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Information Technology and E-Business

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MBA - GENERAL

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UNIT – 1

Unit Structure:

Lesson 1.1 - Introduction to Information Systems in Business
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Lesson 1.1 - Introduction to Information Systems in Business

The objectives of this lesson are to

- Explain why knowledge of information systems is important for business professionals,
- Identify five areas of information systems knowledge they need, and
- Recognize several challenges that a business manager might face in managing the successful and ethical development and use of information technology in a business.

In this lesson we will discuss the following

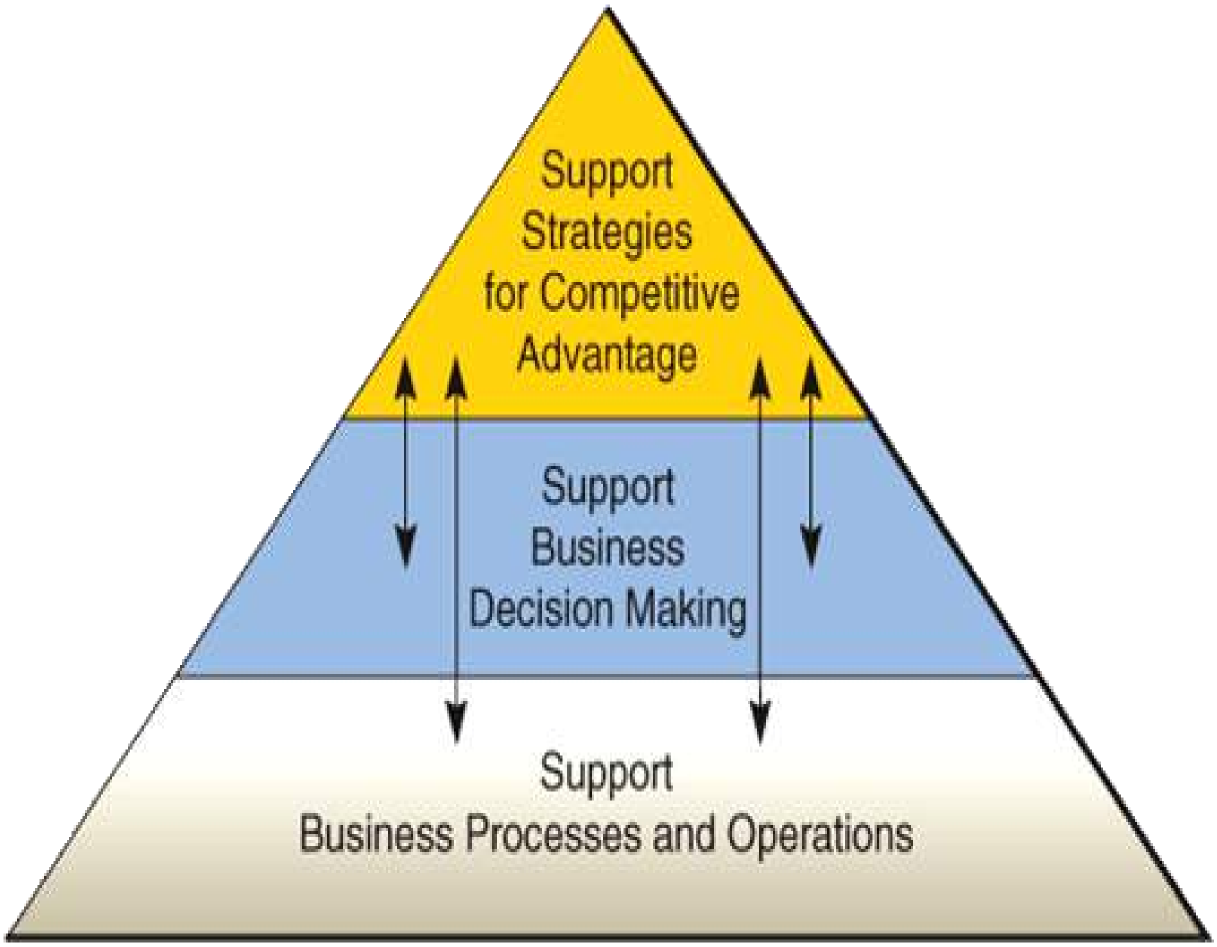
The foundation of information system, components of information system (namely, people, hardware, software, data, and networks as resources to perform input, processing, output, storage, and control activities that transform data resources into information products), business applications of information systems and introduction to electronic business.

Foundation of Information Systems

This section on foundations of Information systems in Business presents an overview of the five basic areas of information systems knowledge needed by business professionals given below, including the conceptual system components and major types of information systems. As shown in Figure information systems provide support at all levels of decision making, viz., operational, tactical, and strategic.

Importance of Information Systems

An understanding of the effective and responsible use and management of information systems and technologies is important for managers, business professionals, and other knowledge workers in today's internetworked enterprises powered by Information and Communication Technologies (ICT).



Information systems support at different levels of decision making

Information systems play a vital role in the e-business and e-commerce operations, enterprise collaboration and management, and strategic success of businesses that must operate in an internetworked global environment. Thus, the field of information systems has become a major functional area of business administration.

The IS knowledge that a business manager or professional needs to know is illustrated in the above Figure and covered in this lesson. This includes

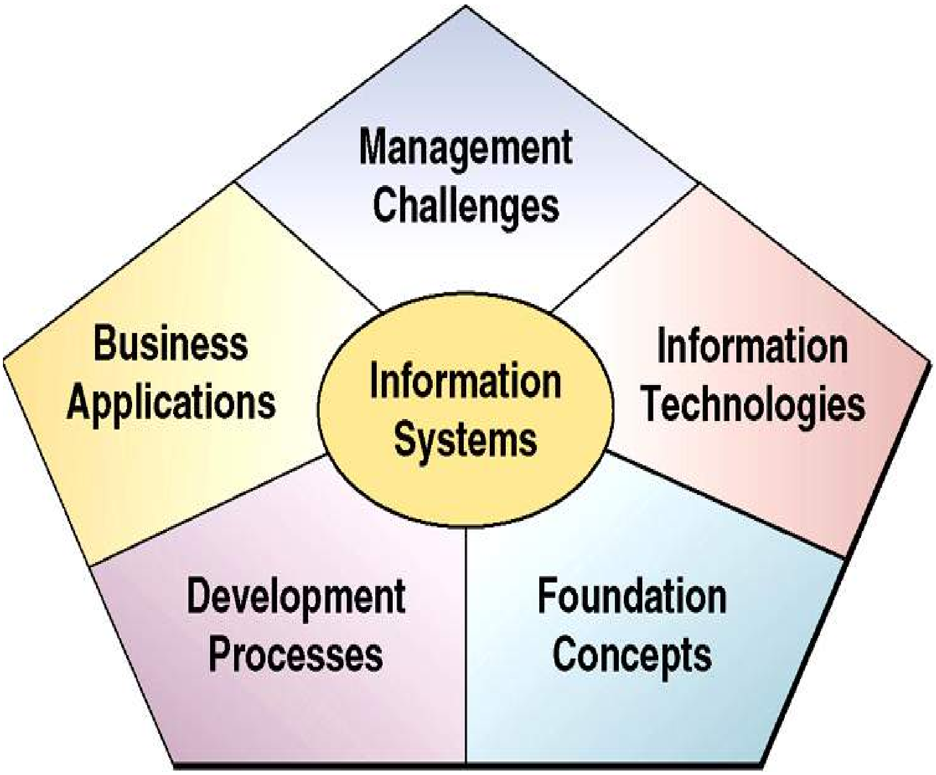
(1) Foundation concepts fundamental behavior, technical, business, and managerial concepts like system components and functions, or competitive strategies;

(2) Information technologies An IS Framework for Business Professionals concepts, developments, or management issues regarding hardware, software, data management, networks, and other technologies;

(3) Business applications major uses of IT for business processes, operations, decision making, and strategic/competitive advantage;

(4) Development processes how end users and IS specialists develop and implement business/IT solutions to problems and opportunities arising in business; and

(5) Management challenges how to effectively and ethically manage the IS function and IT resources to achieve top performance and business value in support of the business strategies of the enterprise.

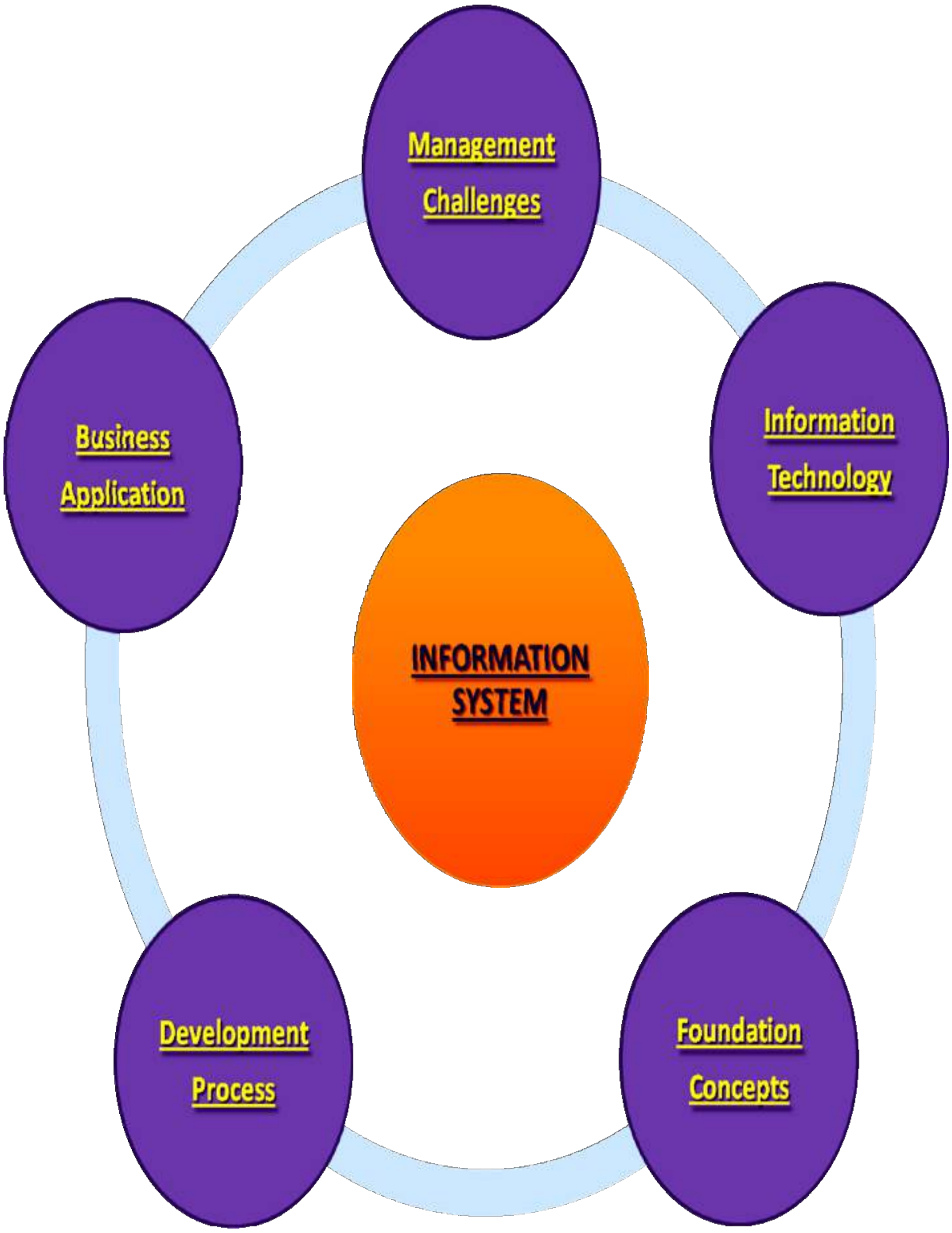


System Concepts

A system is a group of interrelated components working toward the attainment of a common goal by accepting inputs and producing outputs in an organized transformation process. Feedback is data about the performance of a system. Control is the component that monitors and evaluates feedback and makes any necessary adjustments to the input and processing components to ensure that proper output is produced.

System concepts can also be termed as an organized collection, storage, and presentation system of data and other knowledge for decision making, progress reporting, and for planning and evaluation of programs. It can be either manual or computerized, or a combination of both.

Information systems are teleological systems (that is, goal-directed) in which the intention and goals behind the systems determine what to consider information, how informative objects should be selected, labeled, described, organized and retrieved.



Information system Model

An information system as per the above Fig uses the resources of people, hardware, software, data, and networks to perform input, processing, output, storage, and control activities that convert data resources into information products. Data are first collected and converted to a form that is suitable for processing (input).

Then the data are manipulated and converted into information (processing), stored for future use (storage), or communicated to their ultimate user (output) according to correct processing procedures (control).

Components of an Information System

An Information system model expresses a fundamental conceptual framework for the major components and activities of information systems.

An information system depends on the resources of people, hardware, software, data, and networks to perform input, processing, output, storage, and control activities that convert data resources into information products. The information systems model outlined in the text emphasizes four major concepts that can be applied to all types of information systems

- People, hardware, software, data, and networks are the five basic resources of information systems.
- People resources include end users and IS specialists, hardware resources consist of machines and media, software resources include both programs and procedures, data resources can include data and knowledge bases, and network resources include communications media and networks.
- Data resources are transformed by information processing activities into a variety of information products for end users.
- Information processing consists of input, processing, output, storage, and control activities.

IS Resources and Products - Hardware resources include machines and media used in information processing. Software resources include computerized instructions (programs) and instruction for people (procedures).

People resources include information systems specialists and users. Data resources include alphanumeric, text, image, video, audio, and other forms of data. Network resources include communications media and network support. Information products produced by an information system can take a variety of forms, including paper reports, visual displays, multimedia documents, electronic messages, graphics images, and audio responses.

Business Applications of Information Systems

Information systems perform three vital roles in business firms. Business applications of IS support an organization's business processes and operations, business decision-making, and strategic competitive advantage.

Major application categories of information systems include operations support systems, such as

(a) Transaction processing systems,
(b) Process control systems,
(c) Enterprise collaboration systems, and
(d) Management support systems, such as management information systems, decision support systems, and executive information systems.

Other major categories are expert systems, knowledge management systems, strategic information systems, and functional business systems.

However, in the real world most application categories are combined into cross-functional information systems that provide information and support for decision-making and also perform operational information processing activities.

Managers or business professionals are not required to know the complex technologies, abstract behavioral concepts, or the specialized applications involved in the field of information systems.

System concepts – an Introduction

System concepts underlie the field of information systems. Understanding system concepts will help in understanding many other concepts in the technology, applications, development, and management of information systems. System concepts help to understand

- Technology

  That computer networks are systems of information processing components that uses a variety of hardware, software, data and telecommunication technologies.

- Applications

  That electronic business and commerce involves interconnected business information systems.

- Development

  That developing ways to use information technology in business includes designing the basic components of information systems.

- Management

  That managing information technology emphasizes the quality, strategic business value, and security of an organization's information systems.

A system is a group of interrelated components working together toward a common goal by accepting inputs and producing outputs in an organized transformation process. A system (sometimes called a dynamic system) has three basic interacting components or functions.

These include

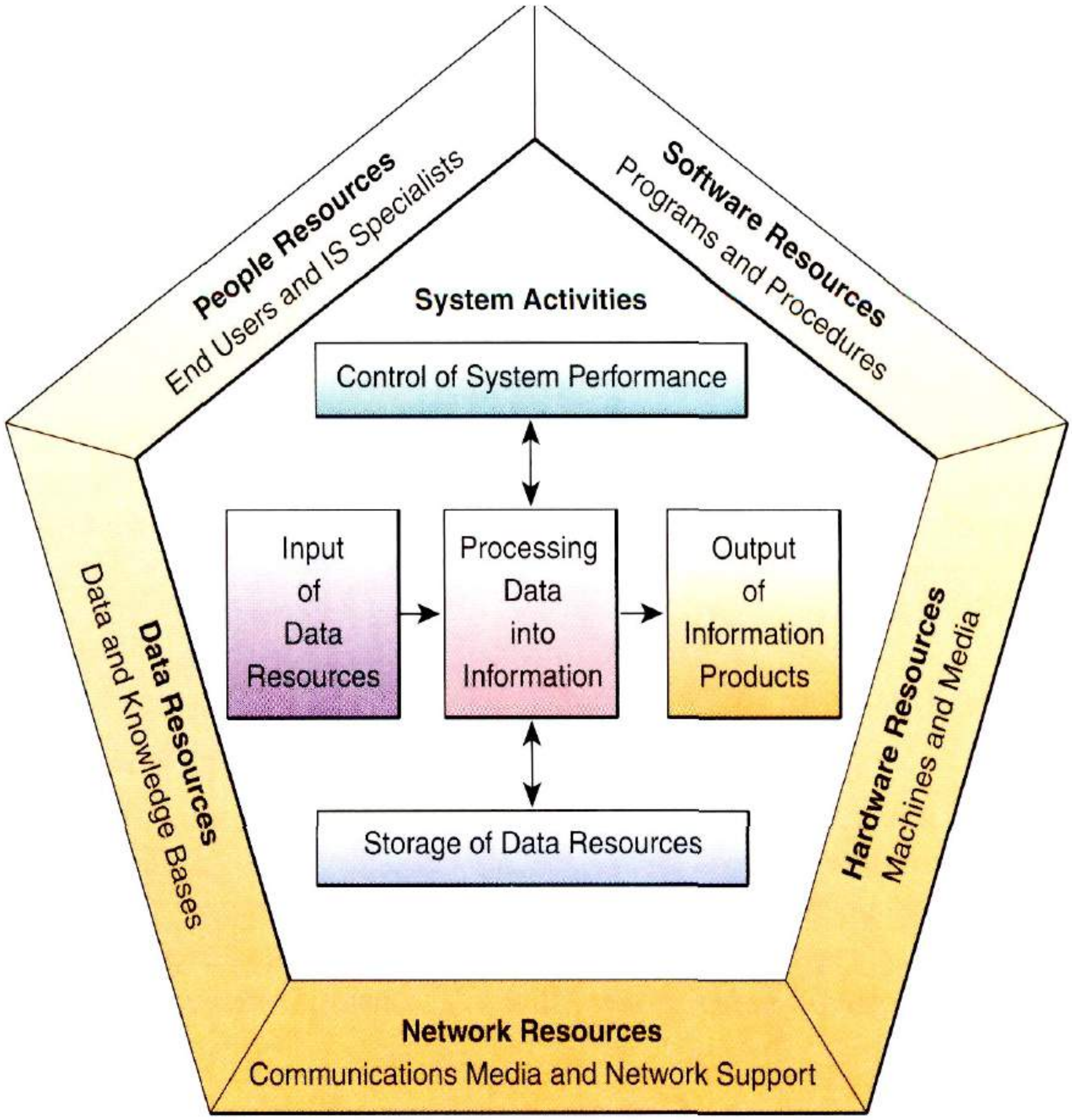
- Input involves capturing and assembling elements that enter the system to be processed.
- Processing involves transformation processes that convert input into output.
- Output involves transferring elements that have been produced by a transformation process to their ultimate destination.

Information System Resources

The basic IS model shows that an information system consists of five major resources, as discussed earlier. They are

- People resources
- Hardware resources
- Software resources
- Data resources
- Network resources

People Resources



IS Model

People are required for the operation of all information systems. This people resource includes end users and IS specialists.

- End Users (also called users or clients) are people who use an information system or the information it produces. Most of us are information system end users. And most end users in business are knowledge workers, that is, people who spend most of their time communicating and collaborating in teams of workgroups and creating, using, and distributing information.
- IS Specialists are people who develop and operate information systems. They include system analysts, software developers, system operators, and other managerial, technical, and clerical IS personnel. Systems analysts – design information systems based on the information requirements of end users. Software developers – create computer programs based on the specifications of systems analysts. System operators – monitor and operate large computer systems and networks.

Hardware Resources

Hardware resources include all physical devices and materials used in information processing.

- Machines – For example, physical devices (computers, peripherals, telecommunications networks, etc.)
- Media – For example, all tangible objects on which data are recorded (paper, magnetic disks, etc.)

Examples of hardware in computer-based information systems are

- Computer Systems which consist of central processing units containing microprocessors, and a variety of interconnected peripheral devices.
- Computer peripherals which are devices such as a keyboard or electronic mouse for input of data and commands, a video screen or printer for output of information, and magnetic or optical disks for storage of data resources.

Software Resources

Software resources include all sets of information processing instructions.

- Program - A set of instructions that causes a computer to perform a particular task.
- Procedures - Set of instructions used by people to complete a task.

- Application software - Programs that direct processing for a particular use of computers by end users.
- Procedures - Operating instructions for the *people* who will use an information system.

Data Resources

Data constitutes a valuable organizational resource. Thus, data resources must be managed effectively to benefit all end users in an organization. The data resources of information systems are typically organized into

- Databases - a collection of logically related records or files. A database consolidates many records previously stored in separate files so that a common pool of data records serves many applications.
- Knowledge Bases - holds knowledge in a variety of forms such as facts and rules of inference about various subjects.

Network Resources

Telecommunications networks like the Internet, intranets, and extranets have become essential to the successful electronic business and commerce operations of all types of organizations and their computer-based information systems.

Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by communications software.

The concept of network resources emphasizes that communications networks are a fundamental resource component of all information systems. Network resources include

- Communications media (twisted-pair wire, coaxial cable, fiber-optic cable, and microwave, cellular, and satellite wireless systems).

Fundamental roles of IS applications in Business

Three major roles of the business applications of information systems include

- Support Business Processes – involves dealing with information systems that support the business processes and operations in a business.
- Support Decision Making – help decision makers to make better decisions and attempt to gain a competitive advantage.
- Support Competitive Advantage – help decision makers to gain a strategic advantage over competitors requires innovative use of information technology. The role of information systems in the organization is shifting to support business processes rather than individual functions. The focus is outwards to customers, rather than inwards to procedures. Services are as important as products. Businesses are changing more and more rapidly.

This poses a challenge to existing information systems, which are often inappropriately structured to meet these needs. It also poses a challenge to the people who design, work with, and use these systems, since they may hold outdated assumptions.

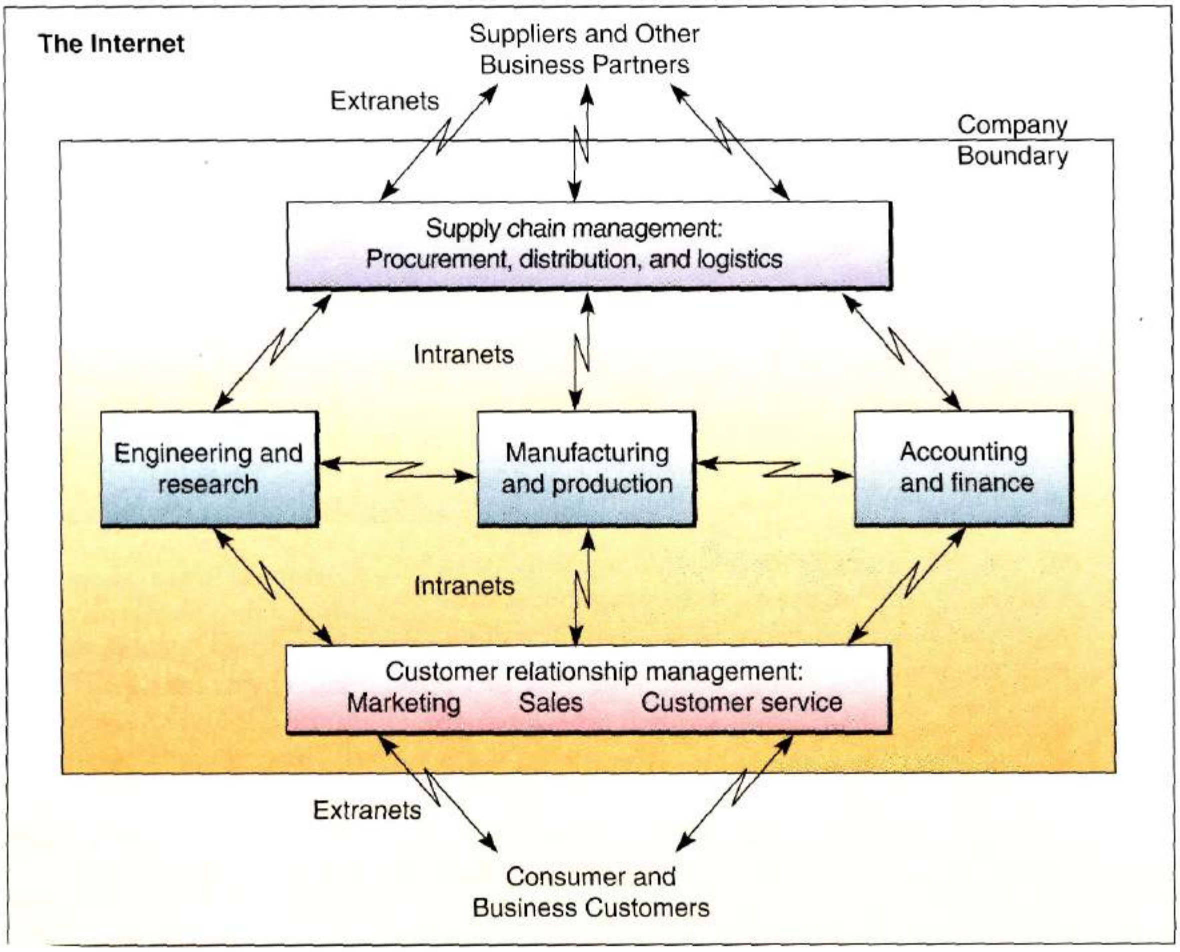
IS can simply be defined as input -> process -> information. IS takes data as input and processes them and generate information.

Managers can use this information for the betterment of their organizations. e.g. IS can analyze existing historical data about customers in bank and generate information like good customers, bad customers etc.

Managers can use this information while deciding to provide loan for new customers. IS helps manager to conduct their daily activities and functions properly e.g. in bank different activities like account creating, withdrawal of money, statement generation etc take place.

IS help mangers to conduct such activities accurately and timely manner with the help of software.

IS can give strategic information like which items to launch in which location by analyzing data collected from different sources such that company can have advantage by using these information over their competitors.



Framework of an electronic business

E-business is a term used to describe businesses run on the Internet, or utilizing Internet technologies to improve the productivity or profitability of a business. In a more general sense, the term may be used to describe any form of electronic business - that is to say, any business which utilizes a computer.

This usage is somewhat archaic, however, and in most contexts e-business refers exclusively to Internet businesses. The most common implementation of e-business is as an additional, or in some cases primary, storefront.

By selling products and services online, an e-business is able to reach a much wider consumer base than any traditional brick-and-mortar store could ever hope for. This function of e- business is referred to as e-commerce, and the terms are occasionally used interchangeably.

An e-business may also use the Internet to acquire wholesale products or supplies for in-house production. This facet of e-business is sometimes referred to as e-procurement, and may offer businesses the opportunity to cut their costs dramatically. Even many e-businesses which operate without an electronic storefront now use e-procurement as a way to better track and manage their purchasing.

Case study Julia Photography's e-business scope

Does having a webpage/e-business give you an advantage over competitors in your industry? Is it possible to do online marketing yourself? Julia is a great photographer who uses her website to display her portfolio and attract new clients to her small business.

This e-business case study tells the story of how Julia, with no formal training, developed a top notch website for her business. When she moved to a new city, she needed to build a new client base from scratch.

Julia's Project

When Julia started her project, she was familiar with computer software that was mainly dedicated to editing photographs but had little experience with web development or design. With a little guidance from her brother and online tutorials, Julia learned how to use Adobe Golive for creating webpages.

After three or four months of going through online tutorials, experimenting, and learning how to make websites, Julia had a website that she felt would help her display her portfolio and attract new clients.

A New Perspective

In June 2005 Julia learned about e-business Connection and decided to go for a one-on-one consultation with an e-business consultant. Julia came out of the consultation with several ideas on how to improve her website.

She then began an overhaul of her website which concluded in October of 2005 with a general goal of improved usability and consistency.

Lessons to be Learned

Julia has learned a lot while developing a website for her business and has some advice she would like to share with other small business owners. First of all, do the research! When it comes to choosing a service provider, such as a hosting company, it is important to shop around and make an educated decision.

She encourages considering a company's record of customer service and not just price. Working with a company that provides decent and timely answers to questions is essential to anyone who is learning while they develop their website.

Second, be patient when it comes to developing effective skills. It is not possible for one to produce a professional looking website over a couple of weekends. It will take a few months of experimenting during the limited time that one have for this project until one come up with something passable.

Finally, learn from mistakes! Like most small business owners, Julia has made her fair share of mistakes. As in anything else, mistakes can be the best lessons in the world of website development.

Success

Julia's website had been up and running for a little over three years. And she says it has been a worthwhile endeavor. Potential clients want to see her previous work before hiring her and her website provides easy access to her portfolio.

Whether referrals come from past clients or from giving out her business card, people always go to her website to check her out before contacting her for business.

In an industry where all of her competition is also going online, her website establishes legitimacy. Any large business worth a grain of salt has a website and consumers are beginning to expect that kind of accessibility from all legitimate businesses.

Julia also uses the internet to check out her competition, research future sites for photo shoots, and learn about new trends in the industry.

