INFORMATION TECHNOLOGY EVOLUTION

1. OPERATIONS

The initial applications of information technology by organizations was in the area of: Transaction processing systems.
These initial applications were based on the notion that current operations could be performed more efficiently with the use of computer technology.
The goal was to reduce labor costs by having computers take over some tasks.

- **TRANSACTION PROCESSING SYSTEM (TPS)**, are called the systems that automate the organization's routine, day-to-day business transactions such as data from sales or purchases from suppliers.
  A TPS collects data from transactions and stores them in a database.
- **DATA WAREHOUSING** is the use of huge databases that combine all of a company's data and allow users to access the data directly, create reports, and obtain responses to what-if questions.
- **Data Mining** software uses sophisticated decision-making processes to search raw data for patterns and relationships that may be significant.
- **Business intelligence** refers to the high-tech analysis of a company's data in order to make better strategic decisions.
  Business intelligence means searching out and analyzing data from multiple sources across the enterprise, and sometimes from outside sources as well, to identify patterns and relationships that might be significant.

2. BUSINESS RESOURCE

Management Information System (**MIS**) is a computer-based system that provides information and support for managerial decision making. The MIS is supported by the organization's transaction processing systems and by organizational and external databases.

Information Reporting System provides mid-level managers with reports that summarize data for day-to-day decision making on issues such as production scheduling.

Executive Information System (**EIS**) is a higher-level application that facilitates decision making at the highest levels of management. These systems are typically based on software that can convert large amounts of complex data into pertinent information and provide that information to top managers in a timely fashion.

Decision Support System (**DSS**) provides specific benefits to managers at all levels of the organization.
DSS is an interactive information system that is designed to help managers at all levels make decisions through integrated databases in which a series of "what if" questions can be posed.

Access to management information systems and executive information systems are typically controlled by placing them on the individual PCs of authorized managers.

FEEDBACK CONTROL MODEL

Another primary use of information in organizations is for control.
The feedback control model consists of setting standards of performance, measuring actual performance and comparing it to the standards, and correcting or changing activities as needed.

Management Control Systems

Management control systems are defined as the formal routines, reports, and procedures that use information to maintain or alter patterns in organizational activity.
The four core subsystems of a management control system are:

Subsystem	**Content and Frequency**
Budget, financial reports	Financial, resource expenditure, profit and loss: monthly
Statistical reports	Nonfinancial outputs; weekly or monthly, often computer-based
Reward systems	Evaluation of managers based on department goals and performance, set rewards; monthly, yearly
Quality control systems	Participation, Benchmarking guidelines, Six Sigma goals, Reengineering

The *budget* is typically used to set targets for the organization's expenditures for the year and then report actual costs on a monthly basis.
As a means of control, budgets report actual as well as planned expenditures for cash, assets, raw materials, salaries, and other resources so that managers can take action to correct variances.

Managers use periodic statistical reports to evaluate and monitor nonfinancial performance, such as customer satisfaction, employee performance, or rate of staff turnover.

Benchmarking is the process of continually measuring products, services, and practices against tough competitors or other industry leaders.

Six Sigma is a highly ambitious quality standard that specifies a goal of no more than 3.4 defects per million parts.
However, it has deviated from that precise meaning to refer to a whole set of control procedures that emphasize the relentless pursuit of higher quality and lower costs.
The discipline is based on a methodology referred to as **DMAIC** (**Define, Measure, Analyze, Improve**, and **Control**), which provides a structured way for organizations to approach and solve problems.

