmental goals rather than overall organizational goals.
- IS over the years have been divided horizontally by functions and vertically by hierarchical levels.
- IS architecture has evolved from centralized mainframe architecture to personal computers with distributed or client-server architecture.
- In order for systems integration to be successful, organizations have to focus both on the human or logical level and on the physical or systems level.
- ERP systems thus make the process of systems integration easier, but they are expensive and often require organizations to start from scratch.
- System integration involves the whole organization, requiring top-management support and resources for a long-term period. Management must be ready to face the human and ethical challenges in a systems integration project.

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.
- 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 these needs and how well a vendor meets those needs now or in the future.
- To be successful in implementing an ERP system, an organization and its management must clearly understand the implementation process.