To analyze traffic on her website, Julia uses her website server logs and free services like Google Analytics. These statistics give Julia an idea of how many people are viewing her portfolio, what particular services are generating the most interest and what areas her clients are coming from.

There are many different benefits of E-commerce and E-business. Some of the benefits of E-commerce include purchases can be made 24 hours a day and 7 days a week, making it available to every place in the world, at any time.

Other benefits of e-commerce include a larger marketplace, more secure then using cheques, can increase you sales potential, leads to increased productivity.

Benefits of e-business include improved speed of response, cost savings, reduced in inventory, better transfer of best practices, and improved customer service. These are all benefits and advantages of e-commerce and e-Business.

Advantages

- With the use of e-commerce you can promote your product globally.
- Reduces Time and money spent
- Gives a competitive advantages
- Removes Location and availability restrictions

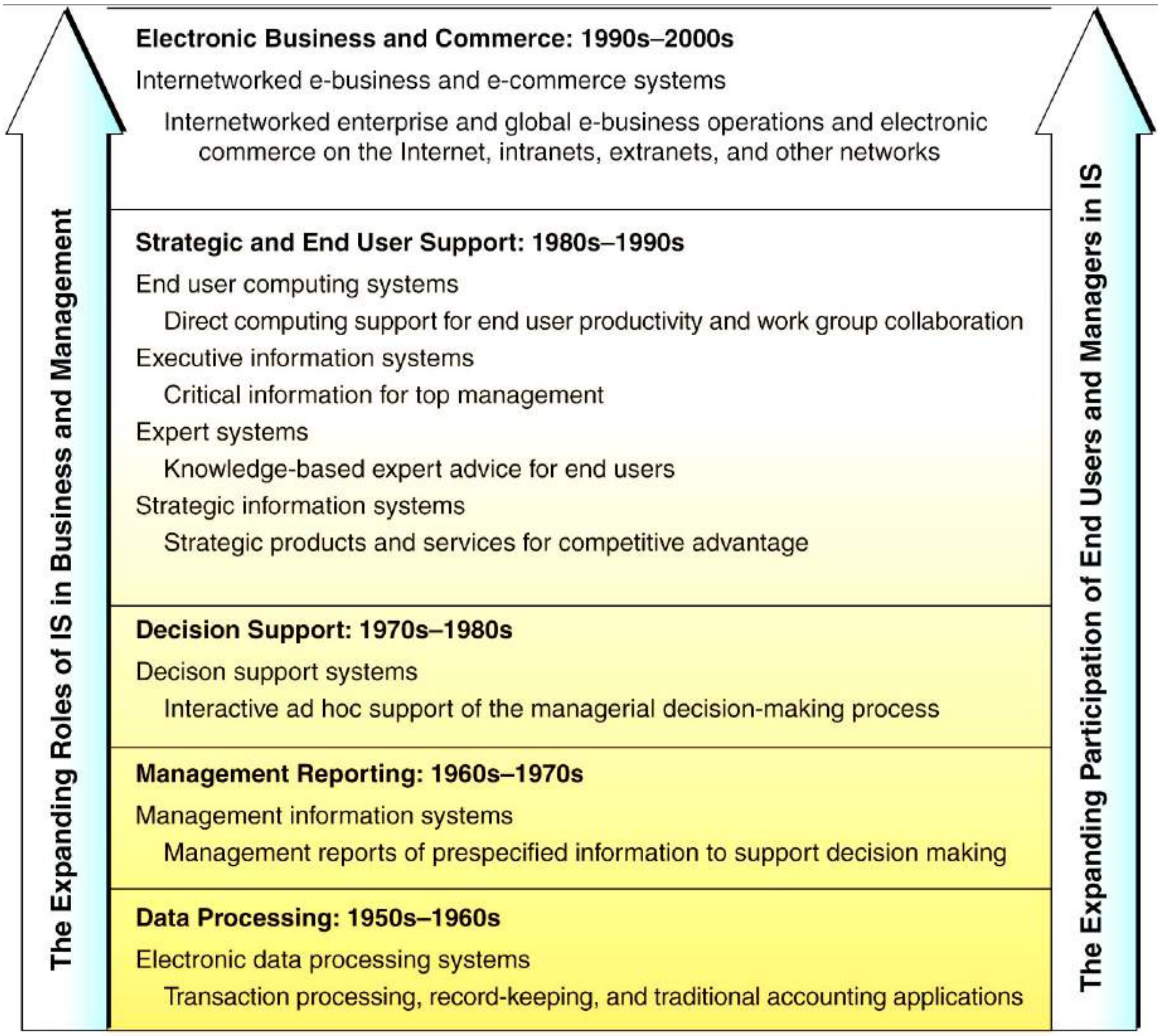
Disadvantages

- Security - there are still some people who don't think it is safe to buy on- line
- You may not receive what you believe you have purchased.
- Things such as viruses could mean losing the site or affecting your customers computers while on your website.

Trends in Information Systems

The roles given to the information systems function have expanded significantly over the years, as described as a timeline in Figure.

The following section explains each of these trends and their roles in organizations.



Trends in Information Systems

Data Processing

Electronic data processing systems Role Transaction processing, record keeping, and accounting and other electronic data processing (EDP) applications1960s - 1970s.

Management Reporting – Management information systems

Role

Providing managerial end users with predefined management reports that would give managers the information they needed for decision-making purposes.1970s - 1980s.

Decision Support - Decision Support Systems

Role

The new role for information systems was to provide managerial end users with ad hoc support of their decision-making process.

This support would be tailored to the unique decision-making styles of managers as they confronted specific types of problems in the real world during 1980s - 1990s.

Strategic and End User Support

Role

End users could use their own computing resources to support their job requirements instead of waiting for the indirect support of corporate information services departments.

- End User Computing Systems

  Role

  Direct computing support for end user productivity and work group collaboration.

- Executive Information Systems (EIS)

  Role

  These information systems attempt to give top executives an easy way to get the critical information they want, when they want it, tailored to the formats they prefer.

- Expert Systems (ES) and other Knowledge-Based Systems

  Role

  Expert systems can serve as consultants to users by providing expert advice in limited subject areas.

- Strategic Information Systems (SIS)

  Role

  Information technology becomes an integral component of business processes, products, and services that help a company gain a competitive advantage in the global marketplace during 1990s – 2000s.

- Electronic business and commerce systems

  Role

  The rapid growth of the Internet, intranets, extranets, and other interconnected global networks has revolutionizing the operations and management of today's business enterprises.

Current Trends in E-Business

E-business is more than a smart web presence or a slick, flash-driven shopping cart. This is a critical emergence of business worldwide, with many technologies entering the enterprise computing eco-system. With an astounding hype over internet business scope, droves of large and medium enterprises across the world realized woefully late the immaturity and driving need for a sensible strategy deployment. But now, they have realized that for enduring competitive advantage, e-business initiatives have to cohere strongly with the overall business strategy and be driven by distinct set of objectives and measurement criteria. It is now that businesses are turning to enterprise eBusiness to enhance value for customers and increase operational efficiencies. E-business's perspective of extending business performance on a transparent, distributed and high-speed platform like internet is today strongly established, fortunately.

It is important to understand that e-business does not claim primacy over the overall business strategy; in fact, it is a highly exciting corollary to it. There are several critical imperatives that drive the success of the e-business paradigm growth of productivity, customer centricity, disintegration of organizational boundaries and velocity, with a delicate balance between the inward and outward orientation of the fundamental business processes and transactions.

It involves a deep strike at the traditional foundation of business organization, by demanding a reordering of process flow, supply and delivery chains for maximum flexibility.

It aims to

Provide the latest service and product intelligence and insight to enterprises as they choose

Knit strongly together - customers, partners, suppliers, employees

Deliver reliability and tremendous enhancements in enterprise computing for employees

Offer ground-breaking communication and collaboration potential for global commerce networks

Reduce expenditures and elevate margins, thus profitability

E-business impacts almost all salient parts of an enterprise in a significant, transformational way - ranging from internal business systems like CRM (customer relationship management), ERP (Enterprise Resource Planning), EIP (enterprise information portal), KM (Knowledge Management), workflow & document systems, process control and internal transaction processing.

Enterprise collaboration and communication undergo tremendous progress with e-mail, voice mail, discussion forums, chat systems, data conferencing – especially collaborative work systems.

With an extended scope like never before, enterprises can extend this new computing and communication power to all, or limited/ designated user groups as they choose, for electronic commerce and transaction processing.

In order to be successful, enterprise e-business applications must support all product types, channel partners, customers, and selling processes seamlessly. Only then customers, employees, partners and suppliers stand to gain.

Priorities

The key to success, in implementing a crucial initiative like e-business development, is to aim for the maximum business value with the minimum cost.

Informed enterprise IT managers need to realize the criticality of this effort and must align application development and operations primarily with the needs and priorities of the business.

Role of Enterprise IT Managers

They must seek augmented effectiveness and risk mitigation in new project and application technology delivery to the enterprise business goals. This demands control over complexities – in changing business landscape, application environments, project management etc. They would do well to establish and focus on certain important parameters driving the e-business priorities in the enterprise like business impact, business urgency, technical complexity, efficiency planning, change management and organizational readiness.

They must note the user experience and techno graphical issues to manage since most enterprise end users have no knowledge of basic information access techniques, leave alone proximity with the advanced, web-based technologies. They need to be responsible for tactical maintenance of systems and initiatives, monitoring the key metrics, and effecting changes to meet business needs as they arise. They need to contribute strategically to the future roadmap of the enterprise computing landscape

Whether it is B2C (business to consumers), B2B (business to business), or traditional back-end support, e-business applications are proving their effectiveness in analyzing business conditions, streamlining operations, fostering customer relations and predicting business outcomes.

Major aspects taking the technology landscape by storm are application servers, advanced content management systems, and enterprise integration projects, aided hugely by open source frameworks. As e-business has taken hold of imagination across the enterprise world, there is a rapid evolution underway in the different associated domains and technologies.

Key technology focus areas today include

Portals - standard browser-based vehicles to deliver critical enterprise information.

Wireless - Full-time access to production business systems for mobile employees and customers.

Web Services - integrating enterprise systems for advanced mobility for the enterprise Collaboration

Development and consulting partnerships that straddle business insight and technology domains will deliver the right results for any forward looking enterprise about to embark on the challenge of implementing the e-business paradigm in its enterprise operations.

Aligns the project milestones with the business goals – giving optimal business value

Integrates technology progress with organizational operations – for better information effectiveness

Manages the entire project – conception through maintenance – providing lowered risk, rationalized costs and minimal complications

Such crucial enterprise computing initiatives will approach success only when strong partnering and communication are ensured between the business and IT constituents in this incidental eco-system.

Types of Information Systems

As discussed already, an *information system* is a collection of hardware, software, data, people and procedures that are designed to generate information that supports the day-to-day, short-range, and long-range activities of users in an organization.

Information systems generally are classified into five categories office information systems, transaction processing systems, management information systems, decision support systems, and expert systems. The following sections present each of these information systems.

1. Office Information Systems (OIS)

An *office information system* is an information system that uses hardware, software and networks to enhance work flow and facilitate communications among employees. Win an office information system, also described as office automation; employees perform tasks electronically using computers and other electronic devices, instead of manually. With an office information system, for example, a registration department might post the class schedule on the Internet and e-mail students when the schedule is updated. In a manual system, the registration department would photocopy the schedule and mail it to each student's house.

An office information system supports a range of business office activities such as creating and distributing graphics and/or documents, sending messages, scheduling, and accounting. All levels of users from executive management to non-management employees utilize and benefit from the features of an OIS.

The software an office information system uses to support these activities include word processing, spreadsheets, databases, presentation graphics, e-mail, Web browsers, Web page authoring, personal information management, and groupware. Office information systems use communications technology such as voice mail, facsimile (fax), videoconferencing, and electronic data interchange (EDI) for the electronic exchange of text, graphics, audio, and video. An office information system also uses a variety of hardware, including computers equipped with modems, video cameras, speakers, and microphones; scanners; and fax machines.

2. Transaction Processing Systems (TPS)

A *transaction processing system* is an information system that captures and processes data generated during an organization's day-to-day transactions. A transaction is a business activity such as a deposit, payment, order or reservation.

Clerical staff typically performs the activities associated with transaction processing, which include the following

1. Recording a business activity such as a student's registration, a customer order, an employee's timecard or a client's payment.
2. Confirming an action or triggering a response, such as printing a student's schedule, sending a thank-you note to a customer, generating an employee's paycheck or issuing a receipt to a client.
3. Maintaining data, which involves adding new data, changing existing data, or removing unwanted data.

Transaction processing systems (TPS) were among the first computerized systems developed to process business data – a function originally called data processing. Usually, the TPS computerized an existing manual system to allow for faster processing, reduced clerical costs and improved customer service.

The first transaction processing systems usually used batch processing. With batch processing, transaction data is collected over a period of time and all transactions are processed later, as a group. As computers became more powerful, system developers built online transaction processing systems. With *online transaction processing* **(OLTP)** the computer processes transactions as they are entered.

Today, most transaction processing systems use online transaction processing. Some routine processing tasks such as calculating paychecks or printing invoices, however, are performed more effectively on a batch basis. For these activities, many organizations still use batch processing techniques.

3. Management Information Systems (MIS)

While computers were ideal for routine transaction processing, managers soon realized that the computers' capability of performing rapid calculations and data comparisons could produce meaningful information for management.

Management information systems thus evolved out of transaction processing systems. They generate accurate, timely and organized information so managers and other users can make decisions, solve problems, supervise activities, and track progress. Because it generates reports on a regular basis, a management information system sometimes is called a *management reporting system* (MRS).

Management information systems often are integrated with transaction processing systems. To process a sales order, for example, the transaction processing system records the sale, updates the customer's account balance, and makes a deduction from inventory.

Using this information, the related management information system can produce reports that recap daily sales activities; list customers with past due account balances; graph slow or fast selling products; and highlight inventory items that need reordering. A management information system focuses on generating information that management and other users need to perform their jobs.

An MIS generates three basic types of information detailed, summary and exception. *Detailed information* typically confirms transaction processing activities. A

Detailed Order Report is an example of a detail report. *Summary information* consolidates data into a format that an individual can review quickly and easily. To help synopsize information, a summary report typically contains totals, tables, or graphs. An Inventory Summary Report is an example of a *summary report*.

Exception information filters data to report information that is outside of a normal condition. These conditions, called the exception criteria, define the range of what is considered normal activity or status. An example of an exception report is an Inventory Exception Report that notifies the purchasing department of items it needs to reorder. Exception reports help managers save time because they do not have to search through a detailed report for exceptions. Instead, an exception report brings exceptions to the manager's attention in an easily identifiable form. Exception reports thus help them focus on situations that require immediate decisions or actions.

4. Decision Support Systems (DSS)

A *decision support system* is an information system designed to help users reach a decision when a decision-making situation arises. A variety of DSSs exist to help with a range of decisions as shown in Figure

Types of Decision Support Systems

Transaction processing and management information systems provide information on a regular basis. Frequently, however, users need information not provided in these reports to help them make decisions. A sales manager, for example, might need to determine how high to set yearly sales quotas based on increased sales and lowered product costs. Decision support systems help provide information to support such decisions.

A decision support system uses data from internal and/or external sources. *Internal sources* of data might include sales, manufacturing, inventory, or financial data from an organization's database. Data from *external sources* could include interest rates, population trends, and costs of new housing construction or raw material pricing. Users of a DSS, often managers, can manipulate the data used in the DSS to help with decisions.

Some decision support systems include query language, statistical analysis capabilities, spreadsheets, and graphics that help you extract data and evaluate the results. Some decision support systems also include capabilities that allow to create a model of the factors affecting a decision. A simple model for determining the best product price, for example, would include factors for the expected sales volume at each price level. With the model, one can ask what-if questions by changing one or more of the factors and viewing the projected results. Many people use application software packages to perform DSS functions.

A special type of DSS, called an *executive information system* **(EIS)**, is designed to support the information needs of executive management. Information in an EIS is presented in charts and tables that show trends, ratios, and other managerial statistics.

Because executives usually focus on strategic issues, EISs rely on external data sources such as the Internet. These external data sources can provide current information on interest rates, commodity prices, and other leading economic indicators.

To store all the necessary decision-making data, DSSs or EISs often use extremely large databases, called data warehouses. A *data warehouse* stores and manages the data required to analyze historical and current business circumstances.

5. Expert Systems

An *expert system* is an information system that captures and stores the knowledge of human experts and then imitates human reasoning and decision- making processes for those who have less expertise. Expert systems are composed of two main components a knowledge base and inference rules. A *knowledge base* is the combined subject knowledge and experiences of the human experts.

The *inference rules* are a set of logical judgments applied to the knowledge base each time a user describes a situation to the expert system. *Integrated Information Systems* With today's sophisticated hardware, software and communications technologies, it is often difficult to classify a system as belonging uniquely to one of the five information system types discussed. Much of today's application software supports transaction processing and generates management information. Other applications provide transaction processing, management information, and decision support. Although expert systems still operate primarily as separate systems, organizations increasingly are consolidating their information needs into a single, integrated information system.

The key to gaining strategic advantages from IT lies in understanding the process of installing, implementing, adapting and managing a strategic information system. But there is growing literature and many case studies on why companies fail to strategically manage their information technology. Two main streams have emerged. The first suggests that top managers misunderstand IT and its strategic significance, mainly through neglect, fear of new technologies, and the wide spread practice of delegating unpleasant tasks. Prescriptions abound. Some suggest that a well-managed company will also generate strategic management of IT. Others have surveyed senior managers and found little enthusiasm for computers and other recent technologies on their desks, or in their decision processes. Hence, they recommend improved communications with the automation specialists in the company - to enhance learning and to allay managers' inherent discomforts.

The second stream encompasses managerial systems tailored to the perceived tasks and needs of senior executives. Such systems include all "executive" brands of information systems, expert systems and decision support systems. The main idea is to enroll the best available and most recent automation technology in the service of the executive's key functions, such as decision making. The results of these prescriptions and "support" systems are added confusion and an even stronger resistance on the part of senior managers to engage IT for strategic purposes.

The problem is essentially in the process, not solely in the perspective of senior management nor in their ability or inability to cope with recent technology. The advent of a new generation of senior managers better skilled in current technology by no means assures an improved strategic approach to IT and MIS. Senior managers make basic decisions which determine, first, what the strategically and competitively important information systems are for the company. Thus, they set the overall direction and the key criteria for the acquisition of information systems and information technology.

Second, senior managers decide on the specific objectives of any given system (usually per recommendations of the systems professionals in the MIS function). Once this is established, the organizational factors, the systems design, and the technological choices will follow and most probably will be delegated to lower echelons and to varied functions in the company. However, although senior managers have had a key role in determining the information systems to be selected, purchased and established in the firm, their impact on the subsequent process of managing the routine operations of the systems is greatly diminished.

IT is essentially managed by the information systems professionals in the company. Further, IT is embedded in almost all functions and activities of the corporation, dispersed and diluted at all levels and departments. In addition, benefits accrued to the company from the usage of IT manifest themselves in improvements in the information system of the corporation and in its MIS, and are not directly measurable at the corporate/strategic level.

Therefore, to strategically manage IT, senior managers need to understand the diffusion of the technology and its role in information gathering, processing, and transfer - at all levels and through the services of IS/MIS. Information technology is too important to be left to the sole discretion of information professionals.

In the field of business decision support, more and more recent research has been concentrating on the human side of the person-technology relation in decision making. It has been shown in a variety of works that business decision making environment is a unity of decision makers' experience, beliefs and perceptions on one side, and decision support tools and techniques – on the other side.

The information environment surrounding business activities and decisions is getting increasingly complex due to growing volumes of information of potential relevance to certain business activities; increasing number of sources of such information; and multiplying technologies for accessing and handling data and information. The expected role of information technologies (IT) is to filter and direct relevant information flows and to provide reliable and flexible support.

At the same time, every case of decision making for a problem situation tests the existing support mechanisms and provides valuable information for future situations, thus creating new knowledge and experience for participants involved, and in the case of right decision increasing confidence in future actions.

Summing up recent research work on the human side of IT management decision support, there seems to be agreement that IT should act as

An enhancing instrument for decision search and analysis as a high-level and knowledge-intensive management activities,

A creativity stimulation and managerial learning tool,

An instrument for reduction of biased attitudes as well as insurance from making fatal decisions,

An instrument for maintaining, managing and developing the explicit part of knowledge on decision making – models, situations, scenarios, case studies etc.

These guidelines have served as a basis for conducting the interviews whose results are presented further.

Decision-Making Environment

In making important decisions, any information sources that contain relevant important information are going to be accessed and used, if possible. As pointed out in, the decision maker uses the whole network of information sources and variety of available media.

In most cases it is impossible to access or produce all required information, so decisions are made under circumstances of uncertainty and incomplete information. Business decision support seems to have common ground with other areas containing significant analytical work scientific research, military and political intelligence, or criminal investigation– in all cases, there are

A problem situation which requires analysis in line with general strategy and goals.

Assumptions,

Deficit of information (and time in many cases), and

Certain (usually big) amounts of diverse empiric data which is chaotic in its nature

Has to be processed in some way for relevant facts and findings

Field knowledge is required to extract these facts and findings,

The calculated facts and findings are carefully evaluated against wider context - Political, social, ethical etc.

Growing IT support.

Apart from needs for data and information and their availability, knowledge possessed or required by the decision making subject is an important part of the decision environment.

The most common understanding of relations between data, information and knowledge is Data → Information → Knowledge. In other words, data is processed into information, which is evaluated against existing knowledge or stimulates creation of new knowledge in a sense that missing links in the decision model are produced and put in place.

There is existing recent research suggesting looking at other relations or sequence chains between data, information and knowledge with the idea that better understanding of these sequences might help producing better support for problem situations. A few examples

Knowledge → Information → Data

This sequence might be based on having the knowledge to look for information and then turn it into data. For instance, in a problem situation general and professional knowledge can point to what information is needed to make the right decision, what information is readily available, and what information must be produced from some sources. This information is then worked into decision data – prices to be set, planned investment, resource distribution and redistribution, budget structure and so on.

Data → Knowledge → Information

Knowledge is required to process data into information. Another possible case the content of data suggests ways (or produces new knowledge) to extract information out of this data, e.g., group or query the data by some criteria which carry business logic or other rationale.

Information → Knowledge → Data

Knowledge is required to get data from information, where data amounts to final decision criteria buy – don't buy; accept proposal – reject proposal; set the price etc.

From the need for simple outcome the situation can be worked backwards to track what information would be needed to, for instance, estimate the price, and what knowledge precedes the definition of this information, its sources, completeness, Such decision disassembly might help to explain better what exactly should be supported and how to do it best.

Knowledge → Data → Information

Probably this path is possible only conditionally if we admit that having knowledge we know where to look for data to produce required information.

Information → Data → Knowledge

The final phase of a decision where decision information is processed and discussed into a decision which might be in a form of data – a simple figure, a set of figures, text, choice, but it carries the load of preceding decision information, concepts and models, and its emergence leads to new knowledge added to existing body.

To clarify the issues of management decision support in the two dimensions of "how much coverage" (that is, how many decision support functions and activities use or benefit from IT), and "in what way" (the actual manner of use, as compared to the research forecasts), the following topics are to be considered

1) Attributes of actual good or well-prepared decision,
2) Attributes of actual wrong decisions,
3) Role of information sources for the above,
4) Role of analytical tools for the above,
5) Issues that stimulate creative thinking,
6) Role of IT in decision making,
7) Decision maker's idea of an ideal environment for decision making.

On the attributes of actual good or well-prepared decision, the issues are

(a) Key factual information presented or available (This information has to possess the features attributed to user quality timely and current, correct, complete, relevant, accurate, easy to use etc.),

(b) 'Soft' information available and utilized for clear understanding of the present and future environment. The most important points regarding 'soft' information can be summarized as

Filtering

Filtering the decision maker selects the most important and reliable information of this type;

Transformation

Transformation the decision maker transforms soft information into hard data and rules by own judgment, or by the existing rules (e.g., laws and other legal acts which can govern translation of "soft" information into "hard" data);

Integration

Integration the decision maker compares one available information against other, looking for matching pieces, confirmations or denials;

Testing

Testing received "soft" information helps to challenge formal information or come back to the formal model with new assumptions;

Stimulation

Stimulation received "soft" information may stimulate Clear alternatives.

Analytical tools have capabilities of different scenarios or "what-if" analysis. Here "analytical tools" have meant any formal methods, approaches, models and their software, if used, to be applied to solve a decision problem.

- *Existence* of an analytical tool that is problem- specific or suitable for the required kind of problem; also its 'reputation', meaning that this tool has been used and accepted by solvers of similar problems;
- *Convenience* of use, when an analytical tool can be used without specific training or considerable consulting services;
- *Clear relations* between data describing the problem situation;
- *Ability to reduce information chaos* to a manageable set of key data or introduce required relations between data in problem environment.

Attributes of actual wrong decisions include

(a) Too much of self-confidence, which can be translated into conscious use of limited problem model, and

(b) Serious external factors omitted such as

Low quality advice from outside advisers;

Wrong "soft" information which was supposed to be trusted;

Mis-formulated problem – a symptom mistaken for a problem;

Not using information, tacit and explicit, to make an informed decision.

The named factors of wrong decisions might be grouped into two general groups

Information Factors

- Lack or misuse of important information about the problem situation;

Political Factors

- Override of formal reasoning by power. Here, it has to be noted that the political factors are assumed to be as well based on some specific information available to deciding authority, but most often unavailable to the participants involved in the formal reasoning.

Role of information sources for both right and wrong decisions has drawn quite uniform responses from the responders in stating that information sources, their variety, quality and ease of access is most important for producing quality decisions. Regarding the role of IT, the importance of internal and external IT- supported sources (own, public and commercial databases, Internet etc.) has been facilitated by improving user interfaces and convenient mechanisms for information search and querying.

The important point here is that growth of information volumes available does not go in hand with the growth of quality sources, and it does not necessarily lead to the growth of the body of knowledge. Decisions also have been influenced by the mechanisms for information and knowledge sharing, and for capturing experiences.

Role of analytical tools (modeling software packages and functions) has been indicated as being minor to moderate. This attitude can be attributed to the following factors

Problem-specific nature of the analytical tools; decision making style based on the use of

Decision information in its initial, unprocessed form; quite often for a decision-making entity the sheer availability of the relevant facts and figures having undergone simple, if none, processing and aggregation is considered sufficient.

Factors Stimulating Creative Thinking

Although widely regarded as one of the key ingredients for making a right decision in an unstructured situation, creativity has been one of the most difficult things to talk about. Generally, "creativity" has been regarded by most as an approach which allows them to find alternatives or courses of action that are outside conventional reasoning for a certain situation.

The factors that stimulate creativity in decision making can be grouped into three groups described below.

1) *Independent view,*

2) *Decision manipulation tools and techniques, and*

3) *Underlying environment*

Conclusions

The role of IT draws a slightly controversial impression at first sight – the confidence and expectations are high, and the actual usage at the same time is somewhat reserved. Eventually, the conclusion is that decision makers prefer simple and trusted tools and techniques to achieve more with less – the job of the technology is to provide guiding and informing points to stimulate the decision makers' concentration instead of interfering with it.

IT is recognized to be helpful in basic tasks – organizing and managing data and information, querying databases, sharing and propagating information, manipulating flexible models, presenting information in a convincing manner. Regarding the simple support tools and techniques, and decision makers' ideas on the ideal decision environment, a concept of "information control center" can be developed for a decision making environment, where the key information sources and most often used support tools are always up and accessible just by few mouse clicks.

The possibilities of IT in facilitating problem solving creativity are an important issue in itself; here the technology has some proven points – idea generation, exchange and testing mechanisms; growing sophistication of work styles; support of teamwork and communication.

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Lesson 1.2 - Competing with Information Technology (IT)

The objectives of this lesson are to

- Highlight the increasingly important role of IT in organizations
- Illustrate how IT may be harnessed for strategic purposes
- Explain how IT enables value creation, delivery and sustenance in the value chain of a business

In this chapter we will discuss the following

- Strategic uses of IT
- The value chain and IT
- Basics of business on Internet

Fundamentals of Strategic Advantage

Information systems must be viewed as more than a set of technologies that support efficient business operations, workgroup and enterprise collaboration, or effective business decision-making. Information technology can change the way businesses compete.

For this reason, one should view information systems strategically, that is, as vital competitive networks, as a means of organizational renewal, and as a necessary investment in technologies that help a company adopt strategies and business processes that enable it to reengineer or reinvent itself in order to survive and succeed in today's dynamic e-business environment.

Competitive Strategy Concepts

The strategic role of information systems involves using information technology to develop products, services, and capabilities that give company major advantages over the competitive forces it faces in the global marketplace.

This creates strategic information systems, information systems that support or shape the competitive position and strategies of an e-business enterprise. So a strategic information system can be any kind of information system (TPS, MIS, DSS, etc.) that helps an organization

- Gain a competitive advantage
- Reduce a competitive disadvantage
- Meet other strategic enterprise objective

Strategic uses of IT

How can the preceding competitive strategy concepts be applied to the strategic role of information systems?

Information technology can be used to implement a variety of competitive strategies. These include the five basic competitive strategies (differentiation, cost, innovation, growth, and alliance), as well as other ways that companies can use information systems strategically to gain a competitive edge. For example

- Lower Costs
- Differentiate
- Innovate
- Promote Growth
- Develop Alliances

Several key strategies that are implemented with information technology include

- Locking in Customers or Suppliers
    - Building valuable relationships with customers and suppliers, which deter them from abandoning a firm for its competitors or intimidating it into accepting less profitable relationships.
- Building Switching Costs
    - The costs in time, money, effort, and inconvenience that it would take a customer or supplier to switch its business to a firm's competitors.