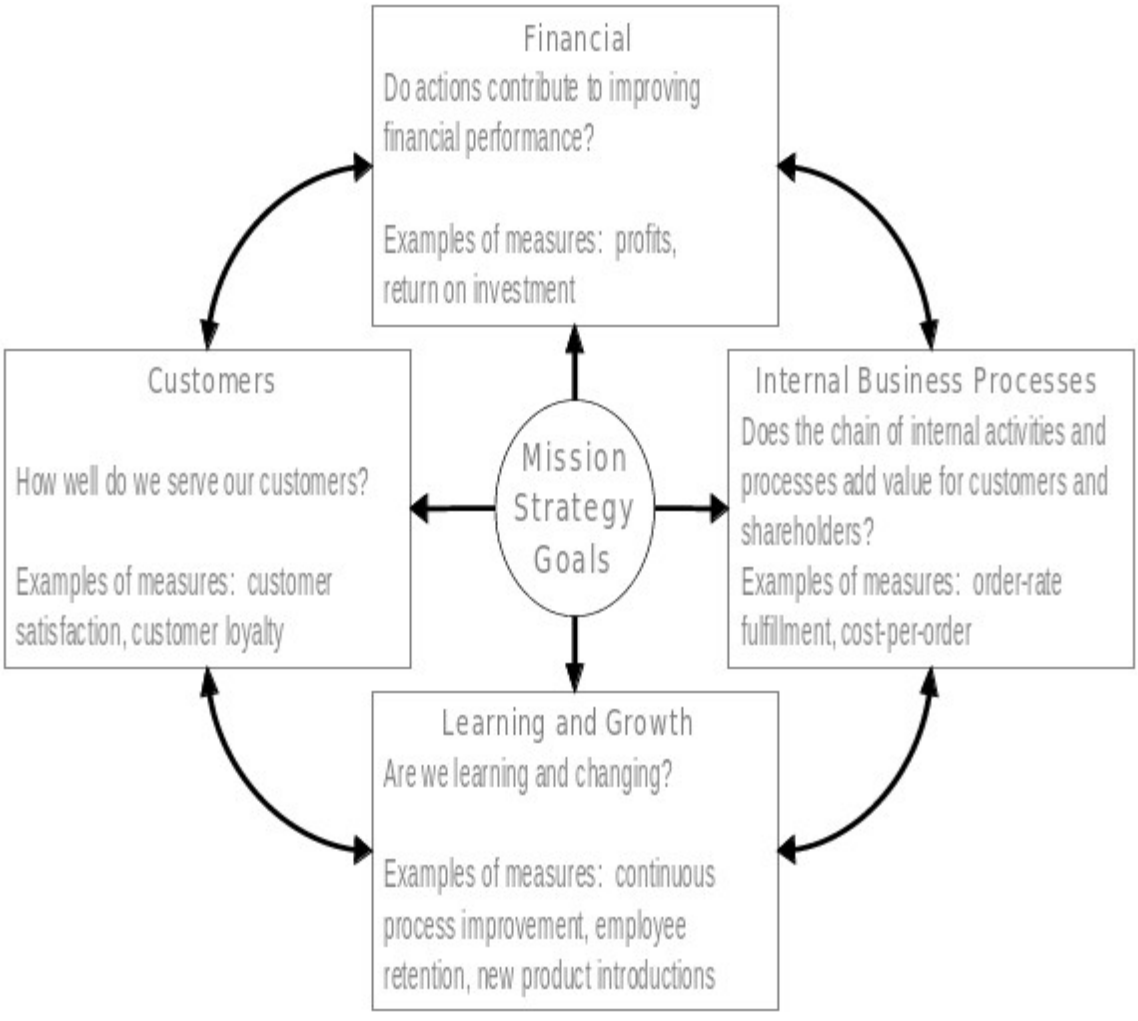
The Level and Focus of Control Systems

Companies use a combination of metrics for measuring organizational performance and effectively controlling the organization. A recent control system innovation is to integrate internal financial measurements and statistical reports with a concern for markets and customers as well as employees.

BALANCED SCORECARD is a comprehensive management control system that balances traditional financial measures with operational measures relating to a company's critical success factors. A balanced scorecard contains four major perspectives: financial performance, customer service, internal business processes, and the organization's capacity for learning and growth.

Within these four areas, managers identify key performance indicators the organization will track.

Major Perspectives of the Balanced Scorecard



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A **strategy map** provides a visual representation of the key drivers of an organization's success and shows how specific outcomes in each area are linked.

The balanced scorecard and strategy map are techniques used primarily by top and upper-level managers.

Lower level managers focus on the performance of people at the department level, who must meet goals and standards if the organization is to attain its overall goals.
There are two different approaches to evaluating and controlling team or individual performance and allocating rewards.
Behavior control is based on manager observation of employee actions to see whether the individual follows desired procedures and performs tasks as instructed.
Outcome control is based on monitoring and rewarding results, and managers might pay little attention to how those results are obtained. Good performance metrics are key to making an outcome control system work effectively.

3. STRATEGIC WEAPON

Following the use of information systems for managerial decision making and control, IT has evolved further as a strategic tool for both internal and external coordination.
This is the highest level of application.

3.1 IT applications for internal coordination are: intranets, Web 2.0 tools, enterprise resource planning (ERP) and knowledge-management systems.

Intranets

The form of corporate networking which is a private internal network, accessible only to people within the company, that uses the infrastructure of the World Wide Web, but is cordoned off from the public, is called intranet.

Web 2.0 Tools

Companies are also tapping into the power of new IT applications such as Web
services, group blogs, wikis, and social networking as powerful collaboration tools within organizations. These second-generation Internet technologies are often referred to collectively as Web 2.0. *Web services* refers to a variety of software that
makes it easier for people to exchange information and conduct business transactions via the Internet.