- Raising Barriers to Entry

  - Technological, financial, or legal requirements that deter firms from entering an industry.

- Leveraging Investment in Information Technology

  - Developing new products and services that would not be possible without a strong IT capability

Globalization

IT has not only brought the world closer together, but it has allowed the world's economy to become a single interdependent system. This means that we can not only share information quickly and efficiently, but we can also bring down barriers of linguistic and geographic boundaries.

The world has developed into a global village due to the help of information technology allowing countries like Chile and Japan who are not only separated by distance but also by language to shares ideas and information with each other.

Communication

With the help of information technology, communication has also become cheaper, quicker, and more efficient. We can now communicate with anyone around the globe by simply text messaging them or sending them an email for an almost instantaneous response.

The internet has also opened up face to face direct communication from different parts of the world thanks to the helps of video conferencing.

Cost Effectiveness

Information technology has helped to computerize the business process thus streamlining businesses to make them extremely cost effective money making machines. This in turn increases productivity which ultimately gives rise to profits that means better pay and less strenuous working conditions.

Bridging the Cultural Gap

Information technology has helped to bridge the cultural gap by helping people from different cultures to communicate with one another, and allow for the exchange of views and ideas, thus increasing awareness and reducing prejudice.

Competing with Information Technology

Information technologies can support many competitive strategies. They can help a business cut costs, differentiate and innovate in its products and services, promote growth, develop alliances, lock in customers and suppliers, create switching costs, raise barriers to entry, and leverage its investment in IT resources.

Thus, information technology can help a business gain a competitive advantage in its relationships with customers, suppliers, competitors, new entrants, and producers of substitute products. The following are specific ways in which businesses can compete using IT

Building a Customer-Focused Business

A key strategic use of Internet technologies is to build a company that develops its business value by making customer value its strategic focus. Customer-focused companies use Internet, intranet, and extranet e- commerce websites and services to keep track of their customers' preferences; supply products, services, and information anytime, anywhere; and provide services tailored to the individual needs of their customers.

Reengineering Business Processes

Business process reengineering **(BPR)** is, in computer science and management, an approach aiming at improvements by means of elevating efficiency and effectiveness of the business process that exist within and across organizations.

The key to BPR is for organizations to look at their business processes from a "clean slate" perspective and determine how they can best construct these processes to improve how they conduct business.

Business process reengineering is also known as BPR, Business Process Redesign, Business Transformation, or Business Process Change Management. It is the radical redesign of an organization's processes, especially its business processes.

Rather than organizing a firm into functional specialties (like production, accounting, marketing, etc.) and considering the tasks that each function performs; complete processes from materials acquisition, to production, to marketing and distribution should be considered.

The firm should be re-engineered into a series of processes.

The main proponents of re-engineering were Michael Hammer and James A. Champy. In a series of books including *Reengineering the Corporation*, *Reengineering Management*, and *The Agenda*, they argue that far too much time is wasted passing-on tasks from one department to another. They claim that it is far more efficient to appoint a team who are responsible for all the tasks in the process. In *The Agenda* they extend the argument to include suppliers, distributors, and other business partners.

Re-engineering is the basis for many recent developments in management. The cross-functional team, for example, has become popular because of the desire to re-engineer separate functional tasks into complete cross-functional processes.

Also, many recent management information systems developments aim to integrate a wide number of business functions Enterprise resource planning, supply chain management, knowledge management systems, groupware and collaborative systems, Human Resource Management Systems and customer relationship management systems all owe a debt to re- engineering theory.

Information technology is a key ingredient in reengineering business operations by enabling radical changes to business processes that dramatically improve their efficiency and effectiveness. Internet technologies can play a major role in supporting innovative changes in the design of workflows, job requirements, and organizational structures in a company.

Improving Business Quality

Information technology can be used to strategically improve the quality of business performance. In a total quality management approach, IT can support programs of continual improvement in meeting or exceeding customer requirements and expectations about the quality of products, services, customer responsiveness, and other features.

Becoming an Agile Company

A business can use information technology to help it become an agile company. Then it can prosper in rapidly changing markets with broad product ranges and short model lifetimes in which it must process orders in arbitrary lot sizes, and can offer its customers customized products while maintaining high volumes of production. An agile company depends heavily on Internet technologies to help it be responsive to its customers with customized solutions to their needs and corporate with its customers, suppliers, and other businesses to bring products to market as rapidly and cost-effectively as possible.

Creating a Virtual Company

Forming virtual companies has become an important competitive strategy in today's dynamic global markets. Internet and other information technologies play an important role in providing computing and telecommunications resources to support the communications, coordination, and information flows needed. Managers of a virtual company depend on IT to help them manage a network of people, knowledge, financial, and physical resources provided by many business partners to quickly take advantage of rapidly changing market opportunities.

Building a Knowledge-Creating Company

Lasting competitive advantage today can only come from innovative use and management of organizational knowledge by knowledge-creating companies and learning organizations. Internet technologies are widely used in knowledge management systems to support the creation and dissemination of business knowledge and its integration into new products, services, and business processes.

IT and its strategic uses

The success or failure of an organization in today's highly competitive and technological business world depends on how they manage to streamline the flow of information between their departments and outside world. This is where IT comes into action. It deals with the application of technology to automate the flow of information in an organization's information system. The strategic opportunities framework enables executives to identify opportunities for strategic use of IT.

The main areas to be considered to study the effects of IT are

1. Developing an IT strategy Issues like Critical Success Factors, IT planning and manpower are considered. Manpower is very important as it can decide on the Strategy being successful or not.
2. Strategic use of IT
   a. Is IT necessary?
   b. What impact has IT on the Business World?
   c. What opportunities have IT brought into a firm's business area?
   d. Is IT of any worth to the business?

Use of Competitive Strategies

The individual advantages of the firm determine the firm's ability to deal with threats from the market. In other words, how do firms compete?

- Product Differentiation use of innovation to produce different products or services that cannot be easily copied. The firm attempts to develop brand loyalty. This strategy can address threats such as position of competitors and substitutes.
- Focused Differentiation the firm uses a niche strategy, it targets its product for a specific section of the market. It tries to serve the market segment better than the competition. This addresses position of competitors and new entrants.
- Develop tight links to customers and suppliers the firm can try to lock in either suppliers or customers. They try to lock suppliers into a delivery time table and price structure. They also can try to lock buyers into a price structure. The idea is to raise the switching costs of the supplier/buyer or try to lower the bargaining power of the supplier/buyer. This addresses bargaining power threats and position of the competitors.
- Become the Low Cost producer Offer the same quality or level of service as competitors at a lower price. This address the threat of new entrants and the position of the competitors.
- Establish Partnerships participants in partnerships can share costs, benefits and risks. Often this redefines the firms relationship with competitors. This address the position of competitors and the threat of new entrants.

Quality Management

Methods of Quality Control, Audits, different strategies used in TQM (Total quality management) are dealt with in this area. As Quality cannot easily be defined, the study of Quality Control and its upkeep deserve our keen involvement and interest.

IT can be used to develop new products or processes or to improve existing products and processes so as to achieve a competitive edge in the market or to effect significant improvements in internal operations. The natural potential importance of IT for an organization depends upon the information intensity of processes and the information content of the products. The strategic use of IT in an organization is necessary for the bending of the IT strategy into the corporate strategy.

CASE STUDY

Capital One Financial Corporation *Using Information*

Technology for Competitive Advantage (Adapted from MIS by O'Brien)

Capital One Financial Corporation did not become the most profitable credit card company in the United States by accident. They diffuse information technology through all their business strategies and business practices. They call it Information Based Strategy, or IBS.

IBS uses a test-and-learn philosophy to differentiate products and services to target market groups. New product ideas are tested on target populations to analyze their reactions to the product or service.

Data are gathered to identify and target specific consumer groups with specific marketing campaigns. Data are used also to set prices on products and interest rates on services. Successful marketing campaigns are tested for multiplication in different regions of the country.

Costs are lowered and customer service productivity is enhanced by the use of testing and matching customer service or sales representatives with customers whom they are best trained to serve. When a customer calls, their record is plugged into a database to determine what his needs are and the call is then routed to a representative who is most qualified to serve that customer's needs.

Capital One uses a software application called Global Service Logistics (GSL) by Cisco Systems for call routing. This is only one of the applications used to support IBS. The amount of support required for IBS is immense. Capital One has spent hundreds of millions of dollars building and refining systems for IBS and uses the services of over 1000 IT professionals.

Questions to Ponder

1. What is the business model of Capital One Financial corpt?
2. What are the factors leading to the success of Capital One?
3. How does Capital One fit into aggregator model?

Value Chain and strategic Information Technology

A value chain consists of two major types of activities

- Primary activities that create value for customers
- Related support activities

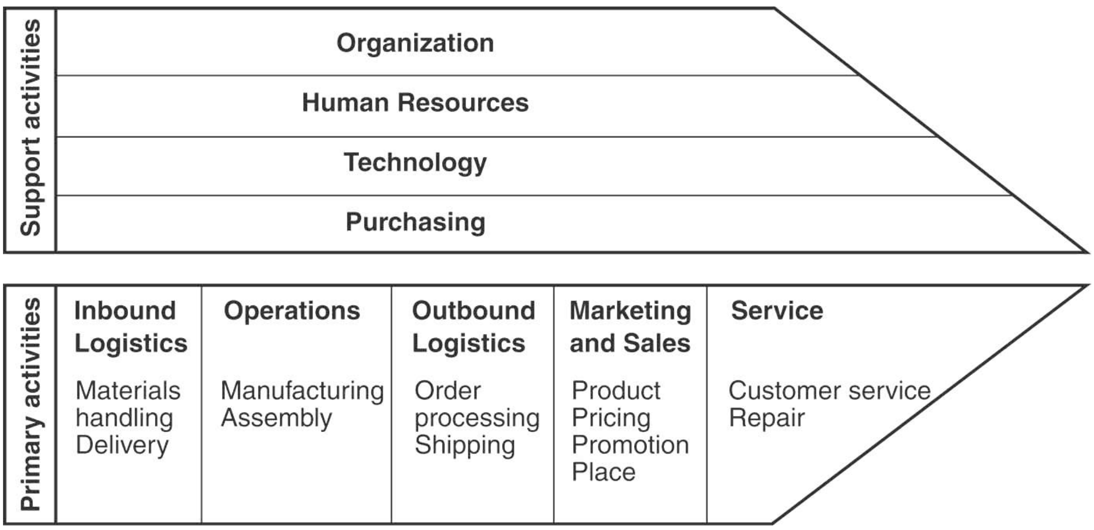


Fig General Value chain of a Firm (Source Michael Porter) Companies today know that competition is increasing and buyers have more power than ever so they recognize the need to achieve a greater advantage in the market. The only way to accomplish this is by adding additional value to their product or service. That's where the value chain comes in.

The value chain idea has been around for nearly 20 years and its basic purpose has been to help companies move closer to an ideal. That ideal is being able to smoothly meet all of their customers expectations by introducing improved products, better customer service, and faster delivery. Unfortunately this ideal has always been nearly impossible to achieve, but the value chain concept allows companies to view their current processes and to determine where value can be added along the chain.

The value chain's bottom line is the need for almost constant analysis. Because the economic conditions are frequently changing, companies need to be able to adapt and to continually re-evaluate their competitive advantage and to learn how to make the most of it in different market situations. Simply maintaining the status quo won't work.

In order to examine the value chain and to determine how best to position a company for success in the market, an organization must look at its functional components the supply chain, its logistics, procurement, product development, and customer order management specifically. In this way, companies can get an idea of what changes to make in order to add value, increase profits, boost revenue, and decrease costs.

One way to add value is through the development of new products. However, companies must be careful in this area. After all, over 60% of firms recognize that correctly determining what their customers want is a major challenge in product development. Companies make mistakes in this area and these types of mistakes can be devastating to a company's profitability.

But today, improved technology makes it easier for businesses to determine what customers want. Firms can actively collect feedback from their clients to determine how they can improve their product catalog. Plus, technology seems to be helping these companies get new products out on the market faster than ever which is also another way of adding value and of pleasing customers.

A second way to add value is through improved procurement strategies. When it costs a company less to purchase the goods and services needed to produce their products, they can charge customers less without affecting their profit margin negatively. Price is, of course, always a major factor in customer satisfaction.

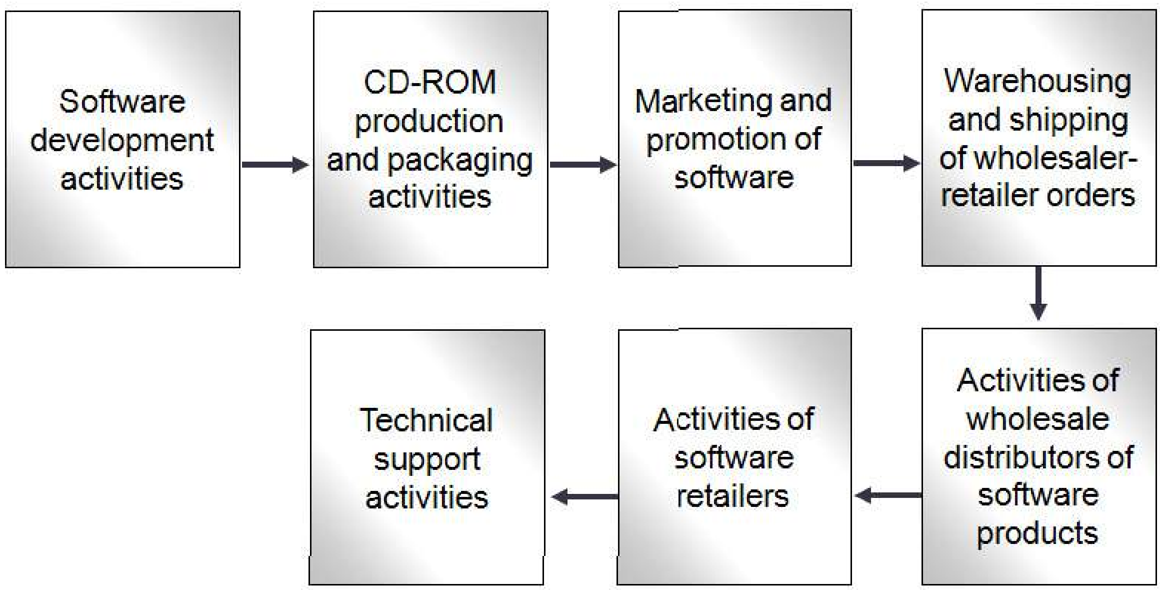
However, companies must be careful when making sources based solely on price. Off shoring may be cheaper initially, but the company must also factor in additional transportation costs and tariffs. Also, the greater distance may increase the lead-time for production. Companies must choose their sourcing partners carefully in order to significantly impact the value chain.

Finally, most of today's companies have already made at least one change in order to meet the demands of their customers. Part of the value chain is logistics and that includes the time a customer's order is delivered.

Shorter delivery times make customers happier; it's that simple. While almost some organizations three years ago took twenty days or more to deliver their goods, today that number has dropped almost in half. Moreover, the number of companies that are able to deliver their products in less than 5 days has increased from just over a third to almost half. Part of these changes can be attributed to better outsourcing choices and a more collaborative approach to logistics.

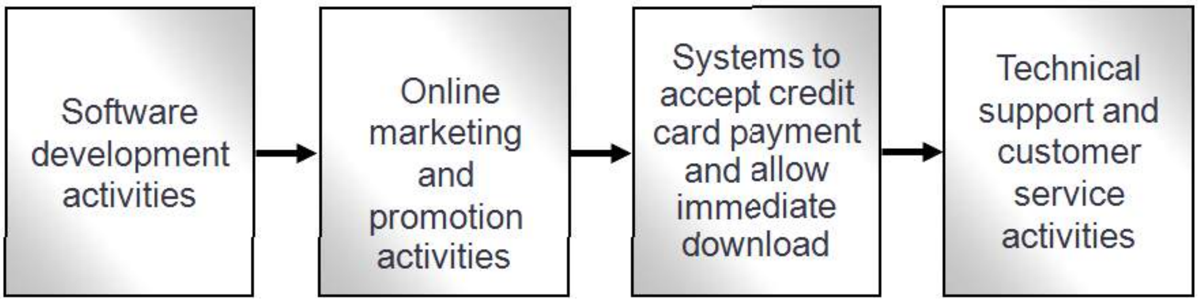
Improvements in delivery time, price, and product line-ups can add significant value to a business's offering and can help them find a true niche in even the most crowded markets. Understanding this fact is the key to success.

The following three figures illustrate how to reconfigure the Value Chain Systems of a software developer to lower costs.



Value Chain System of Software Developers Using Traditional Wholesale-Retail Channels - *Highest Cost*

Value Chain System of Software Developers Using Direct Sales and Physical Delivery of CDs



Value Chain System of Software Developers Using Online Sales and Internet Delivery - *Lowest Cost*

Using IT for strategic advantages

For an organization to improve its business process using technology, an IT department is mandatory for management and support of the infrastructure.

An IT department is required for these areas of technology to provide value to the business, because maintenance tasks must be performed by technically competent staff.

- End-User Technical Support
- Desktop Management
- Network Management
- Voice and Data Communications
- Business Applications
- Strategic Technology Planning
- Project Management

Besides using technology efficiently, an IT department will also provide a business with lower costs, higher productivity and higher efficiency in other areas. The IT department does this by

Minimizing over 85% of down time

Avoids losing revenues

Lost sales from customers being unable to make purchases

Decreases costs

Payroll for employees being idle

Paying a technician to fix the problem

Increases productivity because employees will spend less time idle

Providing a single point of contact for technology issues.

Increases efficiency by assuring that persons handling technology issues are knowledgeable in the area.

Increases productivity by allowing employees to focus on core competencies rather than technology issues.

Technology Planning

- Reduces risk of financial, technological and data losses caused by disasters
- Increases Return On Investment (ROI) and business value realized from technology projects

Improves Equipment Efficiency with Planned Maintenance Activities

Information technology, has changed in many ways how business conduct day today transactions, how they collect knowledge from their industry, how they market their products and moreover how they integrate technology into their business in order to gain the competitive advantage. However there are several critics that claim that Information Technology has not been as revolutionary as once thought. It did not revolutionize the way business is conducted, the basis is still there, and the traditional ways of conducting business are still there. Information technology has revolutionized the way business is conduct, it became more effective, more specific, but it is not radically transformed. Nicholas G. Carr's article on Harvard business review, in 2003, and the later his book Does IT Matter? shed some light onto these issues.

Although technology can be used effectively to provide and advantage over rivals, today it' fails to do so and has become a commodity. All businesses use technology, and spend millions on new IT projects and resources that are not as successful as estimated. Technology, although critical to the success of a business, it is common in all segments and has lost its core function. Services, software and hardware are replicated by suppliers, hampering innovation and decreasing the strategic importance of technology. Carr however does not deny that Information can and has been evidently used to provide the competitive advantage, but notes that it's not what technology a business has in its arsenal but how that technology is used, and integrated into the business processes to create a framework in which IT provides added value to the company's business processes. So it is possible for a company to use information technology to gain the competitive advantage as long as it innovates and embeds information into its business processes and manages information as a corporate asset rather than an external resource. Although information has not changed or revolutionized the way business is conducted, it did however alter the way businesses operate and has transformed enormously, the industry structure. Organizations however have to be careful; the competitive advantage of the first mover is today non-existent, and the sheer number of dot com's signal a very low barriers to entry, thus having new technologies in place, and using e-commerce to lower costs and increase profitability does not create value.

Michael Porter gives five steps to achieving cost leadership

1) Identify the appropriate value chain and assign costs and assets to it.
2) Identify the cost drivers of each value activity and see how they interact.
3) Determine the relative costs of competitors and the sources of cost differences.
4) Develop a strategy to lower relative cost position through controlling cost drivers or reconfiguring the value chain.
5) Test the cost reduction strategy for sustainability.

It is a fact however, that the internet and the general use of internet technologies if used correctly can offer the competitive advantage to companies. Two factors, determine profitability in this case, the effects on industry structure in which competitors function and the sustainable competitive advantage which one company outperforms the other (Porter, 2001).

There are a number of issues however that companies need to take under consideration, especially the effects of technology on the five forces model and the value itself. The effects are both negative and positive, and every decision needs to be measured against these effects. Moreover, the industry is affected by the power of buyers and sellers and the products that are involved. This however shouldn't be a problem, e- Commerce will not change traditional ways of business but it transforms the process that ultimately affects the end result.

Business on Internet

Even if one knows how important it is to market business on the internet, yet don't have thousands of dollars to spend each month, and may not be an expert on Search Engine Optimization or Keyword Advertising, by using consistent, free (or cheap) marketing strategies one can start today to make a difference in the business. The goal of marketing business on the internet is to get consistent traffic to your site from your target market. The three key words to remember about internet marketing are consistent, targeted, and smart.

Consistent marketing practices will help to build a trusted presence on the web, and catch people who visit the same sites regularly. New people are always suspecting, and may not start to get results until've been around long enough for people to trust you.

A targeted strategy will focus on the type of person who is most likely to be interested in product or service.

Smart marketing means using the tools the big kids use. Find out what successful marketers are doing to get such high traffic and do what they do. There is a saying that "It's easier to copy genius than to create mediocrity."

It will take time to create the kind of web presence that will generate consistent traffic (and revenue) for business, but as long as the effort is targeted, consistent, and smart, will attract quality customers without spending thousands of dollars or hundreds of hours of time.

Assume that you already have a website for your business, and a professional email address with a unique URL (not generic like yourname@gmail.com or business@ yahoo.com). If we don't have one yet, can get one free from Google. Next step is getting the business name, image, and content onto the web where your target market will find it and become a customer/client.

There are three main categories of marketing strategies to investigate as when creating a marketing plan Networking, Blogging/Article Writing, and Advertising.

1) Social or Business Networking

Become a part of a networking community where you can build your own profile or web page and interact with others in the community. There are tons of networking sites on the internet, some of which are mostly for socializing about niche topics; others are more focused on doing business. Choose 3-5 networks to join, and make sure all of them are connected to each other, and back to your website. Here are a few to get you started Facebook, Myspace, Squidoo, Twitter, and LinkedIn.

2) Blogging and Article Writing

Every article written for the blog should also be published on the web to as many article directories as possible, with link included in the resource box. The more places link appears on the web, the better. Update the blog frequently, put an RSS (Really Simple Syndication) feed on your website and social networking profiles, and let friends know about it.

Search engines love fresh, new content that matches keywords, so including keywords in the blog content can help searchers find you. For the beginner blogger, Google's BlogSpot is a good way to get started. Wordpress, Squarespace, Typepad, and Thoughts.com all have great templates and can be set up in a day.

3) Advertising using Ad words, keywords, pay-per-click, or traffic exchanges.

A much less personal approach, advertising can give access to a huge number of people for a relatively small cost - and most sites have free trials or sign-up bonuses that can help to create an ad that works before one start paying for it.

Use the same keywords that are on website and blog in advertisements, and search engines will like even more.

Using a few of the services from all three of the above categories in tandem will create a tight web to capture your customers and send them to site.

As long as we update consistently, target campaigns accurately, and be smart about where to spend money and time, see results in a little as a few weeks and secure long- term success.

Here is a list of crucial things before starting one's e-business

What marketing methods must be used to be successful on the internet.

How to suck visitors into the site (and turn those visitors into money into the pocket) without spending a single penny on advertising!

Save time and money. How to easily track all the advertising efforts, and interpret the data gathered to make sure efforts pay off.

How to give you and your business an instant dose of credibility and boost profits by doing one simple thing (and it'll only take a few minutes to do).

Convert more visitors into sales. Discover the little-known secrets of persuading visitors to buy the product**.**

Where to find a hot product to sell

How to start once own newsletter and how to use it to explode profits with only a few minutes of work!

Ways which can increase profits and automate the business (which means less work) at the same time!
Get more people to buy. How to accept credit cards *without* having an expensive merchant account.

Easy ways to create once own e-book, even if don't have a clue about writing.

Increase sales (and cash flow into your bank account).

Why Start a Business on the Internet?

Low start-up costs and very few overhead costs. In the "offline" world, this would likely need thousands of dollars for office space, supplies, inventory, and so on. On the Internet, one can operate with very little money.

For example, monthly expenses are typically just for hosting the site and Internet access - well under $100 a month. Very low risk!

Online Business is Portable

No matter where you are, you can do business so long as you have an Internet connection. There are very few jobs that can claim this! Imagine your daily "commute" simply requiring you to wander from your kitchen or bedroom to your home office.

Your online business can generate income 24 hours a day

The Internet is always "open". Even while you're sleeping, playing with the kids, on vacation, or whatever, your online business continues to work for you.

Huge Potential Customer Base

Every day, more and more people are getting connected to the Internet. You will have a global audience - there are no borders!

Flexibility with Time

Some home businesses, such as running a daycare from home, require working all the time during the "business day". On the Internet there is no real business hours; if needed to take a break to do something else, it'll wait.

How Do You Get Started?

Start with the basics. Learn what needed to do business online. A good place to start is at the Online Business Basics website.

- *Invest in a good manual***.** A good manual is invaluable it can tell how to avoid the pitfalls of doing business online (thus saving countless hours as well as money); and it teaches the unique techniques and skills needed to be successful on the way.
- *Do your learning first ... then go "live".* Once learned the basics and have digested the key points of your manual, then one can start creating your business!

Internet based business opportunities, by the name itself, are all situated in the marketing arena of the World Wide Web. With more and more people gaining access to the online world, budding merchants have taken advantage of the chances provided by the internet. People can freely express their needs and wants in specific types of products, making it easier for marketers to bring their consumer's ideas into form. The business is primarily run at home or at any place that has a working computer and a stable internet connection. On a single day, a person can have unlimited sales depending on the popularity and the number of views connected to the merchant's website. Slowly, these internet based business opportunities have provided an easy alternative for individuals to set up their own business and brands. As an answer to the growing economic crisis, more and more people are enjoying the benefits provided by the online marketplace to secure their own source of income. The process is relatively easy when compared to constructing a physical shop across the street.

Another type of internet based business opportunities is through reselling products from other vendors. Reselling does not always require a particular capital fee. You may choose to set up a pre-ordering guide for your clients and collate your orders by batch. This way, you won't have to immediately use your own money as capital for your business. You can simply get the payments directly from the consumers before buying their goods. However, you need to be extra-cautious about possible scammers in the internet and make sure that you have all the legitimate information you need from your business partner prior to agreeing on reselling.

It is also a good idea to carry out research on your chosen products prior to starting your business so you will get helpful strategies on how to make your brand bigger and more competitive. If you are also unsure on which type business to start with, you can create a search in any of today's popular search engines on some of the best internet based business opportunities.

Glossary of Terms

Internet an interactive online tutorial on Internet Terminology.

Intranet private network that is contained within an enterprise.

Extranet private network that uses Internet protocol.

Value chain string of companies working together to satisfy market demands.

Blog a lot like a journal except it is generally intended to be read by others

Social networking practice of expanding the number of one's business by making connection through individuals.

eBusiness electronic business, the conduct of business on the internet eCommerce electronic commerce is selling products online

System any organized assembly of resources

Information system Any written of electronic graphical method of communicating information

MSN Microsoft Network; Internet based services from Microsoft.

Logistics business planning framework for management of material, service etc.

ERP is the industry term used to describe a broad set of activities.

Supply chain the network of retailers, distributors, transporters, storage facilities.

Ware house place in which goods or merchandise are stored.

Ethics a theory of system of moral values

Virtual company a business organization relying on telecommunication and computer technology for its operation.

Manpower workers available for particular task.

Down time period of time the system fails to function.

URL Uniform Resource locator; some thing as a file which identifies resource.

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UNIT – II

Unit Structure:

Lesson 2.1 - Managing Data Resources
Lesson 2.2 - The Networked Enterprise
Lesson 2.3 - Internet Revolution and Role of Internet

Lesson 2.1 - Managing Data Resources

Learning Objectives

In this lesson, you will be introduced to Data Resource Management in MIS. After you work out this lesson, you should be able to

- Data Administration
- Enterprise Data Planning
- Types of Databases
- Database Management Approach
- Data Mining and Data Warehousing

In this lesson, we will discuss the following

- Data Resource Management
- DBMS
- ACID Properties
- Data Mining and its role over Business Applications
- Data Warehousing and Data Warehousing Project Cycle

Introduction

The flow of data/information within a company is complex since the same data are viewed differently as they move from one department to the other. Data Administration ideally begins at software conception, ensuring there is a data dictionary to help keeping consistency and avoid redundancy and modeling the database so as to make it logical and usable, by means of the normalization technique.

Quite often such modeling is mistaken as diagramming, because of the prevalence of entity-relationship diagrams. Here we answer to some of the questions like, what is the future for data resource management. Considering the past practices and the current data resource situation in most public and private sector organizations, is a new direction needed for developing and managing the data resource? Is a new orientation toward improved data resource quality and increased business support needed? What is a Database? What are the types of Databases? What Do You Need for Transaction Processing? What is Data- Mining? What are Data-Warehousing and its advantages?

Data Resource Management

Data administration or Data resource management is the administration of the organized data, usually as stored in Databases under some Database Management System or alternative systems such as electronic spreadsheets.