Enterprise Resource Planning

Enterprise resource planning *(ERP)* systems collect, process, and provide information about a company's entire enterprise, including order processing, product design, purchasing, inventory, manufacturing, distribution, human resources (HR), receipt of payments, and forecasting of future demand.
ERP can provide the kind of information furnished by transaction processing systems, as well as that provided by information reporting systems, decision support systems, or executive information systems.
The key is that ERP weaves all of these systems together so people can see the big picture and act quickly, helping the organization be smarter and more effective.
More recently, ERP has incorporated tools for supply chain management, so that coordination across organizational boundaries is strengthened as well.

Knowledge Management

Knowledge management refers to the efforts to systematically find, organize, and make available a company's intellectual capital and to foster a culture of continuous learning and knowledge sharing so that organizational activities build on what is already known.
The company's **intellectual capital** is the sum of its knowledge, experience, understanding, relationships, processes, innovations, and discoveries.

Explicit knowledge is formal, systematic knowledge that can be codified, written down, and passed on to others in documents or general instructions.

Tacit knowledge is based on personal experience, rules of thumb, intuition, and judgment. It includes professional know-how and expertise, individual insight and experience, and creative solutions that are difficult to communicate and pass on to others.

Companies need ways to transfer both explicit knowledge and implicit, or tacit, knowledge across the organization.
Explicit knowledge can easily be captured and shared in documents and through IT systems, but tacit knowledge is not easily captured and transferred.

Two approaches to knowledge management

The first approach deals with the collection and sharing of explicit knowledge. The focus is on collecting and codifying knowledge and storing it in databases where it can easily be accessed for reuse.
The second approach deals with tacit knowledge and connecting people through interactive media; managers concentrate on developing personal networks that link people together for the sharing of tacit knowledge.

3.2 Adding Strategic Value: Strengthening External Coordination

External applications of IT for strengthening coordination with customers, suppliers, and partners include systems for supply chain management and the integrated enterprise, tools for enhancing customer relationships, and e-business organization design. One basic approach is to extend the corporate intranet to include customers and partners.

Extranet is an external communications system that uses the Internet and is shared by two or more organizations. Each organization moves certain data outside of its private intranet, but makes the data available only to the other companies sharing the extranet.

The Integrated Enterprise

The integrated enterprise is an organization that uses advanced information technology to enable close coordination within the company as well as with suppliers, customers, and partners.

The integrated enterprise uses *supply chain management systems*, which manage the sequence of processing from obtaining raw materials to distributing finished goods to consumer

Supply chain management systems help a firm achieve the right balance of low inventory levels and customer responsiveness. By establishing electronic linkages between the organization and key partners for the sharing and exchange of data, the integrated enterprise creates a seamless integrated line from end consumers to raw materials suppliers.

The purpose of integrating the supply chain is for everyone to work closely together to meet customers' product and time demands. These horizontal relationships get more attention than vertical relationships for the integrated enterprise to work.

Customer Relationship Management

Customer relationship management **(**CRM) systems help companies track customers' interactions with the firm and allow employees to call up a customer's past sales and service records, outstanding orders, or unresolved problems. Companies are applying Web services, blogs, wikis, and social networking to enhance customer relationships.

E-Business Organization Design

E-business is any business that takes place by digital process over a computer network rather than in physical space. E-business most commonly refers to electronic linkages over the Internet with customers, partners, suppliers, employees, or other key constituents. There is a range of strategies for blending online and offline activities.

Spin-Off

Some organizations create a separate spin-off company to provide for greater autonomy, flexibility, and focus.
Advantages of a spin-off include faster decision making, increased flexibility and responsiveness to changing market conditions, an entrepreneurial culture, and management that is totally focused on the success of the online operation.
Potential disadvantages are the loss of brand recognition and marketing opportunities, higher start-up costs, and loss of leverage with suppliers.

IT Impact on Organizational Design

Some specific implications of these advances for organization design are smaller organizations, decentralized structures, improved internal and external coordination, and new network organization structures.

1. *Smaller organizations* - Information technology enables organizations to outsource, using fewer in-house resources. One or a few people may maintain an Internet site from home or a rented work space.
2. *Decentralized organization structures* - Organizations can reduce layers of management and decentralize decision making. Information can easily be shared throughout an organization and even across great geographical distances.
3. *Improved horizontal coordination* – It can improve coordination and communication with the firm via intranets and knowledge management systems.
4. *Improved interorganizational relationships* – Through extranets, and other networks, people can be connected regardless of where they are located. Interorganizational information networks tend to heighten integration, blur organizational boundaries, and create shared strategic contingencies among firms.
5. *Enhanced modular structures* – a network structure in which most activities are outsourced, so that different companies perform the various functions needed by the organization. The speed and ease of electronic communication makes the network structure a viable option for companies that want to keep costs low but expand activities or market presence.