It is also the analysis, classification and maintenance of an organization's data and data relationships. It includes the development of data models and data dictionaries, which, combined with transaction volume, are the raw materials for database design.

Although data administration and database administration are separate functions, both are typically combined into one department and are often performed by the same people. However, "data" administration deals with the modeling of the data and treats data as an organizational resource, while "database" administration deals with the implementation of the types of databases that are in use.

The person who performs "data" administration functions is a "database analyst" or "data administrator," the latter being an earlier title for the job. The person who handles "database" administration, which is the technical design and management of the database, is the "database administrator."

Data Resource Management refers to the development and maintenance of data models to facilitate data sharing between different systems, particularly in a corporate context. DRM is concerned with both data quality and compatibility between data models.

Data Resource management is a managerial activity that applies information system and other data management tool to the task of managing an organization's data resource to meet a company's business need and the information they provide to their shareholders.

With the beginning of the information age, businesses need all types of data on their business activity. With each data created, when a business transaction is made, need data is created. With these data, new direction is needed that focuses on managing data as a critical resource of the organization to directly support its business activities. The data resource must be managed with the same intensity and formality that other critical resources are managed.

Organizations must emphasize the information aspect of information technology, determine the data needed to support the business, and then use appropriate technology to build and maintain a high-quality data resource that provides that support.

Data resource quality is a measure of how well the organization's data resource supports the current and the future business information demand of the organization. The data resource cannot support just the current business information demand while sacrificing the future business information demand. It must support both the current and the future business information demand. The ultimate data resource quality is stability across changing business needs and changing technology.

A corporate data resource must be developed within single, organization-wide common data architecture. Data architecture is the science and method of designing and constructing a data resource that is business driven, based on real- world objects and events as perceived by the organization, and implemented into appropriate operating environments. It is the overall structure of a data resource that provides a consistent foundation across organizational boundaries to provide easily identifiable, readily available, high-quality data to support the business information demand.

The common data architecture is a formal, comprehensive data architecture that provides a common context within which all data at an organization's disposal are understood and integrated. It is subject oriented, meaning that it is built from data subjects that represent business objects and business events in the real world that are of interest to the organization and about which data are captured and maintained.

Data Administration

- ➢ Guiding the creation and monitoring the usage of data and information as vital agency assets
- ➢ Promulgating agency standards, procedures and guidelines related to data names and definitions
- ➢ Maintaining the inventory of Agency data assets
- ➢ Facilitating understanding of the meaning, accuracy and timeliness of data assets
- ➢ Promoting the reuse of standardized data names, definitions, elements and values

Central Data Administration

CMS Central Data Administration team provides the following services in support of agency's data management and data utilization objectives

- ➢ Support Project development throughout the agency
    - Reviewing and Approval of Logical Data models during the requirement analysis phase
    - Validating Naming Convention compliance in Logical Data Model and first-cut Physical Data Model during development phase
- ➢ Participate in the development of data governance processes and procedures
- ➢ Develop and/or support existing data change request management processes
- ➢ Publish standardized data naming conventions automated tools for enforcement of naming standards
- ➢ Steward and distribute an Enterprise Data Model (EDM) containing common and reusable data objects as well as standardized data modeling templates for jump-starting new software development projects or re- engineering legacy applications
- ➢ Administration and maintenance of Enterprise Metadata repository.
- ➢ Data and impact analysis services in conjunction with new and ongoing application development efforts
- ➢ Demonstration of source to target data lineage among systems and objects

The common services provided by DRM include installation of databases (and their Database Management Systems [DBMS]), configuration, troubleshooting, backups, disaster recovery preparation and other general maintenance functions such as implementation of DBMS version updates.

DRM provides support for Datacom/DB, Oracle and MS SQL Server database environments. DRM also provides assistance with Lotus Domino, TIBCO Business Works, business objects, data analysis and data design.

Direction for Data Resource Management (DRM)

What is the future for data resource management? Considering the past practices and the current data resource situation in most public and private sector organizations, is a new direction needed for developing and managing the data resource? Is a new orientation toward improved data resource quality and increased business support needed?

Data administration has not been an effective way to manage an organization's data resource. People have tried to administer the data with an orientation toward the data, rather than towards support of the business.

Many organizations have been, and still are, oriented toward the technology aspect of information technology by trying every new technology that comes along hoping that it will help them administer the data and provide better business support. They are looking for that elusive silver bullet and are sacrificing future business support for current needs.

A new direction is needed that focuses on managing data as a critical resource of the organization to directly support its business activities. The data resource must be managed with the same intensity and formality that other critical resources are managed.

Organizations must emphasize the information aspect of information technology, determine the data needed to support the business, and then use appropriate technology to build and maintain a high-quality data resource that provides that support.

In other words, organizations must manage data as a resource rather than administer the data.

Database

A Database (DB) is structure that can store information about

- Multiple types of entities,
- The attributes that describe those entities; and
- The relationships among the entities

An integrated, self-describing collection of related data

- Integrated Data is stored in a uniform way, typically all in one place (a single physical computer for example)
- Self-Describing A database maintains a description of the data it contains (Catalog)
- Related Data has some relationship to other data. In a University we have students who take courses taught by professors
- By taking advantage of relationships and integration, we can provide information to users as opposed to simply data.
- We can also say that the database is a model of what the users perceive.
- Three main categories of models
  - User or Conceptual Models How users perceive the world and/or the business.
  - Logical Models Represent the logic of how a business operates.

For example, the relationship between different entities and the flow of data through the organization.

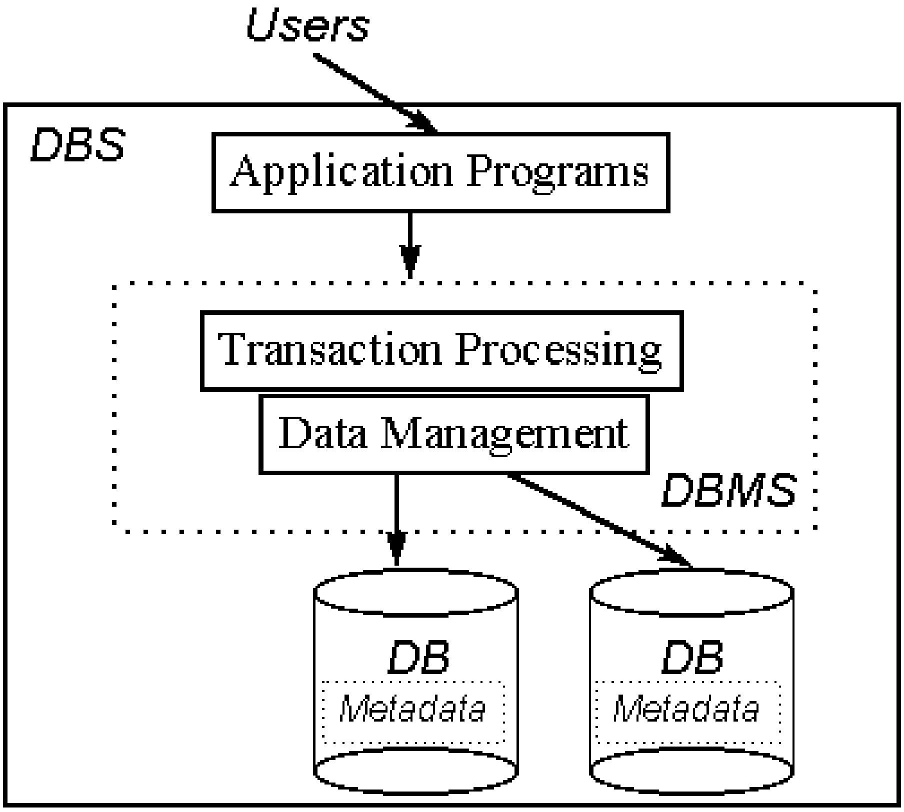
- Based on the User's model Physical Models Represent how the database is actually implemented on a computer system. This is based on the logical model.

Database Management System (DBMS)

A collection of software programs that are used to define, construct, maintain and manipulate data in a database.

Database System (DBS) contains

The Database + The DBMS + Application Programs (what users interact with)



Data base management system architecture

Types of Database

A lot of the sites that we visit on the web today are generated by a script of some description and a great deal of them will use a database in one form or another. Like it or loathe it, building pages dynamically from databases is a technique that is here to stay. There are two main types of database; flat-file and relational.

Flat-File

The flat-file style of database are ideal for small amounts of data that needs to be human readable or edited by hand. Essentially all they are made up of is a set of strings in one or more files that can be parsed to get the information they store; great for storing simple lists and data values, but can get complicated when you try to replicate more complex data structures.

That's not to say that it is impossible to store complex data in a flat-file database; just that doing so can be more costly in time and processing power compared to a relational database. The methods used for storing the more complex data types, are also likely to render the file unreadable and un-editable to anyone looking after the database.

The typical flat-file database is split up using a common delimiter. If the data is simple enough, this could be a comma, but more complex strings are usually split up using tabs, new lines or a combination of characters not likely to be found in the record itself.

One of the main problems with using flat files for even a semi-active database is the fact that it is very prone to corruption. There is no inherent locking mechanism that detects when a file is being used or modified, and so this has to be done on the script level.

Even if care is taken to lock and unlock the file on each access, a busy script can cause a “race condition” and it is possible for a file to be wiped clean by two or more processes that are fighting for the lock; the timing of your file locks will become more and more important as a site gets busy.

Database Management (DBM)

The Database Management Layer allows script programmers to store information as a pair of strings; a key, which is used to find the associated value.

Essentially, a DBM adds more functionality and better sorted during storage to the binary flat-files that it uses. There are several versions of DBMS available, but the most popular is the Berkley Database Manager; also known as the Berkley DB.

The Berkley DB is an improvement over normal flat-files, as it provides a way for programmers to use the database without having to worry about how the data is stored or how to retrieve the values.

Retrieval of data using the Berkley DB is often much faster than from a flat-file, with the time savings being made by storing data in a way that speeds up the locating of a specific key-value pair.

Creating, editing and deleting data when using the Berkley DB is actually quite simple; once the database has been tied to the script you just use and manipulate the variables as normal.

The problem of file locking that plagues flat-file databases is still apparent when using DBM, so you should still take care when planning scripts that utilize it.

Relational

The relational databases such as MySQL, Microsoft SQL Server and Oracle, have a much more logical structure in the way that it stores data. Tables can be used to represent real world objects, with each field acting like an attribute. For example, a table called books could have the columns title, author and ISBN, which describe the details of each book where each row in the table is a new book.

The "relation" comes from the fact that the tables can be linked to each other, for example the author of a book could be cross-referenced with the authors table (assuming there was one) to provide more information about the author. These kind of relations can be quite complex in nature, and would be hard to replicate in the standard flat-file format.

One major advantage of the relational model is that, if a database is designed efficiently, there should be no duplication of any data; helping to maintain database integrity. This can also represent a huge saving in file size, which is important when dealing with large volumes of data.

Having said that, joining large tables to each other to get the data required for a query can be quite heavy on the processor; so in some cases, particularly when data is read only, it can be beneficial to have some duplicate data in a relational database.

Relational databases also have functions "built in" that help them to retrieve, sort and edit the data in many different ways. These functions save script designers from having to worry about filtering out the results that they get, and so can go quite some way to speeding up the development and production of web applications.

Database Comparisons

In most cases, you would want your database to support various types of relations; such databases, particularly if designed correctly, can dramatically improve the speed of data retrieval as well as being easier to maintain. Ideally, you will want to avoid the replication of data within a database to keep a high level of integrity, otherwise changes to one field will have to be made manually to those that are related.

While several flat-files can be combined in such a way as to be able to emulate some of the behaviors' of a relational database, it can prove to be slower in practice. A single connection to a relational database can access all the tables within that database; whereas a flat file implementation of the same data would result in a new file open operation for each table.

All the sorting for flat-file databases need to be done at the script level. Relational databases have functions that can sort and filter the data so the results that are sent to the script are pretty much what you need to work with.

It is often quicker to sort the results before they are returned to the script than to have them sorted via a script, few scripting languages are designed to filter data effectively and so the more functions a database supports, the less work a script has to do.

If you are only working with a small amount of data that is rarely updated then a full blown relational database solution can be considered overkill. Flat-file databases are not as scalable as the relational model, so if you are looking for a suitable database for more frequent and heavy use then a relational database is probably more suitable.

Limitations of a File System

- Separated and Isolated Data - Makes coordinating, assimilating and representing data difficult
- Data Duplication - Wastes space and can lead to data integrity (inconsistency) problems
- Application Program Dependencies - Changes to a single file can require changes to numerous application programs
- Incompatible Files
- Lack of Data Sharing - Difficult to control access to files, especially to individual portions of files

Advantages of a DBMS

- Data Consistency and Integrity - by controlling access and minimizing data duplication
- Application program independence - by storing data in a uniform fashion
- Data Sharing - by controlling access to data items, many users can access data concurrently

- Backup and Recovery
- Security and Privacy
- Multiple views of data

An Example Database

Cust_id	Name	Address	City	State	Acct_No	Balance
123	Mr. Smith	1, Park Ave.	Smithville	KY	9987	4000
123	Mr. Smith	3, Park Ave.	Smithville	KY	9980	2000
124	Mrs. Jones	12, Davis Ave.	Smithville	KY	8811	1000
125	Mr. Axe	44, Lin Rue.	Broadville	GA	4422	6000
125	Mr. Axe	6, Graham.	Broadville	GA	4433	9000
127	Mr. & Mrs. Builder	Parker Rd.	Streetville	GA	3322	500
127	Mr. & Mrs. Builder	Parker Rd.	Streetville	GA	1122	800

- What happens when a customer moves to a new house?
- Who should have access to what data in this database?
- What happens if Mr. and Mrs. Builder both try and withdraw $500 from account 3322?
- What happens if the system crashes just as Mr. Axe is depositing his latest paycheck?
- What data is the customer concerned with?
- What data is a bank manager concerned with ?
- Send a mailing to all customers with checking accounts having greater than $2000 balance
- Let all GA customers know of a new branch location

Brief History of Database Systems

- 1940's, 50's Initial use of computers as calculators. Limited data, focus on algorithms. Science, military applications.

- 1960's Business uses. Organizational data, customer data, sales, inventory, accounting, etc. File system based, high emphasis on applications programs to extract and assimilate data. Larger amounts of data, relatively simple calculations.
- 1970's the relational model. Data separated into individual tables. Related by keys. Initially required heavy system resources. Examples Oracle, Sybase, Informix, Digital RDB, IBM DB2.
- 1980's Microcomputers - the IBM PC, Apple Macintosh. Database program such as dbase (sort of), Paradox, Foxpro, MS Access. Individual user can create, maintain small databases.
- Late- 1980's Local area networks. Workgroups sharing resources such as files, printers, e-mail.
- Client/Server Database resides on a central server, applications programs run on client pc attached to the server over a LAN.
- 1990's Internet and World Wide Web make databases of all kinds available from a single type of client - the Web Browser. Data warehousing and Data Mining also emerge.
- Other types of Databases
  - Object-Oriented Database Systems. Objects (data and methods) stored persistently.
  - Distributed Database Systems. Copies of data reside at different locations for redundancy or for performance reasons.

Appropriate Use for a Database

- In addition to the advantages already mentioned
  - Performance
  - Expendability, Flexibility, Scalability
  - Reduced application development times
  - Standards enforcement
- However, keep in mind
  - DBMS has High initial cost (although falling)
  - DBMS has High Overhead - requires powerful computers

- DBMS are not special purpose software programs. E.g, contrast a canned accounting software package like Quicken or QuickBooks with DBMS like MS Access.

When is a DBMS Not Appropriate?

- Database is small with a simple structure
- Applications are simple, special purpose and relatively static.
- Applications have real-time requirements. Example
  - Traffic signal control
  - ECU patient monitoring
- Concurrent, multi-user access to data is not required.

A Database contains

- User Data
- Metadata
- Indexes
- Application metadata

User Data

- Data users work with directly by entering, updating and viewing.
- For our purposes, data will be generally stored in tables with some relationships between tables.
- Each table has one or more columns. A set of columns forms a database record.
- Recall our example database for the bank. What were some problems we discussed ?
- Here is one improvement - split into 2 tables

Customer Table

Customerid	Name	Address	City	State
123	Mr. Smith	123 Lexington	Smithville	KY
124	Mrs. Jones	12 Davis Ave.	Smithville	KY

125	Mr. Axe	443 Grinder Ln.	Broadville	GA
127	Mr. & Mrs. Builder	661 Parker Rd.	Streetville	GA

Accounts Table

Customerid	Acct_Number	Balance
123	9987	4000
123	9980	2000
124	8811	1000
125	4422	6000
125	4433	9000
127	3322	500
127	1122	800

- The customer table has 4 records and 5 columns. The Accounts table has 7 records and 3 columns.
- Note relationship between the two tables - customerid column.
- How should we split data into the tables? What are the relationships between the tables? There are questions that are answered by Database Modeling and Database Design.

Metadata

- Recall that a database is self describing
- Metadata Data about data.
- Data that describe how user data are stored in terms of table name, column name, data type, length, primary keys, etc.
- Metadata are typically stored in System tables or System Catalog and are typically only directly accessible by the DBMS or by the system administrator.
- Have a look at the Database Documentor feature of MS Access (under the tools menu, choose Analyze and then Documentor).
- This tool queries the system tables to give all kinds of Metadata for tables, etc. in an MS Access database.

Indexes

- In keeping with our desire to provide users with several different views of data, indexes provide an alternate means of accessing user data. Sorting and Searching
- An index for our new banking example might include the account numbers in a sorted order.
- Indexes allow the database to access a record without having to search through the entire table.
- Updating data requires an extra step The index must also be updated.
- Example Index in a book consists of two things

  1. A Keyword stored in order to point to the rest of the information.
  2. In the case of the book, the pointer is a page number.

Applications Metadata

- Many DBMS have storage facilities for forms, reports, queries and other application components.
- Applications Metadata is accessed via the database development programs.
- Example Look at the Documenter tool in MS Access. It can also show metadata for Queries, Forms, Reports, etc.

Data Modeling and Database Design

- Database Design The activity of specifying the schema of a database in a given data model
- Database Schema The structure of a database that
  - Captures data types, relationships and constraints in data
  - Is independent of any application program
  - Changes infrequently
- Data Model
  - A set of primitives for defining the structure of a database.
  - A set of operations for specifying retrieval and updates on a database
  - Examples Relational, Hierarchical, Networked, Object-Oriented

In this course, we focus on the Relational data model.

- Database Instance or State The actual data contained in a database at a given time.

The Database Development Process

Two overall approaches

1. Top-Down Design systems from an overall organization perspective
2. Bottom-Up Design systems from a specific perspective - one system at a time.

The following is a very brief outline describing the database development process.

- User needs assessment and requirements gathering Determine what the user's are looking for, what functions should be supported, how the system should behave.
- Data Modeling Based on user requirements, form a logical model of the system. This logical model is then converted to a physical data model (tables, columns, relationships, etc.) that will be implemented.
- Implementation Based on the data model, a database can be created. Applications are then written to perform the required functions.
- Testing The system is tested using real data.
- Deployment The system is deployed to users. Maintenance of the system begins.

What Do You Need for Transaction Processing?

Data processing folks like to talk about the "ACID test" when deciding whether or not a database management system is adequate for handling transactions. An adequate system has the following properties

Atomicity

Results of a transaction's execution are either all committed or all rolled back. All changes take effect, or none do. That means, for Joe User's money transfer, that both his savings and checking balances are adjusted or neither are.

Consistency

The database is transformed from one valid state to another valid state. This defines a transaction as legal only if it obeys user-defined integrity constraints. Illegal transactions aren't allowed and, if an integrity constraint can't be satisfied then the transaction is rolled back. For example, suppose that you define a rule that, after a transfer of more than $10,000 out of the country, a row is added to an audit table so that you can prepare a legally required report for the IRS. Perhaps for performance reasons that audit table is stored on a separate disk from the rest of the database. If the audit table's disk is off-line and can't be written, the transaction is aborted.

Isolation

The results of a transaction are invisible to other transactions until the transaction is complete. For example, if you are running an accounting report at the same time that Joe is transferring money, the accounting report program will either see the balances before Joe transferred the money or after, but never the intermediate state where checking has been credited but savings not yet debited.

Durability

Once committed (completed), the results of a transaction are permanent and survive future system and media failures. If the airline reservation system computer gives you seat 22A and crashes a millisecond later, it won't have forgotten that you are sitting in 22A and also give it to someone else. Furthermore, if a programmer spills coffee into a disk drive, it will be possible to install a new disk and recover the transactions up to the coffee spill, showing that you had seat 22A.

That doesn't sound too tough to implement, does it? A "mere matter of programming" as our friend Jin likes to say. Well, you still need indexing.

Data Mining

Data mining, the extraction of hidden predictive information from large databases, is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses. Data mining tools predict future trends and behaviors, allowing businesses to make proactive, knowledge-driven decisions.

The automated, prospective analyses offered by data mining move beyond the analyses of past events provided by retrospective tools typical of decision support systems. Data mining tools can answer business questions that traditionally were too time consuming to resolve. They scour databases for hidden patterns, finding predictive information that experts may miss because it lies outside their expectations.

Most companies already collect and refine massive quantities of data. Data mining techniques can be implemented rapidly on existing software and hardware platforms to enhance the value of existing information resources, and can be integrated with new products and systems as they are brought on-line. When implemented on high performance client/server or parallel processing computers, data mining tools can analyze massive databases to deliver answers to questions such as, "Which clients are most likely to respond to my next promotional mailing, and why?"

Examples of profitable applications illustrate its relevance to today's business environment as well as a basic description of how data warehouse architectures can evolve to deliver the value of data mining to end users.

The Foundations of Data Mining

Data mining techniques are the result of a long process of research and product development. This evolution began when business data was first stored on computers, continued with improvements in data access, and more recently, generated technologies that allow users to navigate through their data in real time.

Data mining takes this evolutionary process beyond retrospective data access and navigation to prospective and proactive information delivery. Data mining is ready for application in the business community because it is supported by three technologies that are now sufficiently mature

- Massive data collection
- Powerful multiprocessor computers
- Data mining algorithms

Commercial databases are growing at unprecedented rates. A recent META Group survey of data warehouse projects found that 19% of respondents are beyond the 50 gigabyte level, while 59% expect to be there by second quarter of 1996.1 In some industries, such as retail, these numbers can be much larger.

The accompanying need for improved computational engines can now be met in a cost-effective manner with parallel multiprocessor computer technology.

Data mining algorithms embody techniques that have existed for at least 10 years, but have only recently been implemented as mature, reliable, understandable tools that consistently outperform older statistical methods.

In the evolution from business data to business information, each new step has built upon the previous one. For example, dynamic data access is critical for drill-through in data navigation applications, and the ability to store large databases is critical to data mining.

From the user's point of view, the four steps listed in Table were revolutionary because they allowed new business questions to be answered accurately and quickly.

Evolutionary Step	**Business Question**	**Enabling Technologies**	**Product Providers**	**Characteristics**
Data Collection (1960s)	"What was my total revenue in the last five years?"	Computers, tapes, disks	IBM, CDC	Retrospective, static data delivery
Data Access (1980s)	"What were unit sales in New England last March?"	Relational databases (RDBMS), Structured Query Language (SQL), ODBC	Oracle, Sybase, Informix, IBM, Microsoft	Retrospective, dynamic data delivery at record level
Data Warehousing & Decision Support (1990s)	"What were unit sales in New England last March? Drill down to Boston."	On-line analytic processing (OLAP), multidimensional databases, data warehouses	Pilot, Comshare, Arbor, Cognos, Microstrategy	Retrospective, dynamic data delivery at multiple levels

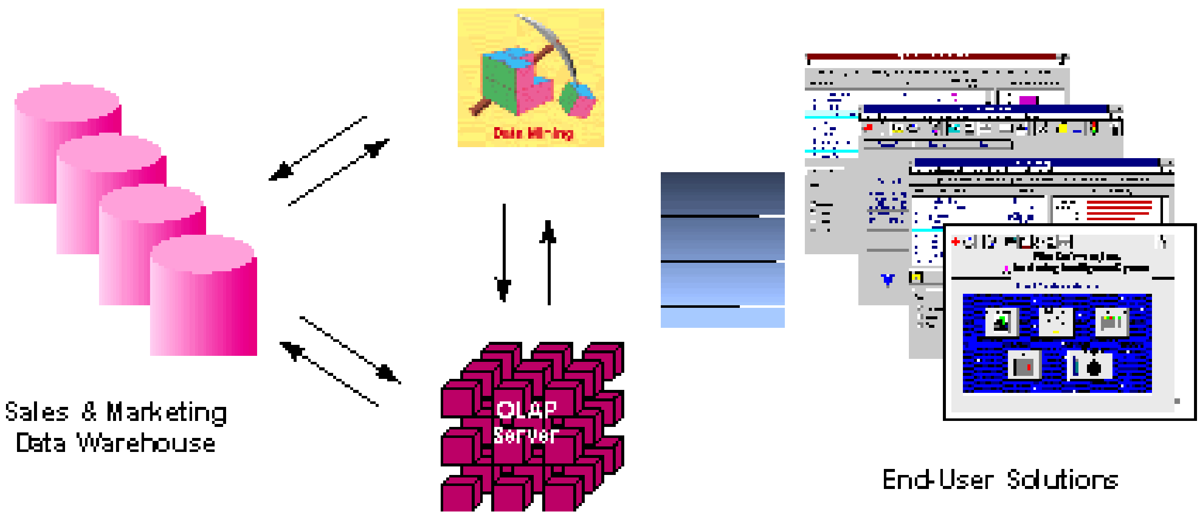
Data Mining (Emerging Today)	"What's likely to happen to Boston unit sales next month? Why?"	Advanced algorithms, multiprocessor computers, massive databases	Pilot, Lockheed, IBM, SGI, numerous startups (nascent industry)	Prospective, proactive information delivery

Steps in the Evolution of Data Mining.

The core components of data mining technology have been under development for decades, in research areas such as statistics, artificial intelligence, and machine learning. Today, the maturity of these techniques, coupled with high- performance relational database engines and broad data integration efforts, make these technologies practical for current data warehouse environments.

Architecture for Data Mining

To best apply these advanced techniques, they must be fully integrated with a data warehouse as well as flexible interactive business analysis tools. Many data mining tools currently operate outside of the warehouse, requiring extra steps for extracting, importing, and analyzing the data. Furthermore, when new insights require operational implementation, integration with the warehouse simplifies the application of results from data mining. The resulting analytic data warehouse can be applied to improve business processes throughout the organization, in areas such as promotional campaign management, fraud detection, new product rollout, and so on. Figure illustrates an architecture for advanced analysis in a large data warehouse.



Integrated Data Mining Architecture

The ideal starting point is a data warehouse containing a combination of internal data tracking all customer contact coupled with external market data about competitor activity. Background information on potential customers also provides an excellent basis for prospecting. This warehouse can be implemented in a variety of relational database systems Sybase, Oracle, Redbrick, and so on, and should be optimized for flexible and fast data access.

An OLAP (On-Line Analytical Processing) server enables a more sophisticated end-user business model to be applied when navigating the data warehouse. The multidimensional structures allow the user to analyze the data as they want to view their business – summarizing by product line, region, and other key perspectives of their business.

The Data Mining Server must be integrated with the data warehouse and the OLAP server to embed ROI-focused business analysis directly into this infrastructure.

An advanced, process-centric metadata template defines the data mining objectives for specific business issues like campaign management, prospecting, and promotion optimization. Integration with the data warehouse enables operational decisions to be directly implemented and tracked. As the warehouse grows with new decisions and results, the organization can continually mine the best practices and apply them to future decisions.

This design represents a fundamental shift from conventional decision support systems. Rather than simply delivering data to the end user through query and reporting software, the Advanced Analysis Server applies users' business models directly to the warehouse and returns a proactive analysis of the most relevant information.

These results enhance the metadata in the OLAP Server by providing a dynamic metadata layer that represents a distilled view of the data. Reporting, visualization, and other analysis tools can then be applied to plan future actions and confirm the impact of those plans.

Profitable Applications

A wide range of companies have deployed successful applications of data mining. While early adopters of this technology have tended to be in information-intensive industries such as financial services and direct mail marketing, the technology is applicable to any company looking to leverage a large data warehouse to better manage their customer relationships. Two critical factors for success with data mining are a large, well-integrated data warehouse and a well-defined understanding of the business process within which data mining is to be applied (such as customer prospecting, retention, campaign management, and so on).

Data Mining Process

The steps in data mining standard process are as follows

1. *Business Understanding*

This initial phase focuses on understanding the project objectives and requirements from a business perspective, then converting this knowledge into a data mining problem definition and a preliminary plan designed to achieve the objectives.

2. *Data Understanding*

The data understanding phase starts with an initial data collection and proceeds with activities in order to get familiar with the data, to identify data quality problems, to discover first insights into the data or to detect interesting subsets to form hypotheses for hidden information.

3. *Data Preparation*

The data preparation phase covers all activities to construct the final dataset (data that will be fed into the modeling tool(s)) from the initial raw data. Data preparation tasks are likely to be performed multiple times and not in any prescribed order. Tasks include table, record and attribute selection as well as transformation and cleaning of data for modeling tools.

4. *Modeling*

In this phase, various modeling techniques are selected and applied and their parameters are calibrated to optimal values. Typically, there are several techniques for the same data mining problem type. Some techniques have specific requirements on the form of data. Therefore, stepping back to the data preparation phase is often necessary.

5. *Evaluation*

At this stage in the project you have built a model (or models) that appear to have high quality from a data analysis perspective. Before proceeding to final deployment of the model, it is important to more thoroughly evaluate the model and review the steps executed to construct the model to be certain it properly achieves the business objectives.

A key objective is to determine if there is some important business issue that has not been sufficiently considered. At the end of this phase, a decision on the use of the data mining results should be reached.

6. *Deployment*

Creation of the model is generally not the end of the project. Even if the purpose of the model is to increase knowledge of the data, the knowledge gained will need to be organized and presented in a way that the customer can use it. It often involves applying "live"models within an organization's decision making processes, for example in real-time personalization of Web pages or repeated scoring of marketing databases.

However, depending on the requirements, the deployment phase can be as simple as generating a report or as complex as implementing a repeatable data mining process across the enterprise. In many cases it is the customer, not the data analyst, who carries out the deployment steps. However, even if the analyst will not carry out the deployment effort it is important for the customer to understand up front what actions need to be carried out in order to actually make use of the created models.

Data Mining and Customer Relationships

The way in which companies interact with their customers has changed dramatically over the past few years. A customer's continuing business is no longer guaranteed. As a result, companies have found that they need to understand their customers better, and to quickly respond to their wants and needs. In addition, the time frame in which these responses need to be made has been shrinking. It is no longer possible to wait until the signs of customer dissatisfaction are obvious before action must be taken. To succeed, companies must be proactive and anticipate what a customer desires.

It is now a cliché that in the days of the corner market, shopkeepers had no trouble understanding their customers and responding quickly to their needs. The shopkeepers would simply keep track of all of their customers in their heads, and would know what to do when a customer walked into the store.

But today's shopkeepers face a much more complex situation. More customers, more products, more competitors, and less time to react means that understanding your customers is now much harder to do. A number of forces are working together to increase the complexity of customer relationships

- Compressed marketing cycle times. The attention span of a customer has decreased dramatically and loyalty is a thing of the past. A successful company needs to reinforce the value it provides to its customers on a continuous basis. In addition, the time between a new desire and when it that desire is satisfied is shrinking.
- Increased marketing costs. Everything costs more. Printing, postage, special offers (and if you don't provide the special offer, your competitors will).
- Streams of new product offerings. Customers want things that meet their exact needs, not things that sort-of fit. This means that the number of products and the number of ways they are offered have risen significantly.
- Niche competitors. Your best customers also look good to your competitors. They will focus on small, profitable segments of your market and try to keep the best for themselves.

Successful companies need to react to each and every one of these demands in a timely fashion. The market will not wait for your response, and customers that you have today could vanish tomorrow. Interacting with your customers is also not as simple as it has been in the past.

Customers and prospective customers want to interact on their terms, meaning that you need to look at multiple criteria when evaluating how to proceed. You will need to automate

- The Right Offer
- To the Right Person
- At the Right Time
- Through the Right Channel

Data Mining and Customer Relationship Management

Customer relationship management (CRM) is a process that manages the interactions between a company and its customers. The primary users of CRM software applications are database marketers who are looking to automate the process of interacting with customers.

To be successful, database marketers must first identify market segments containing customers or prospects with high-profit potential. They then build and execute campaigns that favorably impact the behavior of these individuals. The first task, identifying market segments, requires significant data about prospective customers and their buying behaviors. In theory, the more data the better. In practice, however, massive data stores often impede marketers, who struggle to sift through the massive data to find the nuggets of valuable information.

Recently, marketers have added a new class of software to their targeting arsenal. Data mining applications automate the process of searching the mountains of data to find patterns that are good predictors of purchasing behaviors. After mining the data, marketers must feed the results into campaign management software that, as the name implies, manages the campaign directed at the defined market segments.

In the past, the link between data mining and campaign management software was mostly manual. In the worst cases, it involved "sneaker net," creating a physical file on tape or disk, which someone then carried to another computer and loaded into the marketing database.

This separation of the data mining and campaign management software introduces considerable inefficiency and opens the door for human errors. Tightly integrating the two disciplines presents an opportunity for companies to gain competitive advantage.

Increasing Customer Lifetime Value

Consider, for example, customers of a bank who use the institution only for a checking account. An analysis reveals that after depositing large annual income bonuses, some customers wait for their funds to clear before moving the money quickly into their stock-brokerage or mutual fund accounts outside the bank. This represents a loss of business for the bank.

To persuade these customers to keep their money in the bank, marketing managers can use campaign management software to immediately identify large deposits and trigger a response. The system might automatically schedule a direct mail or telemarketing promotion as soon as a customer's balance exceeds a predetermined amount. Based on the size of the deposit, the triggered promotion can then provide an appropriate incentive that encourages customers to invest their money in the bank's other products. Finally, by tracking responses and following rules for attributing customer behavior, the campaign management software can help measure the profitability and ROI of all ongoing campaigns.

Data Warehousing

The data warehousing market consists of tools, technologies, and methodologies that allow for the construction, usage, management, and maintenance of the hardware and software used for a data warehouse, as well as the actual data itself. The term Data Warehouse was coined by Bill Inmon in 1990, which he defined in the following way "A warehouse is a subject-oriented, integrated, time-variant and non-volatile collection of data in support of management's decision making process".

Data warehousing is combining data from multiple and usually varied sources into one comprehensive and easily manipulated database. Common accessing systems of data warehousing include queries, analysis and reporting. Because data warehousing creates one database in the end, the number of sources can be anything you want it to be, provided that the system can handle the volume, of course. The final result, however, is homogeneous data, which can be more easily manipulated.

Data warehousing is commonly used by companies to analyze trends over time. In other words, companies may very well use data warehousing to view day-to- day operations, but its primary function is facilitating strategic planning resulting from long-term data overviews. From such overviews, business models, forecasts, and other reports and projections can be made. Routinely, because the data stored in data warehouses is intended to provide more overview-like reporting, the data is read-only. If you want to update the data stored via data warehousing, you'll need to build a new query when you're done.

This is not to say that data warehousing involves data that is never updated. On the contrary, the data stored in data warehouses is updated all the time. It's the reporting and the analysis that take more of a long-term view.

Data warehousing is not the be-all and end-all for storing all of a company's data. Rather, data warehousing is used to house the necessary data for specific analysis. More comprehensive data storage requires different capacities that are more static and less easily manipulated than those used for data warehousing. Data warehousing is typically used by larger companies analyzing larger sets of data for enterprise purposes. Smaller companies wishing to analyze just one subject, for example, usually access data marts, which are much more specific and targeted in their storage and reporting. Data warehousing often includes smaller amounts of data grouped into data marts. In this way, a larger company might have at its disposal both data warehousing and data marts, allowing users to choose the source and functionality depending on current needs.

Data Warehousing Project Cycle

After the tools and team personnel selections are made, the data warehouse project can begin. The following are the typical processes involved in the data warehousing project cycle.

- Requirement Gathering
- Physical Environment Setup
- Data Modeling
- ETL
- OLAP Cube Design
- Front End Development
- Report Development
- Performance Tuning
- Query Optimization
- Quality Assurance
- Rolling out to Production
- Production Maintenance
- Incremental Enhancements

Each item listed below represents a typical data warehouse phase, and has several sections

- Task Description This section describes what typically needs to be accomplished during this particular data warehouse phase.

- Time Requirement A rough estimate of the amount of time this particular data warehouse task takes.
- Deliverables Typically at the end of each data warehouse task, one or more documents are produced that fully describe the steps and results of that particular task. This is especially important for consultants to communicate their results to the clients.
- Possible Pitfalls Things to watch out for. Some of them obvious, some of them not so obvious. However, all of them are real.

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Lesson 2.2 - The Networked Enterprise

Learning Objectives

In this lesson, you will be introduced to Enterprise Networking in MIS. After you work out this lesson, you should be able to

- Understand various Hardware tools that are used in Networking
- Know the current Trends in Tele communications
- Know the Business value of Telecommunications Networks

In this lesson, we will discuss the following

- Hardware and Software Components involved in Network
- Various types of Networks – Internet, Intranet and Extranet
- New challenges for Performance analysts
- Trends in Telecommunications networks

Introduction

The networking infrastructure in a large enterprise with multiple computer systems and networks of different types is extraordinarily complex. An enormous amount of effort goes into planning the integration of disparate networks and systems and managing them, and, planning again for yet more interfaces as marketing pressures force vendors to develop new techniques that routinely change the ground rules.

We discuss some of the basic terminology and help you to understand the Technical world behind the Networked Enterprise. Here we also focus on the on going global trends in telecommunications and their business value. We also see the role of Internet, intranet and extranet in our global trends in Telecommunications.

Enterprise Networking

The networking infrastructure in a large enterprise with multiple computer systems and networks of different types is extraordinarily complex. Due to the myriad of interfaces that are required, much of what goes on has little to do with the real data processing of the payroll and orders. An enormous amount of effort goes into planning the integration of disparate networks and systems and managing them, and, planning again for yet more interfaces as marketing pressures force vendors to develop new techniques that routinely change the ground rules.

Application Development/Configuration Management

There is a large number of programming languages and development tools for writing today's applications. Each development system has its own visual programming interface for building GUI front ends and its own fourth- generation language (4GLs) for doing the business logic. Programmers are always learning new languages to meet the next generation.

Traditional programming has given way to programming for graphical user interfaces and object-oriented methods, two technologies with steep learning curves for the traditional programmer.

Programming managers are responsible for maintaining legacy systems in traditional languages while developing new systems in newer languages. They must also find ways to keep track of all the program modules and ancillary files that make up an application when several programmers work on a project. Stand-alone version control and configuration management programs handle this, and parts of these systems are increasingly being built into the development systems themselves (see configuration management).

Database Management

Like all software, a database management system (DBMS) must support the hardware platform and operating system it runs in. In order to move a DBMS to another platform, a version must be available for the new hardware and operating system. The common database language between client and server is SQL, but each DBMS vendor implements its own rendition of SQL, requiring a special SQL interface to most DBMS.

Database administrators must select the DBMS or DBMSs that efficiently process the daily transactions and also provide sufficient horsepower for decision support. They must decide when and how to split the operation into different databases, one for daily work, the other for ad hoc queries. They must also create the structure of the database by designing the record layouts and their relationships to each other.

Operating Systems

Operating systems are the master control programs that run the computer system. Single-user operating systems, such as Windows and Mac, are used in the clients, and multiuser network operating systems, such as Windows NT/2000, Unix and NetWare, are used in the servers. Windows is the clear winner on the desktop, but Windows and Unix compete with each other for the server side.

The operating system sets the standard for the programs that run under it. The choice of operating system combined with the hardware platform determines which ready-made applications can be purchased to work on it.

Systems programmers and IT managers must determine when newer versions of operating systems make sense and plan how to integrate them into existing environments.

Communications Protocols

Communications protocols determine the format and rules for how the transmitted data are framed and managed from the sending station to the receiving station. Exchanging data and messages between PCs, Macs, mainframes and Unix servers used to mean designing networks for a multiprotocol environment. Today, most enterprises have migrated their proprietary protocols (IBM's SNA, Apple's AppleTalk, Novell's IPX/SPX, Microsoft's NetBEUI) to the Unix-based TCP/IP protocol, which is the transport of the Internet.

LANs

Transmission from station to station within a LAN is performed by the LAN access method, or data link protocol, which is typically Ethernet. As traffic expands within an organization, higher bandwidth is required, causing organizations to plan for faster Ethernet connections (from 100 Mbps to 1,000 Mbps to 10,000 Mbps).

Repeaters, bridges, routers, gateways, hubs and switches are the devices used to extend, convert, route and manage traffic in an enterprise network. Increasingly, one device takes on the job of another (a router does bridging, a hub does routing). Over the years, vendor offerings have been dizzying.

Network traffic is becoming as jammed as the Los Angeles freeways. Network administrators have to analyze current network traffic in light of future business plans and increasing use of Web pages, images, sound and video files. They have to determine when to increase network bandwidth while maintaining existing networks, which today have become the technical lifeblood of an enterprise.

WANs

Transmitting data to remote locations requires the use of private lines or public switched services offered by local and long distance carriers and Internet providers.

Connections can be as simple as dialing up via modem or by leasing private lines, such as T1 and T3. Switched 56, frame relay, ISDN, SMDS and ATM offer a variety of switched services in which you pay for the digital traffic you use. With Internet access, you typically pay a fixed amount per month based on the total bandwidth of the connection.

Laptop use has created a tremendous need for remote access to LANs. Network administrators have to design LANs with a combination of remote access and remote control capability to allow mobile workers access to their databases and processing functions.

Network Management

Network management is the monitoring and control of LANs and WANs from a central management console. It requires network management software, such as IBM's NetView and HP's OpenView. The Internet's SNMP has become the de facto standard management protocol, but there are many network management programs and options. For example, there are more than 30 third-party add-ons for HP's popular OpenView software.

Systems and Storage Management

Systems management includes a variety of functions for managing computers in a networked environment, including software distribution, version control, backup &

recovery, printer spooling, job scheduling, virus protection and performance and capacity planning. Network management may also fall under the systems management umbrella.

Storage management has become critical for two reasons. First, there is an ever- increasing demand for storage due to the Internet, document management and data warehousing as well as increasing daily transaction volume in growing companies. Secondly, finding the time window in a 7x24 operation to copy huge databases for backup, archiving and disaster recovery has become more difficult.

Electronic Mail

Most earlier proprietary mail systems have given way to Internet protocol-based e-mail; however, some still remain within the enterprise. No matter which mail system is used, keeping the network safe from virus-laden attachments and preventing it from overloading because of spam is an ongoing challenge.

The Internet and Intranets

As if everything above is not enough to keep the technical staff busy, the World Wide Web came along in the mid-1990s with the force of a tornado, and nothing in the IT world would ever be the same.

Today, the Internet sets many of the standards, and the browser has become an interface for accessing just about everything. Every component of system software from operating system to database management system, as well as every application on the market, was revamped in some manner to be Internet compliant. Today, almost every new application deals with the Internet in some manner.

In the world of computers, networking is the practice of linking two or more computing devices together for the purpose of sharing data. Networks are built with a mix of computer hardware and computer software.

Area Networks

Networks can be categorized in several different ways. One approach defines the type of network according to the geographic area it spans. Local area networks (LANs), for example, typically reach across a single home, whereas wide area networks (WANs), reach across cities, states, or even across the world. The Internet is the world's largest public WAN.

Network Design

Computer networks also differ in their design. The two types of high-level network design are called client-server and peer-to-peer. Client-server networks feature centralized server computers that store email, Web pages, files and or applications. On a peer-to-peer network, conversely, all computers tend to support the same functions. Client-server networks are much more common in business and peer-to-peer networks much more common in homes.

A network topology represents its layout or structure from the point of view of data flow. In so-called bus networks, for example, all of the computers share and communicate across one common conduit, whereas in a star network, all data flows through one centralized device. Common types of network topologies include bus, star, ring and mesh.

Network Protocols

In networking, the communication language used by computer devices is called the protocol. Yet another way to classify computer networks is by the set of protocols they support. Networks often implement multiple protocols to support specific applications. Popular protocols include TCP/IP, the most common protocol found on the Internet and in home networks.

Wired vs Wireless Networking

Many of the same network protocols, like TCP/IP, work in both wired and wireless networks. Networks with Ethernet cables predominated in businesses, schools, and homes for several decades. Recently, however, wireless networking alternatives have emerged as the premier technology for building new computer networks.

Network Topology

Computer networks may be classified according to the network topology upon which the network is based, such as bus network, star network, ring network, mesh network, star-bus network, tree or hierarchical topology network.

Network topology signifies the way in which devices in the network see their logical relations to one another. The use of the term “logical” here is significant.

That is, network topology is independent of the "physical" layout of the network. Even if networked computers are physically placed in a linear arrangement, if they are connected via a hub, the network has a Star topology, rather than a bus topology.

In this regard the visual and operational characteristics of a network are distinct; the logical network topology is not necessarily the same as the physical layout. Networks may be classified based on the method of data used to convey the data, these include digital and analog networks.

Types of Networks

Below is a list of the most common types of computer networks in order of scale.

Personal Area Network

A personal area network (PAN) is a computer network used for communication among computer devices close to one person. Some examples of devices that are used in a PAN are printers, fax machines, telephones, PDAs and scanners. The reach of a PAN is typically about 20-30 feet (approximately 6-9 meters), but this is expected to increase with technology improvements.

Local Area Network

A local area network (LAN) is a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, or an airport. Current wired LANs are most likely to be based on Ethernet technology, although new standards like ITU-T also provide a way to create a wired LAN using existing home wires (coaxial cables, phone lines and power lines)

Campus Area Network

A campus area network (CAN) is a computer network made up of an interconnection of local area networks (LANs) within a limited geographical area. It can be considered one form of a metropolitan area network, specific to an academic setting.

In the case of a university campus-based campus area network, the network is likely to link a variety of campus buildings including; academic departments, the university library and student residence halls. A campus area network is larger than a local area network but smaller than a wide area network (WAN) (in some cases).

The main aim of a campus area network is to facilitate students accessing internet and university resources. This is a network that connects two or more LANs but that is limited to a specific and contiguous geographical area such as a college campus, industrial complex, office building, or a military base.

A CAN may be considered a type of MAN (metropolitan area network), but is generally limited to a smaller area than a typical MAN. This term is most often used to discuss the implementation of networks for a contiguous area. This should not be confused with a Controller Area Network. A LAN connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs (perhaps one per room), and occasionally a LAN will span a group of nearby buildings. In TCP/IP networking, a LAN is often but not always implemented as a single IP subnet.

Metropolitan Area Network

A metropolitan area network (MAN) is a network that connects two or more local area networks or campus area networks together but does not extend beyond the boundaries of the immediate town/city. Routers, switches and hubs are connected to create a metropolitan area network.

Wide Area Network

A wide area network (WAN) is a computer network that covers a broad area (i.e. any network whose communications links cross metropolitan, regional, or national boundaries). Less formally, a WAN is a network that uses routers and public communications links.

Contrast with personal area networks (PANs), local area networks (LANs), campus area networks (CANs), or metropolitan area networks (MANs), which are usually limited to a room, building, campus or specific metropolitan area (e.g., a city) respectively. The largest and most well-known example of a WAN is the Internet.

A WAN is a data communications network that covers a relatively broad geographic area (i.e. one city to another and one country to another country) and that often uses transmission facilities provided by common carriers, such as telephone companies. WAN technologies generally function at the lower three layers of the OSI reference model the physical layer, the data link layer, and the network layer.

Global Area Network

A global area networks (GAN) specification is in development by several groups, and there is no common definition. In general, however, a GAN is a model for supporting mobile communications across an arbitrary number of wireless LANs, satellite coverage areas, etc. The key challenge in mobile communications is "handing off" the user communications from one local coverage area to the next. In IEEE Project 802, this involves a succession of terrestrial WIRELESS local area networks (WLAN).

Virtual Private Network

A virtual private network (VPN) is a computer network in which some of the links between nodes are carried by open connections or virtual circuits in some larger network (e.g., the Internet) instead of by physical wires. The link-layer protocols of the virtual network are said to be tunneled through the larger network when this is the case.

One common application is secure communications through the public Internet, but a VPN need not have explicit security features, such as authentication or content encryption. VPNs, for example, can be used to separate the traffic of different user communities over an underlying network with strong security features.

A VPN may have best-effort performance, or may have a defined service level agreement (SLA) between the VPN customer and the VPN service provider. Generally, a VPN has a topology more complex than point-to-point.

A VPN allows computer users to appear to be editing from an IP address location other than the one which connects the actual computer to the Internet.

Internetwork

Internetworking involves connecting two or more distinct computer networks or network segments via a common routing technology. The result is called an internetwork (often shortened to internet). Any interconnection among or between public, private, commercial, industrial, or governmental networks may also be defined as an internetwork.

In modern practice, the interconnected networks use the Internet Protocol. There are at least three variants of internetwork, depending on who administers and who participates in them

Intranet

Extranet

Internet

Intranets and extranets may or may not have connections to the Internet. If connected to the Internet, the intranet or extranet is normally protected from being accessed from the Internet without proper authorization. The Internet is not considered to be a part of the intranet or extranet, although it may serve as a portal for access to portions of an extranet.

Intranet

An intranet is a set of networks, using the Internet Protocol and IP-based tools such as web browsers and file transfer applications, which are under the control of a single administrative entity. That administrative entity closes the intranet to all but specific, authorized users. Most commonly, an intranet is the internal network of an organization. A large intranet will typically have at least one web server to provide users with organizational information.

Extranet

An extranet is a network or internetwork that is limited in scope to a single organization or entity but which also has limited connections to the networks of one or more other usually, but not necessarily, trusted organizations or entities (e.g., a company's customers may be given access to some part of its intranet creating in this way an extranet, while at the same time the customers may not be considered 'trusted' from a security standpoint).

Technically, an extranet may also be categorized as a CAN, MAN, WAN, or other type of network, although, by definition, an extranet cannot consist of a single LAN; it must have at least one connection with an external network.

Internet

The Internet is a specific internetwork. It consists of a worldwide interconnection of governmental, academic, public, and private networks based upon the networking technologies of the Internet Protocol Suite. It is the successor of the Advanced Research Projects Agency Network (ARPANET) developed by DARPA of the U.S. Department of

Defense. The Internet is also the communications backbone underlying the World Wide Web (WWW). The 'Internet' is most commonly spelled with a capital 'I' as a proper noun, for historical reasons and to distinguish it from other generic internetworks.

Participants in the Internet use a diverse array of methods of several hundred documented, and often standardized, protocols compatible with the Internet Protocol Suite and an addressing system (IP Addresses) administered by the Internet Assigned Numbers Authority and address registries. Service providers and large enterprises exchange information about the reachability of their address spaces through the Border Gateway Protocol (BGP), forming a redundant worldwide mesh of transmission paths.

Basic Hardware Components

All networks are made up of basic hardware building blocks to interconnect network nodes, such as Network Interface Cards (NICs), Bridges, Hubs, Switches, and Routers. In addition, some method of connecting these building blocks is required, usually in the form of galvanic cable (most commonly Category 5 cable). Less common are microwave links (as in IEEE 802.12) or optical cable ("optical fiber").

Network Interface Cards

A network card, network adapter or NIC (network interface card) is a piece of computer hardware designed to allow computers to communicate over a computer network. It provides physical access to a networking medium and often provides a low-level addressing system through the use of MAC addresses.

Repeaters

A repeater is an electronic device that receives a signal and retransmits it at a higher power level, or to the other side of an obstruction, so that the signal can cover longer distances without degradation. In most twisted pair Ethernet configurations, repeaters are required for cable which runs longer than 100 meters.

Hubs

A hub contains multiple ports. When a packet arrives at one port, it is copied unmodified to all ports of the hub for transmission. The destination address in the frame is not changed to a broadcast address.

Bridges

A network bridge connects multiple network segments at the data link layer (layer 2) of the OSI model. Bridges do not promiscuously copy traffic to all ports, as hubs do, but learn which MAC addresses are reachable through specific ports. Once the bridge associates a port and an address, it will send traffic for that address only to that port. Bridges do send broadcasts to all ports except the one on which the broadcast was received.

Bridges learn the association of ports and addresses by examining the source address of frames that it sees on various ports. Once a frame arrives through a port, its source address is stored and the bridge assumes that MAC address is associated with that port. The first time that a previously unknown destination address is seen, the bridge will forward the frame to all ports other than the one on which the frame arrived.

Bridges come in three basic types

1. Local bridges Directly connect local area networks (LANs)
2. Remote bridges Can be used to create a wide area network (WAN) link between LANs. Remote bridges, where the connecting link is slower than the end networks, largely have been replaced by routers.
3. Wireless bridges Can be used to join LANs or connect remote stations to LANs.

Switches

A switch is a device that forwards and filters OSI layer 2 data grams (chunk of data communication) between ports (connected cables) based on the MAC addresses in the packets. This is distinct from a hub in that it only forwards the packets to the ports involved in the communications rather than all ports connected. Strictly speaking, a switch is not capable of routing traffic based on IP address (OSI Layer 3) which is necessary for communicating between network segments or within a large or complex LAN.

Some switches are capable of routing based on IP addresses but are still called switches as a marketing term. A switch normally has numerous ports, with the intention being that most or all of the network is connected directly to the switch, or another switch that is in turn connected to a switch.

Switch is a marketing term that encompasses routers and bridges, as well as devices that may distribute traffic on load or by application content (e.g., a Web URL identifier). Switches may operate at one or more OSI model layers, including physical, data link, network, or transport (i.e., end-to-end). A device that operates simultaneously at more than one of these layers is called a multilayer switch.

Overemphasizing the ill-defined term "switch" often leads to confusion when first trying to understand networking. Many experienced network designers and operators recommend starting with the logic of devices dealing with only one protocol level, not all of which are covered by OSI. Multilayer device selection is an advanced topic that may lead to selecting particular implementations, but multilayer switching is simply not a real-world design concept.

Voice over Internet Protocol (VoIP) is a general term for a family of transmission technologies for delivery of voice communications over networks such as the Internet or other packet-switched networks. Other terms frequently encountered and synonymous with VoIP are IP telephony, Internet telephony, voice over broadband (VoBB), broadband telephony, and broadband phone.

Internet telephony refers to communications services - voice, facsimile, and/or voice-messaging applications - that are transported via the Internet, rather than the public switched telephone network (PSTN).

The basic steps involved in originating an Internet telephone call are conversion of the analog voice signal to digital format and compression/translation of the signal into Internet protocol (IP) packets for transmission over the Internet; the process is reversed at the receiving end.

VoIP systems employ session control protocols to control the set-up and tear-down of calls as well as audio codecs which encode speech allowing transmission over an IP network as digital audio via an audio stream. Codec use is varied between different implementations of VoIP (and often a range of codecs are used); some implementations rely on narrowband and compressed speech, while others support fidelity stereo codecs.

Trends in Telecommunications

Over the past few years the landscape of the information and telecommunication industry has been subject to dramatic changes. The enormous growth of the Internet and the advances in both wired and wireless network technologies have boosted the emergence of advanced multimedia applications offered over distributed systems consisting of a heterogeneity of network technologies and information servers.

On the business side, the market share of e-business is increasing, the telco market is becoming more competitive and the unbundling of the telecommunications world has become reality. In this context, network and service providers experience that it is becoming crucial to be able to offer customers high and predictable end-to-end Quality of Service (QoS) in a cost- effective manner. These developments raise a number of new challenges for performance analysts.

Business Relies Increasingly on the Performance of ICT

Many companies in competitive markets are trying to become more cost- efficient by automating their business processes. One of the most prominent examples is the automation of sales by e-commerce applications. The doubling period is simply the time it takes to consume twice the server capacity that exists now. For some e-commerce sites, this period can be as short as six months, which is four times faster than Moore's Law. Under these circumstances poor (network or IT) capacity planning will lead to major performance problems. And in the e-commerce context, customer dissatisfaction about overly long response times or unavailable servers will directly cause a decrease in revenues for e- commerce applications.

Other examples that illustrate that performance of information and communication infrastructures are becoming more business critical, are the use of Enterprise Resource Planning (ERP), supply chain management and billing tools. Those applications are used for increasing control over vital business processes and over the past decade their use has become increasingly popular, especially for larger companies.

Typically, these larger companies consist of several branch-stores that are geographically spread. And for this reason the enterprise applications are often implemented as distributed applications, which are connected by Virtual Private Network (VPN) communication technology. In practise, we see that unavailability of distributed enterprise applications for a few hours has negative consequences for customer care services, such as order intake and helpdesk facilities. Unavailability for a period of days makes management teams nervous, because they get the feeling of losing control over their business.

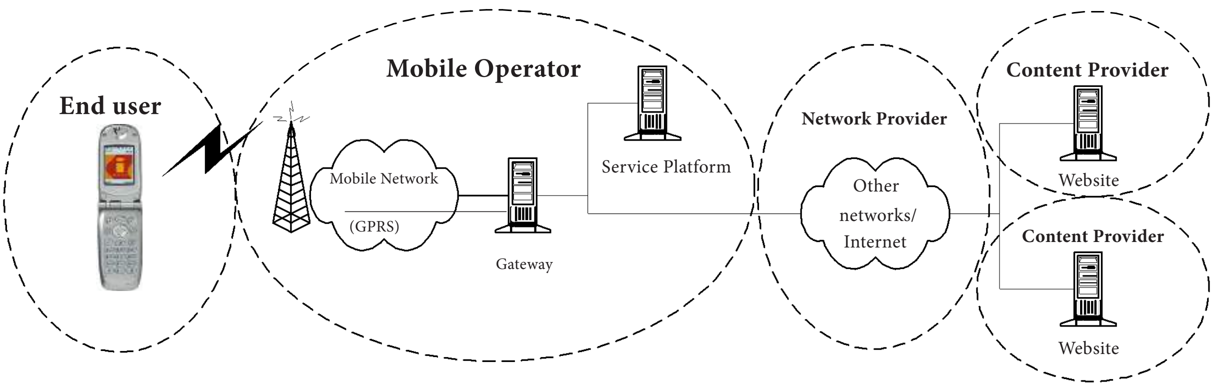
Unbundling

Unbundling of the telecom world is reality, separating functional roles in the telecom and information domain, such as access network providers, core network providers, service providers, portal providers and content providers.

This leads to a heterogeneous, multi-domain infrastructure over which new services and applications are supported, and consequently, an increasing business importance of Service Level Agreements (SLAs) between administrative domains.

A concrete example of unbundling can be found in the emerging market of mobile internet access services, such as i-mode and Vodafone-live. Fig shows a typical architecture for a mobile internet access service.

In the i-mode case illustrated in Fig the mobile access network and the service platform are both in the mobile operator domain. The gateway mainly supports authentication functionality and the service platform supports functionality such as, the start page for the service (i-menu), subscription to content provider sites and e-mail distribution (i-mail). Content such as local weather forecasts, traffic information, etc., is delivered by several contentproviders. For some cases the inter-connectivity between the mobile operator and the content provider is realised by yet another network provider.



Website Technical architecture for mobile internet access

The business success of previous mobile data services, such as WAP, was disappointing. In general, the reasons for this lack of success are due to (amongst others) the limited type and range of the offered content, the text- based presentation of information and the long browsing response times. For the commercial success of mobile internet services the gap between mobile internet access and wired internet access will have to be filled, for each of the mentioned criteria. With the breakthrough of the next generation mobile internet access services most of the obstacles for success are eliminated. For example, the latest terminals feature glossy displays and sounds, and much attention is paid to make sure that a wide range of content is provided to the users. The requirement of good browsing performance remains quite a challenge, in particular because end-to-end performance is no longer an issue of one single provider.

Increasing Heterogeneity of Services

Demand for device- and location-independent access to information and services that are presented according to user specified preferences, is still growing. In conjunction with this growing demand and boosted by the opportunities enabled by the Internet, the variety of offered services and user-devices has grown tremendously. Typically, in order to stay in business service providers have to offer a wide range of these services, such as e-mail, information downloading, on-line banking, ticketing, remote access to a company intranet and streaming services.

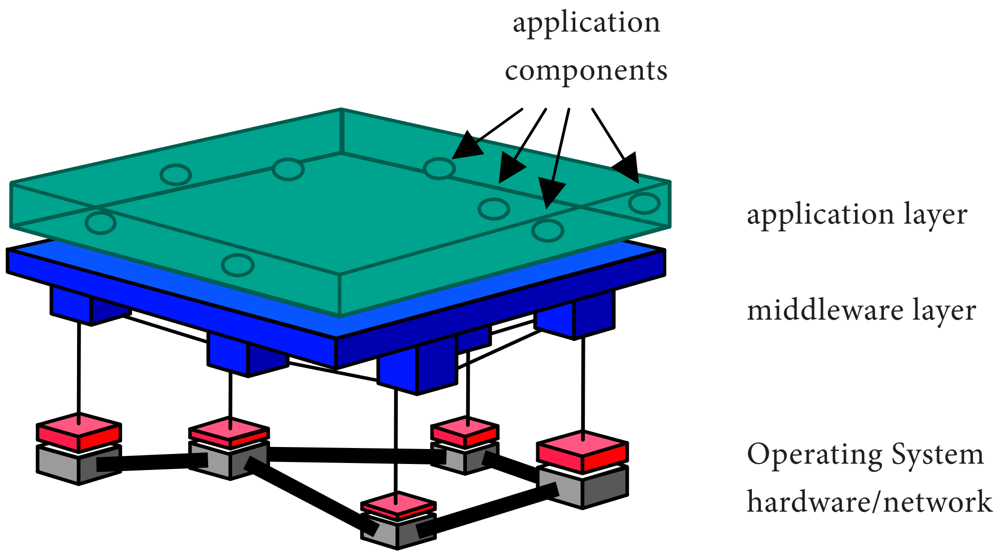
For these applications, the end users typically have access to information servers via a heterogeneous mix of wired and wireless access networks and backbone infrastructures. We observe that new user demands emerge with the technological advances in distributed system architectures. Each of these services has its own traffic characteristics and performance requirements, depending for example on the type of content and the level of user interaction.

Emergence of Distributed Applications and Middleware Architectures

Besides the increasing heterogeneity of user demands and offered services, network providers see new business opportunities in terms of so-called third party service provisioning (3PSP). 3PSP is the concept where network providers provide ‘open interfaces’ for ‘third party’ service providers to build services on top of communication networks. Note, that the 3PSP concept is partly a result of the unbundling trend and its growing popularity emphasises the increasing ICT dependency of modern industry.

To support applications with that cover a wide range of features, functionalities and open interfaces in multi-domain environments, software infrastructures have become increasingly complex. This has led to the development of so-called middleware architectures. Middleware technology enables to manage this heterogeneity by abstracting details of lower-layer communication protocols for application programmers.

Middleware is software that resides between the application and operating system, as illustrated in Figure. The most popular middleware architectures are the Common Object Request Broker Architecture (CORBA), a product of the Object Management Group (OMG), Microsoft's proprietary middleware called Distributed Component Object Model (DCOM), and Sun's increasingly popular Enterprise Java Beans (EJB). For implementation of open network interfaces much work is being done on the Open Service Architecture (OSA, recently called Open Service Access), Parlay and Simple Object Access Protocol (SOAP).



Visualisation of middleware

In an environment where services are created on top of middleware, much of the service control functionality is performed by the middleware layer. As a consequence, the middleware performance will have strong impact on service performance, making it important to control middleware performance.

Paradigm Shift in Performance Bottlenecks

In the context of the increasing complexity of software architectures, we observe a growing impact of server and software performance on the end-to-end performance observed by the end user.

During a study of i-mode page download times, we encountered an interesting effect. It appeared that the average response time was dominated by the throughput of radio links. However, the variability of response times was dominated by the service platform and content providers.

Since the 95%- percentiles of response times, which was regarded as key performance indicator, depend both on the average and the variability of response times the performance model had to include both network and server performance. In general, we experience that the assumption network performance dominates end-to-end performance will not hold.

When reviewing approaches to performance analyse, we observe a typical difference. Opposite to the communication community the emphasis in the information technology community is much more on performance monitoring and testing than on performance modelling.

This difference in approach to performance analysis seems to be an obstacle for joining communication and IT expertise in performance analysis.

This addresses a fundamental paradigm shift that has received relatively little attention in the performance modelling community, which traditionally has focused on performance aspects of communication networks, rather than servers and software architectures. Realistic modelling of end-to-end performance requires combined knowledge of performance modelling of communication and information technology.

New challenges for performance analysts

- Increased importance of performance monitoring capabilities
- New concepts for modelling ICT performance
- Analysis techniques for performance models of servers and software architectures
- Development and analysis of end-to-end multi-domain performance models
- Implementing integrated performance and capacity management

Business Value of Telecommunications Network

The International Telecommunication Union (ITU) estimates the number of mobile subscribers worldwide at 4.01 billion at the end of 2008, up from 1.41 billion in 2003. This is a compound annual growth rate of 23.2%, and represents 59.3% of world population.

Global wireless subscribers will grow to over 5.5 billion by 2011 to 2012, as low-cost providers are making service prices low enough to be affordable for vast numbers of people in Third World nations. Inexpensive cell phones are now indispensable to consumers from Haiti to Africa to New Guinea. Telecommunications remains one of the largest providers of employment in the world, with over 1 million employees in the U.S. alone.

Several major factors are creating changes in the telecommunications sector today, including

a) Budgetary pressures and slower growth due to the global recession,

b) A shift in residential and personal use from wired services to wireless,

c) Intense competition between cable and wired services providers and

d) Rapid advances in Internet and wireless technologies, including more advanced cellular handsets and wider availability of 3G services.

No other industry touches as many technology-related business sectors as telecommunications, which, by definition, encompasses not only the traditional areas of local and long-distance telephone service, but also advanced technology-based services including wireless communications, the Internet, fiber-optics and satellites.

Telecom is also deeply intertwined with entertainment of all types, including cable TV systems, since cable companies are now aggressively offering local exchange service and high-speed Internet access. The relationship between the telecom and cable sectors has become even more complex as telcos are now selling TV via IP (Internet protocol) services, competing directly against cable for consumers' entertainment dollars.

Ingenuity, innovation, cost control and a reasonable approach to spending and investment will help to move the industry ahead. New cellular, cable telephony, VOIP (Voice Over Internet Protocol) and wireless technologies promise continuous rapid evolution of this sector and pose a massive threat to traditional landlines. The cost of a cell phone call has become a bargain worldwide, and cell phone manufacturers are adding advanced new features to their phones on a regular basis.

Improved cell phone service has prompted tens of millions of consumers to cancel their landlines altogether, eating into traditional revenue streams at AT&T, Verizon and Qwest, among others. Meanwhile, wireless access to the Internet threatens traditional broadband suppliers. WiMAX, an advanced wireless technology with a range of up to 30 miles, has the potential to disrupt traditional broadband, cell phone, landline and Wi-Fi systems.

As more consumers recognize the promise, and good value, of phone service using VOIP, the number of companies offering this service has increased dramatically and millions of households and businesses worldwide have signed up for less-expensive VOIP service as an alternative to landlines, often through their cable providers as part of a bundle of services. Several heavy hitters, such as Comcast, have jumped on the VOIP bandwagon, along with startups like Skype and Vonage.

At the same time, local phone companies, led by Verizon and AT&T, are laying fiber-optic cable directly to the neighborhood and even into the home and office in order to retain customers with promises of ultra-high-speed Internet connections and enhanced entertainment offerings online.

This is the big telcos' way of fighting back. If cell phone owners are dropping their landlines, while VOIP over cable takes even more landline customers away, then the best weapon that traditional telcos can use in their battle for market share is the Internet.

AT&T and its peers are focusing on bundled service packages (combining wireless accounts, very high-speed Internet access and entertainment such as video on demand and TV via IP, in addition to VOIP or landlines).

Next, the traditional telcos need to create innovative new value-added services that are accessed online. For example, consumers might respond well to online services that monitor home security or adjust home energy usage, or services that monitor the movements and needs of elderly family members at home. The right value-added services, controlled via cellphones and/or the Internet, could get consumers hooked, with the potential to build new revenues and stop customer turnover.

In the U.S., cellular phone companies have upgraded many of their networks to 3G. In addition, they are adding new towers in large numbers to better handle traffic volume. In developing nations, wireless service providers such as India's Bharti Airtel have become extremely innovative and cost-effective, providing basic cellular service for very modest amounts of money.

Mergers, acquisitions and other industry changes redefined telecom. AT&T and SBC merged (changing the name of the merged company to AT&T, Inc.), and MCI merged into Verizon. Sprint and Nextel have combined to create wireless giant Sprint Nextel. The competitive landscape is shifting dramatically due to these mergers.

In addition, government regulations are evolving quickly, which will bring even bigger changes to business strategies. Overall, the telecommunications industry is in a state of continuous technological and economic flux driven by intense competition and new technologies.

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Lesson 2.3 - Internet Revolution and Role of Internet

Learning Objectives

In this lesson, you will be introduced to the Internet Revolution and how it added more sense to Marketing. After you work out this lesson, you should be able to

- Understand the Internet Revolution
- Differentiate Internet, Intranet and Extranet
- Appreciate Internet Marketing Services

In this lesson, we will discuss the following

- Internet Evolution and Revolution
- Various components which plays a major role in Internetwork
- Uses of Internet, Intranet and Extranet

Introduction

The internet has expanded faster than any other communications medium in history. The way in which computers and the internet are developed will determine how we live in the next century. From since the Internet started taking roots in our society, our Life. Now almost everyone is dependent on Internet and its services for every corner of our life. Thus Internet plays a prominent role in reaching the targeted customers in many ways. Studying about how the Internet started its roots so deeper in our life gives a little edge in reaching customers. The uses of Internet, Intranet and Extranet in the Marketing will give us the idea of involving Internet in our Business Planning.

Internet Revolution

The marvels created by the combination of computing and the internet enable us to link and communicate as never before. The capitalists were extremely slow to adapt to the new technology, even though it would create massive new markets and make their operations more efficient. In the mid 1990s they did an about turn and threw hundreds of billions of dollars into various electronic commerce ventures. However, most of them are kings with no clothes. The sale of stocks was all the capitalists cared about and ridiculous money was poured into hopeless lossmakers like the British internet company "Freeserve", which cannot and will not ever make money. Freeserve was recently valued at £1.5 billion or £1500 for every user, so how they are supposed to make this money remains a mystery.

In 1957 the Advanced Research Projects Agency ARPA was formed by the US Department of Defence to develop technology for military usage to combat the threat posed by the Soviet Union‘s satellite launch, Sputnik.

The problem of how to keep in regular contact led to the creation of ARPANET, which linked the computer systems together in a way that sent data in multiple tiny packets (packet switching). This allowed data to reach its destination via diverse routes, which would find their way to their destination even if a nuclear bomb destroyed parts of the network.

Communications

The Internet-working Working Group (INWG) was formed in 1972 introducing standardised protocols, which had to be the core of such data transfers. From 1973 the internet became international developing gradually until 1991, when the world wide web was publicly released. Since that time the internet has expanded faster than any other communications medium.

Although the internet started as a military project, the core of the internet has been maintained and developed by various co-operative organisations where the work of the collaborators is voluntary. This is a fact barely mentioned in the mass media. The most influential group is the internet society (ISOC) formed in 1992. The motivation for their collective work is purely to assist the development of the internet.

High-Speed

The internet has challenged all this though. Through being able to transfer data from remote computers onto your own, distribution costs have effectively disappeared. Eventually when high-speed communications systems are introduced, no one will buy a CD-ROM and every programme will be downloaded from the internet. Microsoft's method of distribution by CD-ROM is like selling TV programmes on video tapes. But to make the internet the means of distribution for large computer programmes, video and three- dimensional moving imagery, requires high-speed communications systems to the home.

The entire global telecommunications system is being held back by narrow profit motivation.

In early September it was announced that technology that could provide high speed internet access through the electricity supply had been shelved. British Telecom have sat on fast speed access “ADSL” technology for over two years because it makes such huge profits out of the outdated phone system and the ISDN system. To this day they are touting ISDN to business and home users as a communications “revolution”.

The reason for their sloth-like behaviour is that ADSL will eventually replace the phone system and that may eat into BT’s vast profits.

Finally after years of delay BT have announced they will introduce ADSL from next March and Cable companies will introduce similar speed Cable modems in Spring 2000. The Labour government should immediately renationalise BT, provide free access to the internet from every home and inject massive financial support into Linux programming and internet content providers. This would break the stranglehold that the multinationals hold over mass communications. ***Linux***

In computer programming, the real challenger is co-operative work such as we are seeing with the Linux computer system. The concept behind Linux is that information belongs to the public domain under General Public License, this is the exact opposite of capitalist “Intellectual Property Rights”, which hold that ideas are personal property and the owner has a right to payment for every copy of their programme.

Linux is an operating system that works by providing the “source codes” for all programmes that run on it, so there are no secrets, errors can be corrected immediately and development has no limits, unlike private copyrighted source codes of commercial companies. Linux can be made to run any computer operation you can imagine, and an infinite variety you cannot yet think of - and it is free.

According to the UN Human Development Report, the Linux “Apache” programme now runs over 50% of all web servers world-wide, and the Financial Times reports 70% of e-mail is sent on Linux’s “Send Mail” programme. In other words the internet is being run by co-operative endeavour.

The largest 200 multinationals dominate the world economy, but when they are publicly owned, all their operations knowledge will be available through the internet. This will enable the consumers and producers to democratically plan human development for peace, freedom and plenty.

Internet Marketing Services

There are many companies that offer Internet marketing services for getting the most out of website and digital marketing campaigns.A team of experienced consultants, designers, web editors and SEO specialists will lend a hand. Pay Per Click services and Search Engine Optimization services are also offered.

Popular Uses of the Internet

Usage of the Internet is becoming more common due to rapid advancement of technology and the power of globalization. Societies are becoming more inter- connected. Thoughts from different cultures are shared through the use of Internet chat rooms and web postings. Study results also track the most popular uses of the Internet "this year's study shows that e-mail is the top task conducted online, followed by general surfing, reading News, shopping, and seeking entertainment News." It can be summarized that the Internet is now being used for common, everyday tasks that would have normally taken more time to complete.

Internet shopping is becoming popular amongst users in developed nations, as it is more efficient to 'shop on the Internet' than to go physically into the stores. The Internet provides a virtual environment where consumers' demands are met with supplies. For example, research has shown that shopping on the Internet can result in lower search costs and better product selections. This is because the shopper has the ability to analyze prices from various stores without having to travel distances. The shopper can now shop online for goods that are for sale in a foreign nation, and rather than having to travel to the country to receive the goods, the consumer can order online and get it delivered efficiently. According to the Ernst and Young Survey ('Internet Shopping' 1998), prospective shoppers viewed price savings and selection as more important benefits than convenience, which was ranked third. However, using the Internet we have the capacity to achieve both, having the ability to offer shoppers convenience as well as better prices.

Not only has the Internet achieved a more equitable trading environment for consumers, it also gives us the potential to communicate more effectively and efficiently.

For example, the cost of sending an email is generally cheaper than posting a letter in the mail, especially for people wishing to communicate internationally. Furthermore, an email can be sent immediately after it is written, and does not need to go through official procedures such as the Post Office and a mail box. The recipient of the email is able to access it from anywhere, as it is a virtual communication tool, as opposed to having a physical mail box where the letters are delivered. Thus, clearly, an Internet communication tool such as the Internet is extremely valuable, especially for travelers who need to be able to be interconnected with their 'old' lifestyle whilst journeying to experience foreign cultures.

The power of the Internet not only extends to people who need the convenience of shopping, and to be able to easily communicate with associates and friends, but the Internet also provides an environment for News sharing and encourages people to be updated with the News.

Unfortunately, as there currently isn't any appropriate 'virtual filtering system' software out there, although there are many News articles available, they are from the perspective of international media institutions. However, the Internet is constantly changing and is becoming more accommodating to the individual as opposed to just catering to international corporations. Many academics believe that the Internet is a form of communication for people who want to express their own opinions and who don't want to be repressed by the wealthy, whom are often seen as domineering as they hold too much power in a capitalist society.

Furthermore, many teenagers would also confirm that they have had many positive experiences with the Internet as they believe it is a place for them to 'escape' from the pressures of reality and enjoy the entertainment that this system has the ability to provide. Computer games, although some would argue that they actually distract people from reality, provide the opportunity for individuals to express creativity and challenge themselves. Interactive computer games provide an environment where individuals are allowed to explore foreign surroundings and take risks that will result in no harm to the game player.

The Internet appeals to the younger generation not only because of entertainment purposes, but young academics have also agreed that the Internet creates convenience to research and university students. This is because many different articles can be found on a specific topic, and not only is the opinions of academics read, but people with unique experiences and in different professions are also heard and critically analyzed.

In conclusion, popular uses of the Internet have largely contributed to the advancement of society. More people are now turning to this phenomenon in order to have an efficient lifestyle where the maximum number of tasks can be achieved everyday. Although some would argue that people are becoming too reliant on the Internet, others would argue that it is a freedom of choice and it is the individuals' choice to be able to choose how much they should be using the Internet per day, and on how dependent they want to be. Ultimately, the Internet is a tool that is effective when used appropriately and effectively and it is at the discretion of the individual. As quoted by Schipper, "the Internet is a tool that has both good and bad sides; let's weed out the bad ones."

Uses of Intranets

Implementation benefits

- Fast, easy, low-cost to implement
- Based on open standards
- Connectivity with other systems
- Many tools available
- Scalable

Usability Benefits

- Easy to learn and use
- Multimedia
- Hypertext links
- Single interface to information resources and services

Organizational Benefits

- Access to internal and external information
- Improves communication
- Increases collaboration and coordination
- Supports links with customers and partners
- Can capture and share knowledge

Uses of Extranets

An extranet is a private network that uses Internet protocols, network connectivity, and possibly the public telecommunication system to securely share part of an organization's information or operations with suppliers, vendors, partners, customers or other businesses.

An extranet can be viewed as part of a company's Intranet that is extended to users outside the company (eg normally over the Internet). It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers.

Briefly, an extranet can be understood as "a private internet over the Internet". Another very common use of the term "extranet" is to designate the "private part" of a website, where "registered users" can navigate, enabled by authentication mechanisms on a "login page".

Security

An extranet requires security and privacy. These can include firewalls, server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPNs) that tunnel through the public network.

Industry Uses

During the late 1990s and early 2000s, several industries started to use the term "extranet" to describe central repositories of shared data made accessible via the web only to authorised members of particular work groups.

There are a variety of commercial extranet applications, some of which are for pure file management, and others which include broader collaboration and project management tools.

Advantages

1. Extranets can improve organization productivity by automating processes that were previously done manually (eg reordering of inventory from suppliers). Automation can also reduce the margin of error of these processes.

2. Extranets allow organization or project information to be viewed at times convenient for business partners, customers, employees, suppliers and other stake-holders. This cuts down on meeting times and is an advantage when doing business with partners in different time zones.

3. Information on an extranet can be updated, edited and changed instantly. All authorised users therefore have immediate access to the most up-to- date information.

4. Extranets can improve relationships with key customers, providing them with accurate and updated information.

Disadvantages

1. Extranets can be expensive to implement and maintain within an organisation (eg hardware, software, employee training costs) - if hosted internally instead of via an ASP.

2. Security of extranets can be a big concern when dealing with valuable information. System access needs to be carefully controlled to avoid sensitive information falling into the wrong hands.

3. Extranets can reduce personal contact (face-to-face meetings) with customers and business partners. This could cause a lack of connections made between people and a company, which hurts the business when it comes to loyalty of its business partners and customers.

Glossary of Terms

Analytical model A structure and process for analyzing a dataset. For example, a decision tree is a model for the classification of a dataset.

Artificial neural networks Non-linear predictive models that learn through training and resemble biological neural networks in structure.

Classification The process of dividing a dataset into mutually exclusive groups such that the members of each group are as "close" as possible to one another, and different groups are as "far" as possible from one another, where distance is measured with respect to specific variable(s) you are trying to predict. For example, a typical classification problem is to divide a database of companies into groups that are as homogeneous as possible with respect to a creditworthiness variable with values “Good” and “Bad.”

Clustering The process of dividing a dataset into mutually exclusive groups such that the members of each group are as “close” as possible to one another, and different groups are as “far” as possible from one another, where distance is measured with respect to all available variables.

Data cleansing The process of ensuring that all values in a dataset are consistent and correctly recorded.

Data mining The extraction of hidden predictive information from large databases.

Data navigation The process of viewing different dimensions, slices, and levels of detail of a multidimensional database. See OLAP.

Data visualization The visual interpretation of complex relationships in multidimensional data.

Data warehouse A system for storing and delivering massive quantities of data.
Decision tree A tree-shaped structure that represents a set of decisions.

These decisions generate rules for the classification of a dataset.

Genetic algorithms Optimization techniques that use processes such as genetic combination, mutation, and natural selection in a design based on the concepts of natural evolution.

Logistic regression A linear regression that predicts the proportions of a categorical target variable, such as type of customer, in a population.

Multidimensional database A database designed for on-line analytical processing. Structured as a multidimensional hypercube with one axis per dimension.

Multiprocessor computer A computer that includes multiple processors connected by a network. See parallel processing.

OLAP On-line analytical processing. Refers to array-oriented database applications that allow users to view, navigate through, manipulate, and analyze multidimensional databases.

Outlier A data item whose value falls outside the bounds enclosing most of the other corresponding values in the sample. May indicate anomalous data. Should be examined carefully; may carry important information.

Parallel processing The coordinated use of multiple processors to perform computational tasks. Parallel processing can occur on a multiprocessor computer or on a network of workstations or PCs.

Retrospective data analysis Data analysis that provides insights into trends, behaviors, or events that have already occurred.

Time series analysis The analysis of a sequence of measurements made at specified time intervals. Time is usually the dominating dimension of the data.

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UNIT – III

Unit Structure:

Lesson 3.1 - E-Business Systems
Lesson 3.2 - E-Commerce Systems

Lesson 3.1 - E-Business Systems

Learning Objectives

In this lesson, we will introduce you to the concept of E-business systems, how the activities to be performed and how the problems can be solved. After you work out this lesson, you should be able to

- Understand the application of IT in the functional areas of management
- Define a Cross-functional enterprise system and its elements
- Explain e-business models

In this lesson, we will discuss the following

- Functional business systems
- Customer Relationship Management – orientation and solutions
- Enterprise Resource Planning
- Supply Chain Management – process and components
- E-business models

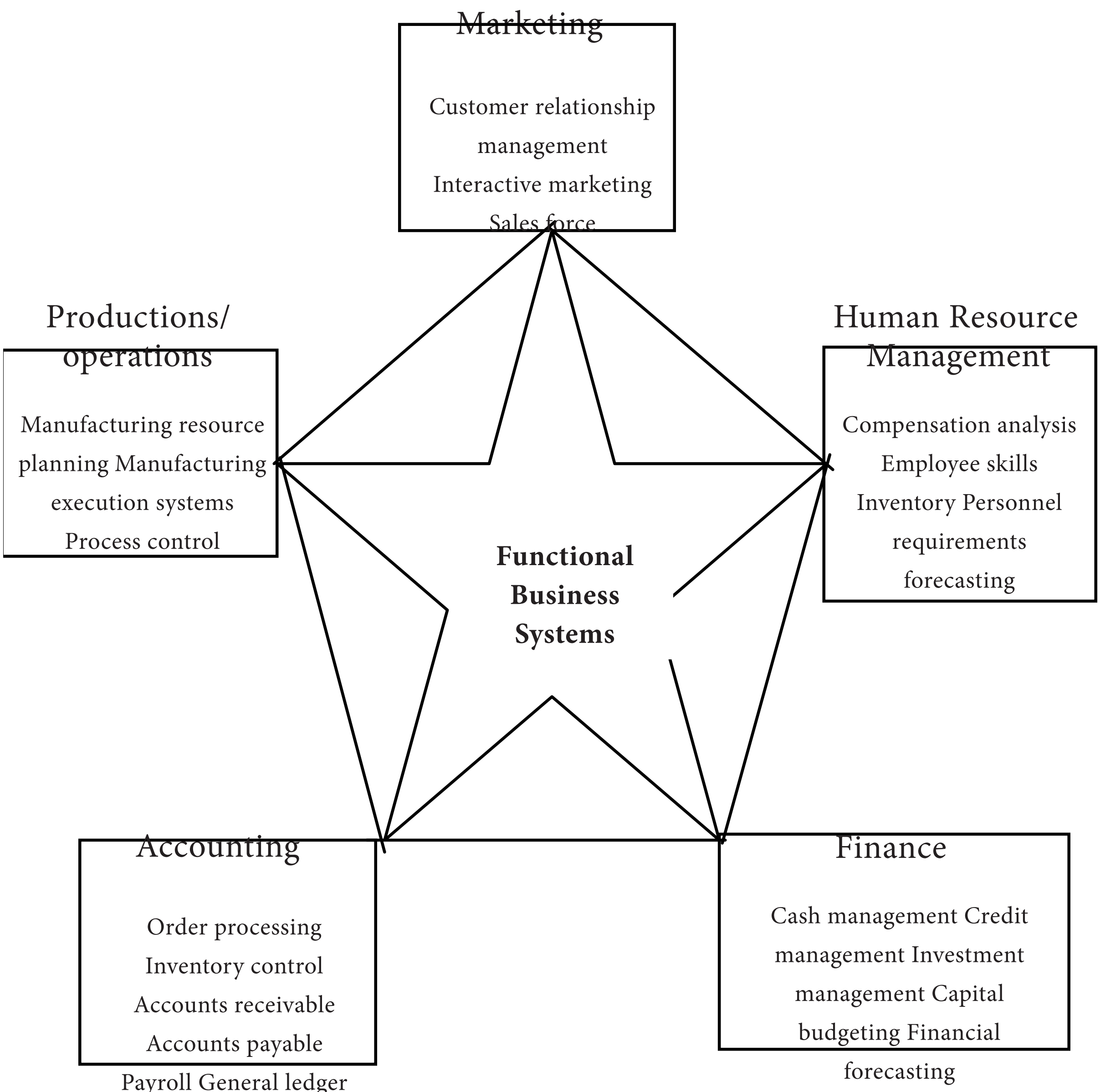
Functional Business Systems

Introduction

There are as many ways to use information technology in business as there are business activities to be performed, business problems to be solved, and business opportunities to be pursued. A business professional should have a basic understanding and appreciation of the major ways information systems are used to support each of the functions of business that must be accomplished in any company that wants to succeed. Thus, in this section, Functional business systems, that is, a variety of types of information systems (transactionprocessing, management information, decision support, etc) that support the business functions of accounting, finance, marketing, operations management, and human resource management are described.

IT in Business

A business professional should have a specific understanding of how information systems affect a particular business function – marketing, for example – or a particular industry (e.g. banking) that is directly related to his/her career objectives.



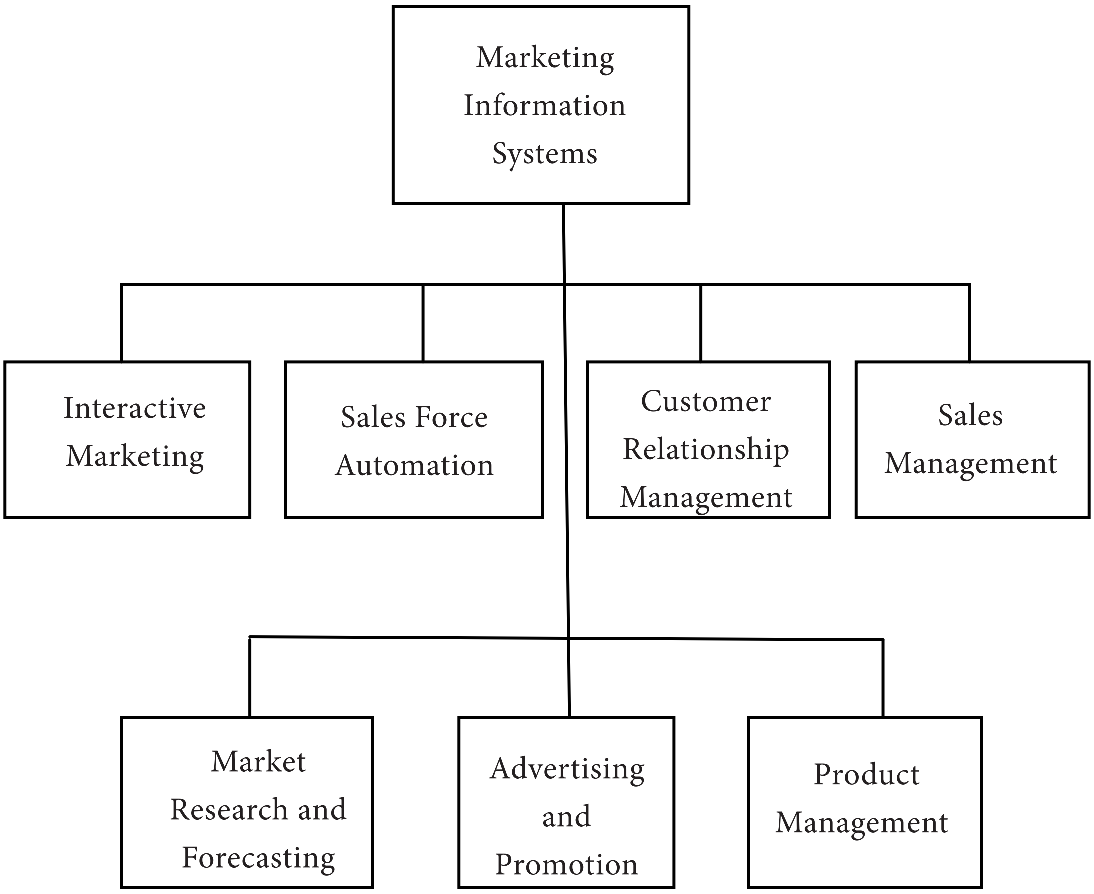
Examples of functional information systems.

For example, someone whose career objective is a marketing position in banking should have a basic understanding of how information systems are used in banking and how they support the marketing activities of banks and other firms.

Figure illustrates how information systems can be grouped into business function categories. Thus, information systems in this section will be analyzed according to the business function they support by looking at a few key examples in each functional area. This should give you an appreciation of the variety of functional business systems that both small and large business firms may use.

Marketing Systems

The business function of marketing is concerned with the planning, promotion, and sale of existing products in existing markets, and the development of new products and new markets to better attract and serve present and potential customers. Thus, marketing performs a vital function in the operation of business enterprise. Business firms have increasingly turned to information technology to help them perform vital marketing functions in the face of the rapid changes of today's environment.



Marketing Information Systems provide information technologies to support major components of the marketing system.

Figure illustrates how *marketing information systems* provide information technologies that support major components of the marketing function. For example, Internet/intranet websites and service make an interactive marketing process possible where customers can become partners in creating, marketing, purchasing, and improving products and services.

Sales force automation systems use mobile computing and internet technologies to automate many information processing activities for sales support and management. Other marketing information systems assist marketing managers in customer relationship management, product planning, pricing, and other production management decisions, advertising, sales promotion, and targeted marketing strategies, and market research and forecasting.

Human Resource Systems

The human resource management (HRM) function involves the recruitment, placement, evaluation, compensation, and development of the employees of an organization. The goal of human resource management is the effective and efficient use of human resources of a company. Thus human resources information systems are designed to support

(1) Planning to meet the personal needs of the business,
(2) Development of employees to their full potential, and
(3) Control of all personnel policies and programs.

Originally, businesses used computer based information systems to

(1) Produce paychecks and payroll reports,
(2) Maintain personnel records, and
(3) Analyze the use of personnel in business operations.

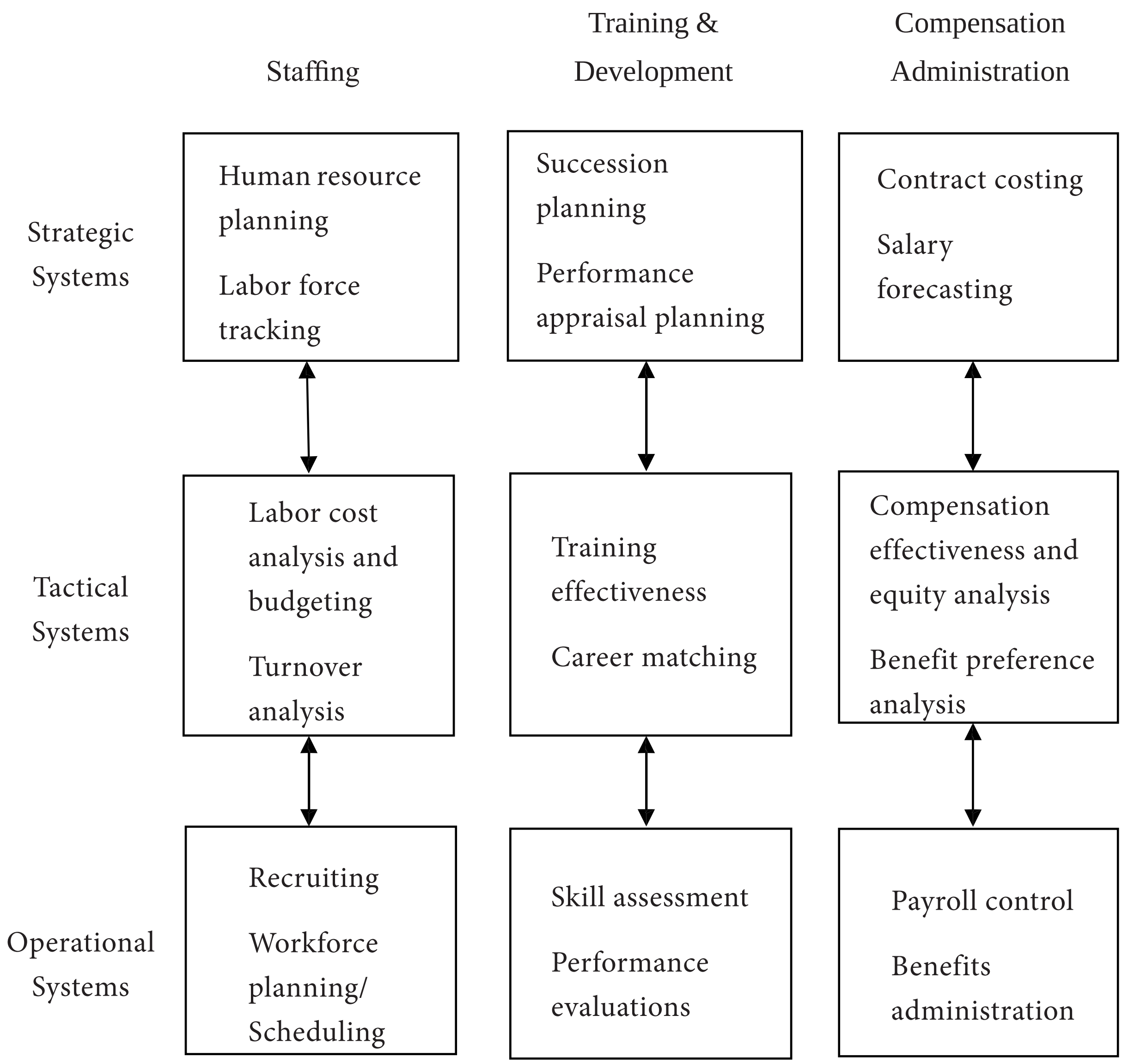
Many firms have gone beyond these traditional personnel management functions and have developed human resource information systems (HRIS) that also support

(1) Recruitment, selection, and hiring;
(2) Job placement;
(3) Performance appraisals;

(4) Employee benefit analysis;

(5) Training and development; and

(6) Health, safety, and security. See Figure.



Human resource information systems support the strategic and operational use of the human resources of an organization.

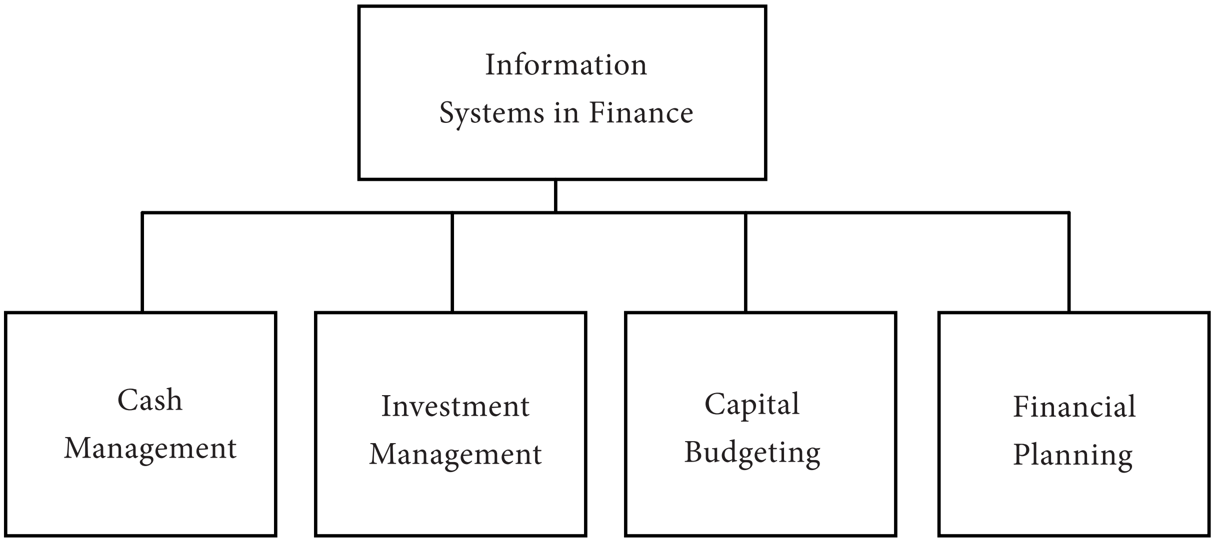
Financial Management Systems

Computer based *Financial management systems* support business managers and professionals in decision concerning

(1) The financing of a business and

(2) The allocation and control of financial resources within a business.

Major financial management system categories include cash and investment management, capital budgeting, financial forecasting, and functional planning. See Figure



Examples of important financial management systems

For example, the *capital budgeting* process involves evaluating the profitability and financial impact of proposed capital expenditures. Long-term expenditure proposals for facilities and equipment can be analyzed using a variety of return on investment (ROI) evaluation techniques. This application makes heavy use of spreadsheet models that incorporate present value analysis of expected cash flows and probability analysis of risk to determine the optimum mix of capital projects for a business.

Financial analysts also typically use electronic spreadsheets and other financial planning software to evaluate the present and projected financial performance of a business. They also help determine the financing needs of a business and analyze alternative methods of financing.

Financing analysts use financial forecasts concerning the economic situation, business operations, types of financing available, interest rates, and stock and bond prices to develop an optimal financing plan for the business. Electronic spreadsheet packages, DSS software, and Web-based groupware can be used to build and manipulate financial models.

Manufacturing Systems

Manufacturing information systems support the production/operations function that includes all activities concerned with the planning and control of the processes producing goods and services. Thus, the production/operations function is concerned with the management of the operational processes and systems of all business firms. Information systems used for operations management and transaction processing support all firms that must plan, monitor, and control inventories, purchases, and the flow of goods and services. Therefore, firms such as transportation companies, wholesalers, retailers, financial institutions, and service companies must use production/operations information systems to plan and control their operations.

Cross Functional Enterprise Applications

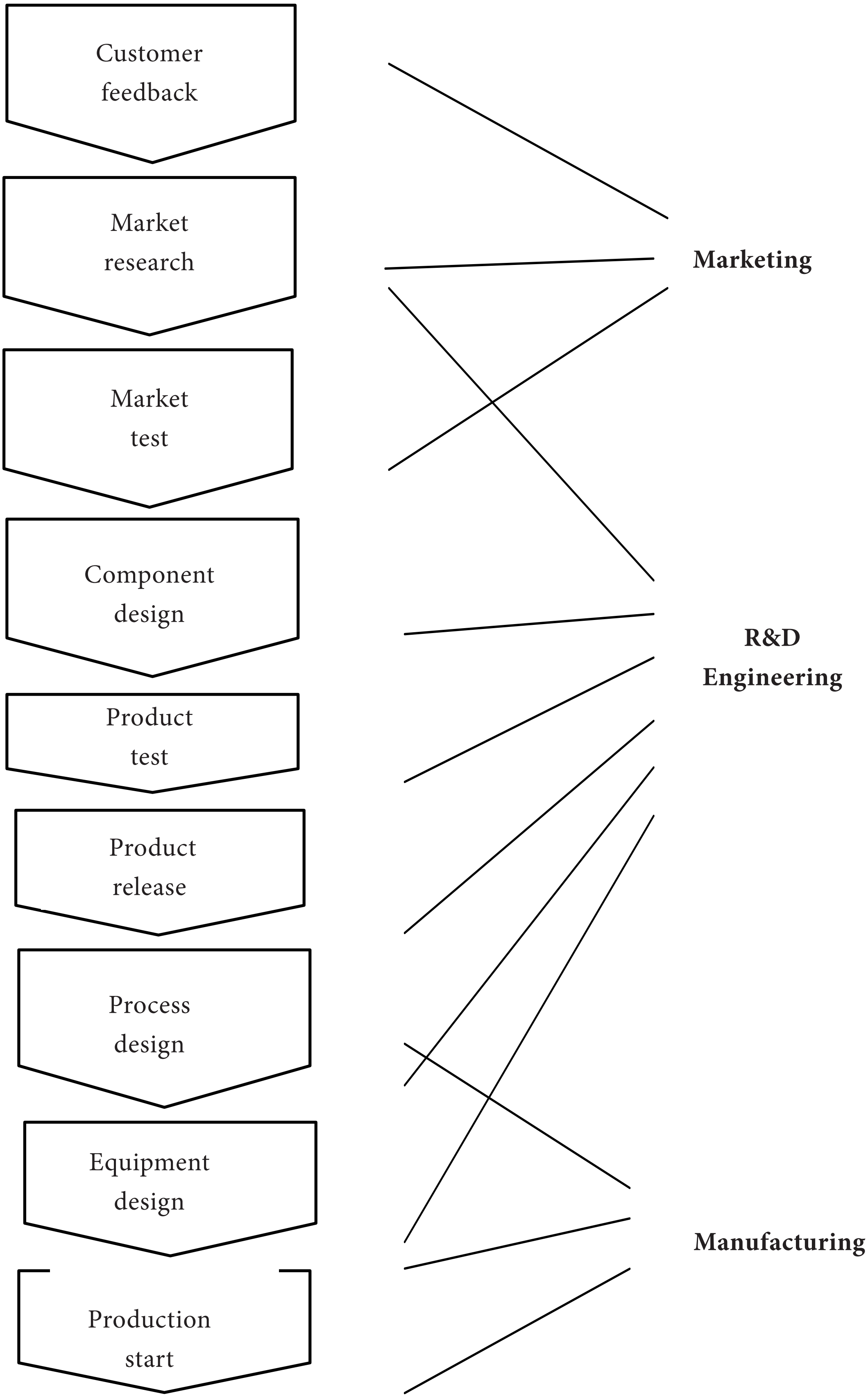
Many companies today are using information technology to develop integrated Cross-functional enterprise systems (refer Figure) that cross the boundaries of traditional business functions in order to reengineer and improve vital business processes all cross the enterprise. These organizations view cross- functional enterprise systems as a strategic way to use IT to share information resource and improve the efficiency and effectiveness of business processes, and develop strategic relationships with customers, suppliers, and business partners.

Enterprise Application Architecture

Figure presents an enterprise application architecture, which illustrates the inter-relationships of the major cross-functional enterprise applications that many companies have or are installing today. This architecture does not provide a detailed or exhaustive application blueprint, but provides a conceptual framework to help you visualize the basic components, processes, and interfaces of these major e-business applications, and their interrelationships to each other.

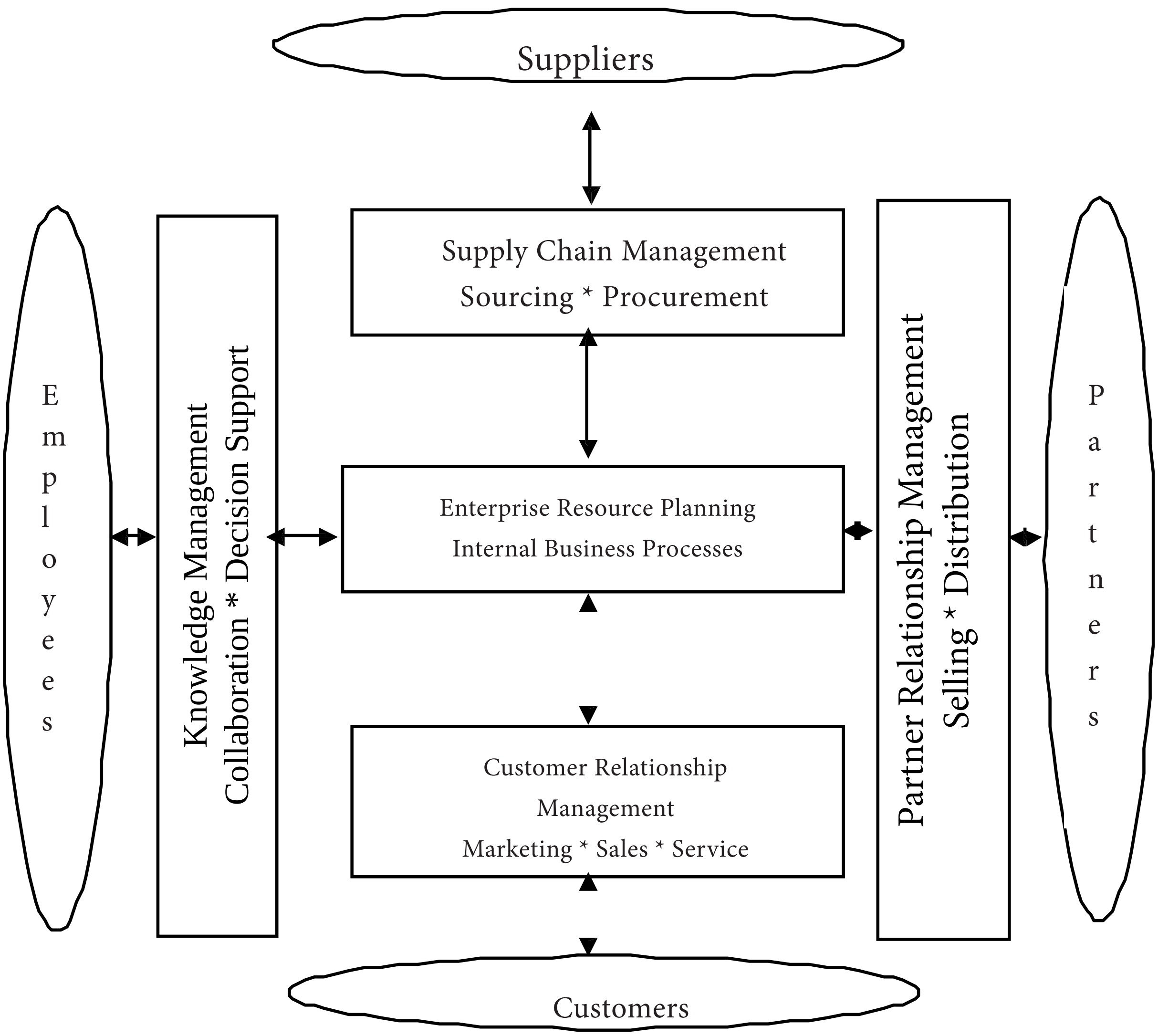
This application architecture also spotlights the roles these business systems play in supporting the customers, suppliers, partners, and employees.

Notice that instead of concentrating on traditional business functions, or only supporting the internal business processes of a company, enterprise applications are focused on accomplishing fundamental business processes in concert with a company's customer, supplier, partner, and employee stakeholders.



Example of a business process that must be supported by cross functional information systems Suppliers

Thus, enterprise resource planning (ERP) concentrates on the efficiency of a firm's internal production, distribution, and financial processes. Customer relationship Management (CRM) focuses on acquiring and retaining profitable customers via marketing, sales, and service processes. Partner relationship management (PRM) aims at acquiring and retaining partners who can enhance the selling and distribution of a firm's products and services. Supply chain management (SCM) focuses on developing the most efficient and effective sourcing and procurement processes with suppliers for the products and services needed by a business. Knowledge management (KM) applications focus on providing a firm's employees with tools that support group collaboration and decision support.



Enterprise application architecture

To provide a fast and effective ordering and delivery process to their customers, companies like IBM and Apple have turned their expertise and the technology inward. The result is an example of an enterprise system. An enterprise e- business system requires end-to-end connectivity across all of the different processes, from the company's legacy systems to the outer reaches of its suppliers, customers, and partners.

In the personal computing world, customers want a system configured exactly the way they want it, and they want it as fast as possible. To accommodate these market pressures, PC manufacturers are developing and implementing configure-to-order enterprise systems.

Consider the real-time, configure-to-order system that IBM has created for its personal systems division. A customer in Europe can configure a personal computer on IBM's website and get real-time availability and order confirmation. While this seems simple enough, to make this action possible it took a team of analysts and programmers and hundreds of man-years of effort to develop the myriad business processes and systems that need to work together.

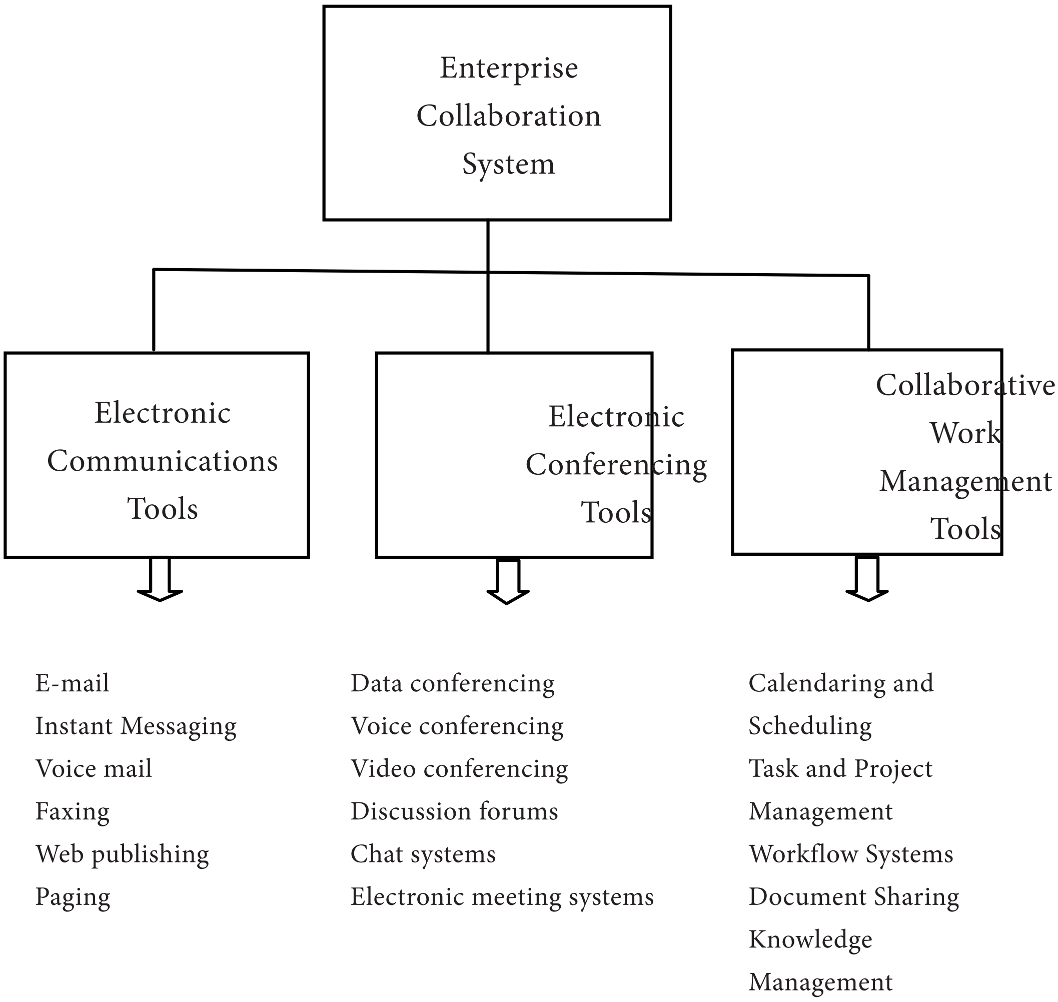
Here's what happens when a European customer places an order with IBM The other travels to IBM fulfillment engine located in the United Kingdom; its e- commerce engine located in Colorado, USA; its ERP and production management systems located in North Carolina, USA; its sales reporting system located in Connecticut, USA; its product database located in New York; and back to the customer's browser in Europe. Every system updates its status and communicates with every other system in real time. And each order placed in Europe zips across the Atlantic an average of four times. In its journey, it touches dozens of geographical units, legacy systems, and databases strewn across the globe.

Enterprise Collaboration Systems

Enterprise Collaboration Systems (ECS) are cross-functional information systems that enhance communication, coordination, and collaboration among the members of business teams and workgroups. Information Technology, especially Internet technologies, provides tools to help us collaborate—to communicate ideas, share resources, and coordinate our competitive work efforts as members of the many formal and informal process and project teams and workgroups that make up many of today's organizations. Thus, the goal of enterprise collaboration systems is to enable us to work together more easily and effectively by helping us to

- *Communicate* sharing information with each other.
- *Coordinate* Coordinating our individual work efforts and use of resources with each other.
- *Collaborate* Working together cooperatively on joint projects and assignments.

For example, engineers, business specialists, and external consultants may form a virtual team for a project. The team may rely on intranets and extranets to collaborate via e-mail, videoconferencing, discussion forums, and a multimedia database of work-in-progress information at a project website. The enterprise collaboration system may use PC workstations networked to a variety of servers on which project, cooperate, and other databases are stored. In addition, network servers may provide a variety of software resources, such as Web browsers, groupware, and application packages, to assist the team's collaboration until the project is completed.



Electronic communications, conferencing, and collaborative work software tools enhance enterprise collaboration.

Customer Relationship Management

Beyond the glamour of developing the e-channel, business is investing to deploy customer relationship management in traditional channels. In most cases, these capabilities are developed independently, requiring expensive integration later on to achieve the vision of true customer relationship management on an enterprise-wide scale. Integration of these resources is one of the key challenges of successful deployment of CRM across the enterprise.

This is because it has a direct impact on the consistency of the customer experience with the enterprise. So how does the enterprise integrate systems across functions and channels? It does not happen by accident, but through foresight and planning. All the functions and the channels must come together to be fully integrated with maximum efficiency and effectiveness. This technology spreads customer information throughout the enterprise and it must be based on unified information architecture.

Independently developed CRM capabilities usually begin based on function-specific short-term needs. Marketing begins to implement CRM with a variety of products, often combined with integrated suites to plan, execute, and monitor marketing campaigns and perform database marketing.

Lead management and sales force automation capabilities are deployed to support mass customization and to provide up-to-the minute information about the goods in transit, to the customer. Field service representatives and contact centers deploy sophisticated telephony and information systems to provide ongoing customer service and cross-selling.

These separate capabilities do provide a means to support function-specific and channel-focus. Sales and marketing can focus on retention and increase of share of customers instead of acquisition and market share. Customer service can identify and take advantage of cross-sell and up-sell opportunities.

However, customer information does not freely flow across the enterprise. To obtain the vision of customer relationship management, information must move about freely. This requires integration.

And the e-channel is the vision of customer relationship management realized. Customer information must flow like water within, around, and through these functions and channels to ensure that the enterprises can build mutually beneficial relationship with the customers, and even amongst their customers. Everyone in the enterprise participating in the conversion with the customer needs access to the latest information on the customer's profile, behavior, and expressed needs.

Marketing provides the latest promotions and offers for individual customers, based on their interactions on the website. Products are customized to meet specific customer needs and customer service is fully done, resulting in increased levels of customer satisfaction and loyalty.

With an enterprise-wide view of each customer, the value of each relationship is measurable, and each relationship is managed based on this value. Every customer touch becomes an opportunity to modify customer behavior in a beneficial way based on the totality of information at the disposal of the enterprise. Achieving this vision results in unprecedented competitive advantage in some industries or mere survival in other industries.

E-CRM Solutions

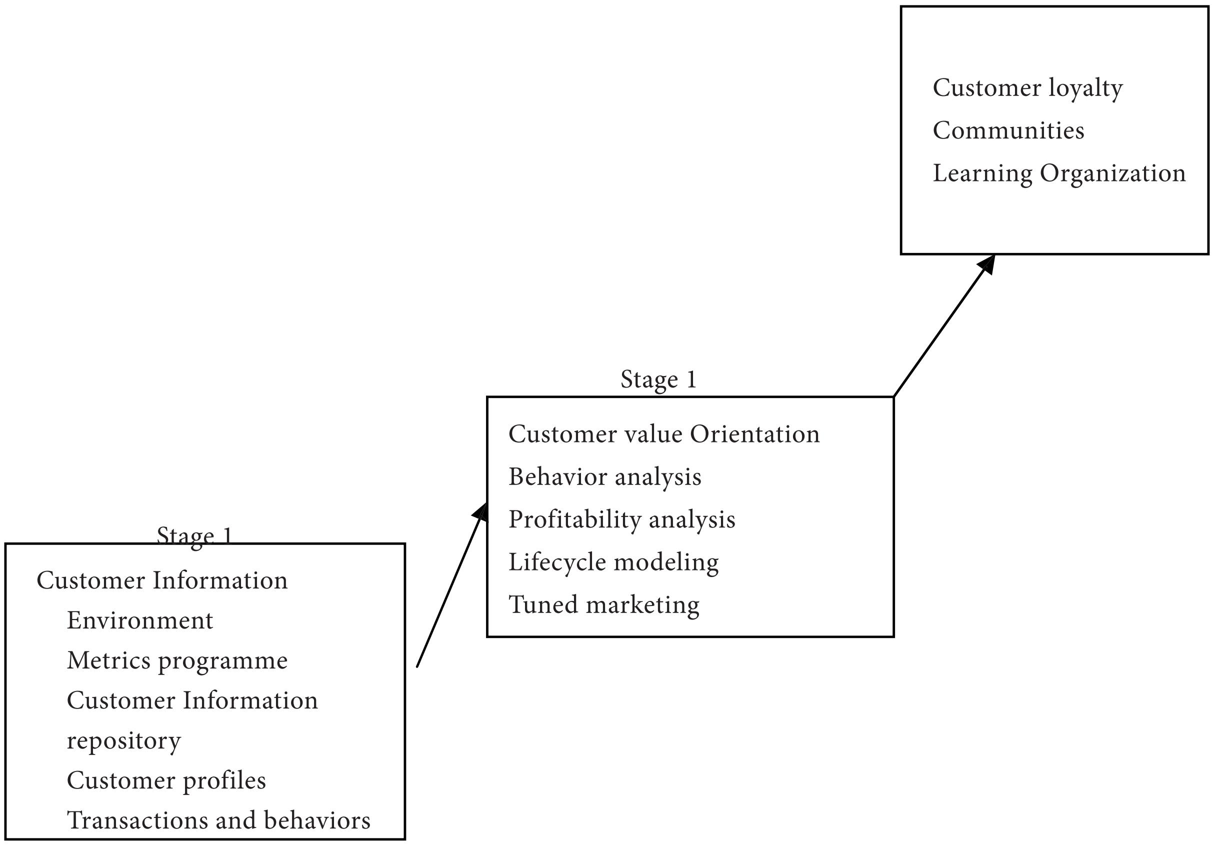
E-CRM solutions can be deployed and managed to provide increased revenues and decreased costs for companies while improving customer service. E-CRM goals can be achieved with internet business strategies, web-based CRM specification development, web systems design and project management, interactive interface design and electronic publishing. The strategy for e-CRM can be visualized in three stages, as given in Figure.

How Technology can help a Business thru Customer Relationships

Interactive computer and communications technology can assist in the sales and support process in several ways. Telephone, live chat and e-mail can enhance the effectiveness of customer service representatives.

Computer-mediated e- mail, chat and animated chat can take over when a human representative is exhausted. They can serve as a filter, answering all but the most difficult questions for the representatives.

Stage 1



Strategies of a customer focused business

Reducing Cost Per Contact

One of the effects of adding the appropriate technology to the customer support or sales mix is that there is often a reduction in the cost per contact, i.e. the money spent to connect with each customer. The cost per contact tends to be highest for personal, one-on-one interactions, simply because the representative's full attention is necessarily focused on a single customer. The customer receives the full benefit of the representative's training during the period of contact, as well as many of the resources that result in direct and indirect costs to the company.

Decreasing Developing Time

Customer representatives are expensive to train, to keep motivated, and to retain, especially in this state of the economy. Training a representative for a new product or service may take a few days or up to several weeks, depending on the complexity and the number of products and services the representative is expected to sell or support. Development time is the greatest for representatives who work face-to-face with customers. One reason for this is that it includes recruiting time.

Good all-round salespeople and representatives with fascinating manners, speech, dress, and charisma are hard to find. A business may be lucky enough to locate a representative who has excellent live chat skills, but whose squeaky voice may not do in phone support and whose green hair might not present the business is looking for in person-to-person sales.

Creating Emotional Bonds

Although the golden standard for creating an emotional bond between the customer and a company is to have a dedicated, charismatic salesperson or a representative, technology can be of great help in creating an emotional bond. Live chat is also capable of supporting a meaningful dialogue that can help create an emotional bond, but it is not as powerful as the phone or direct contact. Since e-mail lacks most of the cues we normally associate with a conversation such as immediacy, it has the lowest likelihood of creating a meaningful emotional bond.

Presenting Emotive Content

Human beings are emotional creatures. We react to not only language and voice intonation and the subject, but also to dozens of subtle cues, in the form of physical gestures.

Displaying Empathy

Great salespeople and customer representatives are emphatic; they can understand the customer's situation or at least give the impression that they do. It is the impression that matters to customers; they want to feel that they have been listened to. This feeling can be communicated best in person, but to some degree over a phone conversation and to a lesser extent over a live chat conversation. Because it lacks immediacy, e-mail tends to be a poor communications conduit for emphatic thoughts and feelings.

Reducing Human Error

Humans are simply more error-prone than computers when it comes to manipulating symbols and values. Assuming there is an accurate customer data to work with; computer-mediated customer communications can have a much lower error rate than human-mediated communications in tracking orders, verifying charges, and identifying repeat customers.

Increasing Flexibility

While computers might excel in flawlessly following human instructions, good customer service representatives excel in flexibility. Regardless of the touch- point, a good representative, when properly trained, can help rectify errors or retrieve missing data that current computer mediated systems cannot.

Improving Interactivity

Interactivity, the ability of representatives to respond to a customer's queries in near real-time, is best in person and over the phone. E-mail interactivity suffers from an inherent lag from the time a problem statement is made to the response, but the lag time tends to be smaller when the e-mail is computer-mediated. Chat, whether live or computer-mediated, can support a moderate level of interactivity.

Increasing Continuity

From the customer's perspective, continuity can be extended with computer-mediated chat and e-mail. Continuity is important in forming a bond with customers, especially with personal, and to a lesser extent, phone interactions. Computer-mediated communications can provide infinite continuity. For example, the names used to identify a chat bot can be held constant, and the appearance of animated figures used in animated chat communications can remain constant as well.

Adding a Personal Touch

Even human-mediated communications tend to rely on computer-generated or warehoused customer data to the same extent that computer-mediated communications do. In other words, most touch-points are already leveraging computer technology to provide a personal touch.

Communicating Personality

Computer hardware, programs and websites, all have personalities. However, just as personal interactions tend to have a great potential to exhibit personality, animated chat, where an anthropomorphic figure can communicate with visual cues, text and even voice, has a much greater chance of communicating personalities to customers. The challenge is to create personalities that customers can relate to in a positive way.

Increasing Quality

The quality of customer dialogue tends to be highest when it is controlled by a good salesperson or motivated customer service representative. Phone, live chat, e-mail, and other touch-points can also be of high quality, but are usually not as high as of a good salesperson. Computer technology can help with these other touch-points by minimizing variability and otherwise contributing to quality control. Computer-mediated communications can have consistent, high-quality dialogues with customers, because all possible responses can be validated before they are presented to customers.

Providing Reassurance

An important aspect of the sales process is reassuring customers that their purchase decisions are correct, their problems have been solved, and that their products are on the way. Computer technology can be used for something as ordinary as helping reassure customers about the status of their order, or as sophisticated as creating a personal profile of customers and using it to explain why the products they just ordered are in their best interest.

Increasing Reliability

Humans vary in their reliability from person to person and from day to day. Computers are reliable machines as along as human-generated viruses do not attack them. A business can rely on computer-mediated communications with customers as long as it has tightly controlled parameters. In short, computers excel where reliability is an issue.

Improving Responsiveness

Properly trained sales and support staff can do a good job of responding to customer needs in a timely manner. E-mail has the lowest responsiveness of the human-mediated communication, simply because of the inherent delays in e- mail carries with it, a perceptible delay that is not noticed or at least is not significant in a live chat, for example. Because of the rapid 24×7 response made possible by computers, computer-mediated chat and animated chat are potentially much more responsive than a customer representative or salesperson could be.

Improving Return on Investment (ROI)

Generalizing the Return on Investment (ROI) for a customer representative or computer technology is complicated. There are always specific circumstances, such as the cost of the money and specifications of the people or computer technology involved.

However, in today's economy, it is generally understood that the turnover is high. This is especially true in the customer-support area, where temporary and seasonal workers fill a relatively large number of representative jobs. It is because of the variable nature of the labor supply and the low cost per contact for computer-mediated dialogue, that the ROI for computer-mediated support of all types is potentially greater than for human- mediated support.

Increasing Scalability

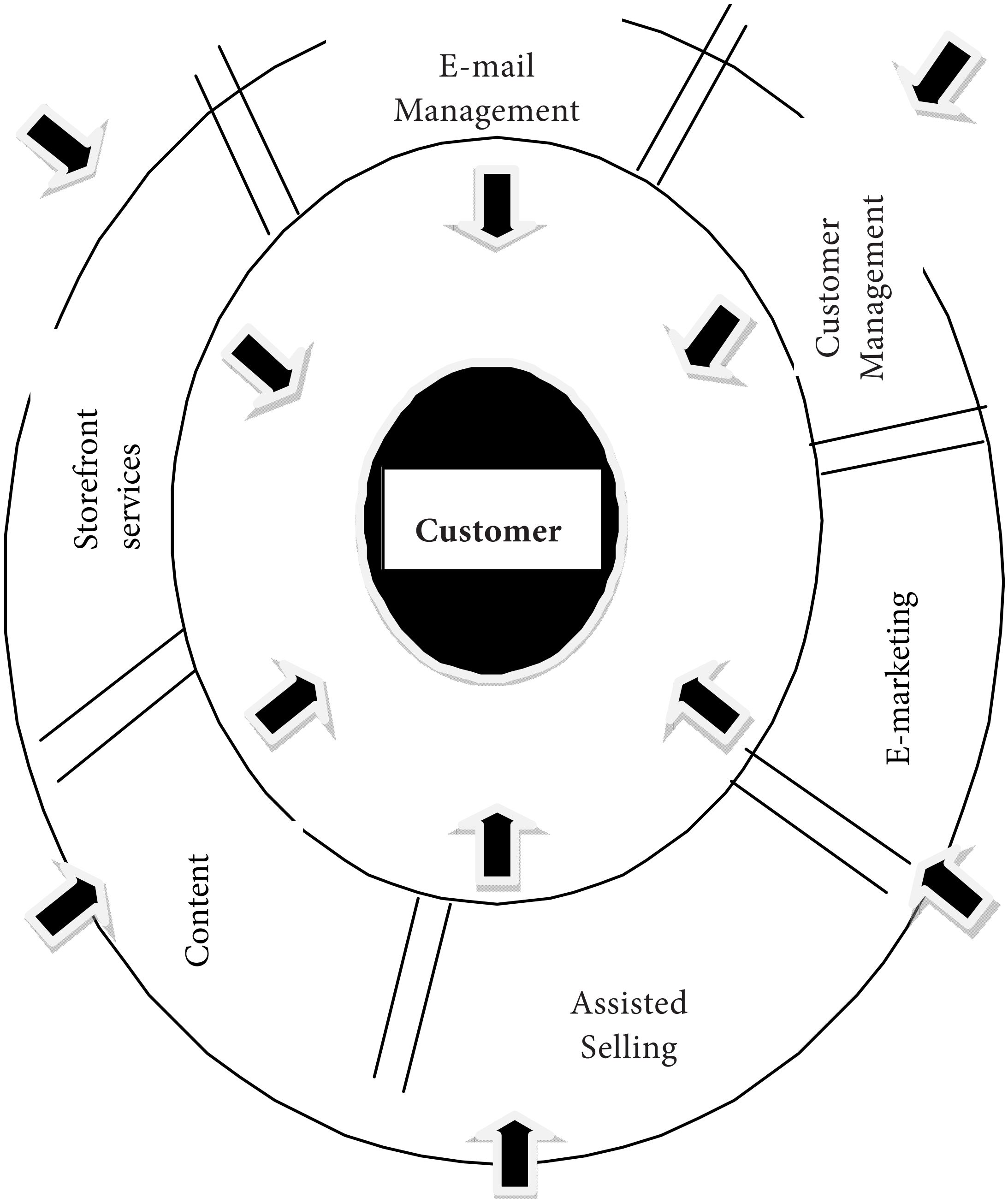
In general, humans do not scale very well. Most interactions are on a one-on-one basis, such as personal, phone, and live-chat communications. E-mail is scalable because it may be handled in batches, with the same generic answer being applied to hundreds of questions. In contrast, computer-mediated touch points are virtually infinitely scalable, given an adequate infrastructure, including supporting server hardware.

Decreasing Variability

Variability is a characteristic of human-mediated communications that is virtually absent in properly computer-mediated dialogues. The variability may be a nuisance, as for example, if the customer inquires about tax code information. An animated chat bot may not be as engaging as a human, but a business will know, to what information its customers are being exposed.

E-CRM Toolkit

An E-CRM 'toolkit' covers a wide diversity of channels (see figure). In order to bring true customer management across online business, one needs the E-CRM products to fulfill the following criteria



E-CRM toolkit

Is the system delivering the contents a customer wants to see? How is it being managed on the IT platform?

Storefront and Merchandising Services

With large numbers of visitors failing to complete transaction at the checkout, it is needed to ensure that your storefront services propel your customers to the cash point.

E-mail Management

Are e-mail campaigns focused to provide an offer that customer cannot refuse? How are these tied in with the websites so that customers enjoy a seamless experience?

Customer Management

Is the company managing data across all the sales and marketing functions to its best?

E-Marketing

How well are e-marketing efforts targeted? How well do they combine with online selling operation?

Assisted Selling

One needs only to look at the Dell business model to see how assisted selling can enhance the shopping experience and achieve business success. But what assisted selling approach will work best for any company?

Managing Customer Value Orientation and Life Cycle

The CRM industry has matured rapidly over the past few years. Contact managers have evolved into full-function sales force automation systems. CRM front-office suites now support marketing, sales and service. Integration between CRM systems and enterprise resource planning (ERP) is becoming more common, if not commonplace.

The E-CRM market is new and rapidly evolving. Implementing CRM for traditional front-office marketing, sales and service operations is becoming the top priority for most companies. That prospect has been challenging enough, being formidable to the new touch-points such as the web. Integration is still the key. Online or offline, client/server technology is still a major factor. Anyone who has implemented client/server applications between the various contact centers and touch-points within an enterprise can afford the complexity and the cost involved in them. In short, CRM is a square peg and e-business is a round hole. However, everything is changing with the introduction of new, web-based CRM solutions.

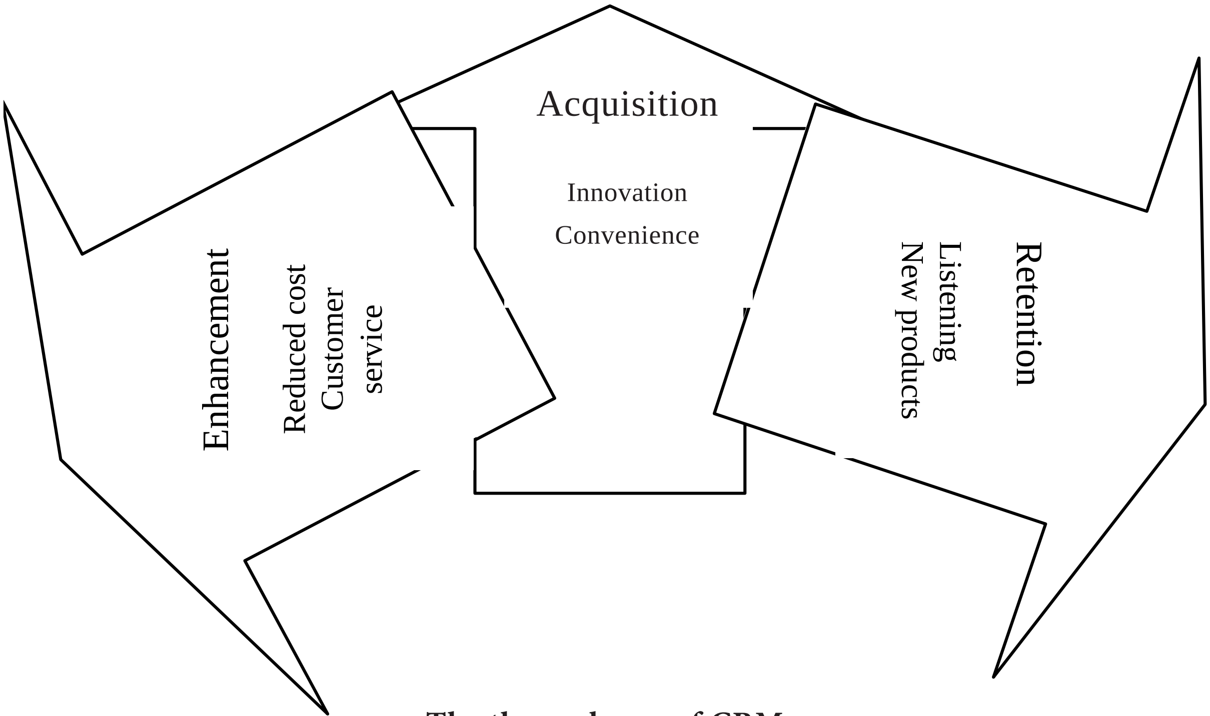
To help organize the chaos, E-CRM solutions can be grouped into two categories—web-based solutions and web-extended solutions.

The web-based CRM solutions are designed from the bottom up, exclusively for the internet. These are very innovative products, initially focused on the sales (e- commerce) function. More marketing and service capabilities will soon be added.

Web-extended CRM solutions are established (primarily client/server-based) CRM suites, originally designed for enterprise users with extensions, to include web-interface functions. There are three phases of CRM

1. Acquisition
2. Enhancement
3. Retention

Each has a different impact on the customer relationship, and each can more closely tie a company with its customer's life.



The three phases of CRM.

Acquisition

You acquire new customers by promoting product/service leadership that pushes performance boundaries with respect to convenience and innovation. The value proposition to the customer is the offer of a superior product backed by excellent service.

Enhancement

You enhance the relationship by encouraging excellence in cross-selling and up selling. This deepens the relationship. The value proposition to the customer is an advantage with greater convenience at low cost (one-stop shopping).

Retention

Retaining profitable customers for life should be the aim. Retention focuses on service adaptability, i.e. it delivers not what the market wants, but what the customer wants. The value proposition to the customer enhances a proactive relationship that works well with the best interest of the customers. Today, leading companies focus on retention of existing customers much more than on attracting new customers. The reason behind this strategy is simple If we want to make money hold on to customers.

All the phases of CRM are interrelated as shown in Figure. However, performing the tasks as well in all the phases is a difficult proposition, even for the best of companies. Companies often have to choose which one of these dimensions will be their primary focus.

Enterprise Resource Planning

Enterprise resource planning (ERP) systems have become the heart or, more accurately, the spine of many corporate technology initiatives, having been widely adopted in the late 1990s by companies eager to streamline their operations. Goals for ERP ranged from reducing inventory levels to increasing process efficiencies across the supply chain or even integrating core business systems.

ERP systems were the focal point of new work processes across these companies. Because ERP products offer easier information-sharing across various organizations from purchasing to manufacturing to finance to human resources, corporate procedures were aligned with the way ERP products worked.

Gone were the archaic general ledger systems and warehouses brimming with file cabinets full of purchase orders. ERP automated key corporate functions, and the companies buying these systems compiled with their inherent business processes, including

- Order processing and fulfillment
- Production planning and scheduling
- Logistics management
- Accounting
- Human resource allocation and planning

Major ERP vendors such as PeopleSoft and SAP not only automated these and other functions; they also linked them for companies who previously had disparate systems that had never been interrelated. These companies replaced their outdated legacy systems and enabled integrated operations across the enterprise. The products themselves required hefty investments, often into the millions of dollars, and ERP implementation resources usually doubled those budgets.

The integration piece alone was a boon to companies. With ERP, salespeople could access a single system to check inventory, a purchasing agent could look up a supplier's pricing history, and a marketing product manager could track defects. Despite war stories about underestimated budgets and overestimated consultants, ERP delivered across-the –board efficiencies.

This integration had dramatic effects on downstream customer-facing business processes. Ravi Kalakota and Marcia Robinson describe Colgate's ERP success in their book *e-Business Roadmap for success*

Before SAP R/3…distribution planning and picking used to take up to four days;today it takes 14 hours. In total, order-to-delivery time has been cut in half.

In other words, Colgate's customers—including heavy-hitter retailers such as Wal-Mart and Rite Aid—were getting products faster, which can in turn increase satisfaction rates. Companies were also reducing out-of-stock situations, an influential factor in enhancing factor in enhancing customer loyalty.

The marriage between ERP and CRM is stronger than ever. For instance, a company's accounts receivable staff might choose not to open collections on past-due customers who have in-process trouble tickets.

Likewise, CRM business users can use accounting and supply chain information to decide how to treat customers who don't meet provisioning deadlines. ERP vendors have recognized the link between tighter, more integrated operations and business customer satisfaction and are now busy releasing CRM modules that tie into their core products, rendering the customer a key link in the supply chain.

Supply Chain Management

E-commerce is slowly affecting the distribution channels through which consumers and businesses have traditionally bought and sold goods and services. The online channel provides sellers with the ability to reach a global audience and operate with minimal infrastructure, reduced overheads, and greater economies of scale, while providing consumers with a broad selection and unparalleled convenience.

As a result, a growing number of consumers do business transactions on the web, such as buying products, trading securities, paying bills, and purchasing airline tickets. Essentially, e-commerce is all about the transactional business process of selling and buying via the Internet. E- Supply Chain refers in particular to the management of supply chain, using the internet technologies.

Supply Chain

Supply chain is a process umbrella under which products are created and delivered to customers. From a structural standpoint, a supply chain refers to the complex network of relationships that organizations maintain with trading partners to source, manufacture and deliver products.

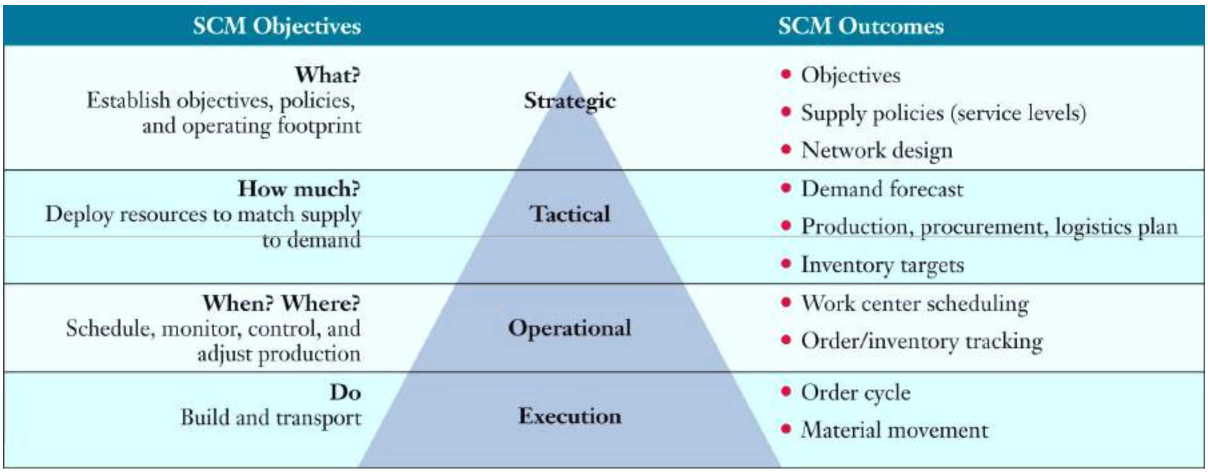
The organizational process of making the product and selling it stands between the supply markets and the customer markets. In the old way of doing things, the following seven processes were not integrated.

1. Procurement planning
2. Production planning
3. Demand planning
4. Inbound logistics
5. Capacity utilization
6. Distribution of products
7. Customer service

But Supply Chain Management (SCM) attempts to integrate them. In short, SCM is a cross-functional inter-enterprise system that uses IT to help support and manage the links between some of a company's key business processes and those of its suppliers, customers and business partners. The goal of SCM is to create a fast, efficient and low cost network of business relationships or supply chain, to get a company's products from concept to market.

Figure helps to understand the roles and activities of SCM in business. The top three levels show the strategic, tactical and operational objectives and outcomes of SCM planning, which are then accomplished by the business partners in a supply chain at the execution level of SCM.

The role of IT in SCM is to support these objectives with inter-enterprise information systems that produce many of the outcomes a business needs to effectively manage its supply chain.



SCM objectives and outcomes

The New Way

The flow of materials and information through a business, from the initial purchasing function through the operation and eventually to the customers, is known as supply chain.

The concept of SCM is a holistic view of coordinating functions that transfer data and material resources from the suppliers to consumers in the finished form to make the process efficient and cost effective. The importance of e-commerce to manufacturing and distribution is undoubtedly a part of SCM. If high speed, low cost, communication and collaboration with customers and suppliers are critical success factors for effective SCM, then the e-chain is the future.

The very essence of SCM is its effective collaboration throughout a network of customers and suppliers. The potentials in productivity, cost reduction and customer service are enormous. Of course, the benefits are based on effectively employing e-commerce, which makes information quality an even higher priority than before. Providing the right amount of relevant information to those who need to know when they need to know, is in fact an effective supply chain management from an information point of view.

Good supply chain practitioners know that information should be passed on only to those who need to know it, and in the form in which they should receive the information. For example, demand information, inventory positions, order- fulfillment, supply management and a whole host of other information exchange activities will change how we sell products, supply products, and make and receive payments for goods and services.

The e-supply chain will have customers and suppliers seamlessly linked together, throughout the world, exchanging information almost instantly. The velocity of relevant information flow will be so fast that responding to the inevitable changes in expected vs actual customer demand will allow faster changes in the actual material flow.

Fast access to relevant supply information can pay-off handsomely at a lower cost, less inventory, higher quality decision-making, shorter cycle times and better customer service. One of the biggest cost savings is in the over heads associated with lots of paperwork and its inherent redundancies. The non-value added time of manual transaction processing could instead be focused on higher revenue creation activities without proportional increases in expense. For example, a customer's purchase order instantly becomes the supplier's sales order, which then results in packing, shipping and subsequently, an invoice.

The result in cycle time compression, lower inventories, decision-making quality, reduced overhead costs among other benefits, makes e-chain processing a highly desirable web application. Supply chain processes can now be more streamlined and efficient than was even thought is where the profit and competitive advantage will emerge.

E-SCM-The Strategic Advantage

Rapid Deployment and Scalability

The e-SCM suite of applications is based on an "open" Internet Application Architecture that provides enterprise-wide scalability and rapid deployment to numerous end-users.

Real-Time Processing

E-SCM creates an open, integrated system that addresses the complex e- business and supply chain management needs and requirements by allowing the exchange of "real-time" information to take place with employees and their trading partners (customers, suppliers, distributors, manufacturers) regarding product configuration, order status, pricing, and inventory availability.

Such functions improve order accuracy and provide 100 percent order fulfillment through accurate inventory information. This "real-time" data enables users to make informed ordering, purchasing and inventory decisions, and thereby enhances the quality and scope of customer service.

Return on Investment

In addition to increasing productivity and reducing overall operating expenses, e-SCM maximizes selling opportunities by capturing valuable customer information-buying patterns, frequency of visits, preferences, order history-and then uses this information for up-selling, cross-selling and promotional opportunities. E-SCM provides the tool sets to achieve new business by reaching out to the customers who could not be before.

Benefits

Some of the benefits of e-SCM are enumerated below

1. It is web-based (client/server), not web-enabled;
2. It incorporates broadcast and active messaging to proactively notify an individual of a condition that requires attention;

3. It supports the exchange of “real-time” information through trading communities such as employees, customers, suppliers, distributors and manufacturers;
4. It has open internet application architecture which allows for rapid development and scalability, combining unlimited internal/external users in a “real-time” environment;
5. It has an interface capability with any third party software;
6. It is platform independent;
7. It is a fully integrated system;
8. It has web visibility and processing capability-24×7;
9. It is rules based

E-Supply Chain Components

The components of e-supply chain are as follows

Advanced Scheduling and Manufacturing Planning Programme

This automated program provides detailed coordination of all manufacturing and supply efforts based on individual customer orders. Scheduling is based on real- time analysis of changing constraints through out the process, from equipment malfunctioning to supply interruptions. Scheduling creates job schedules for managing the manufacturing process as well as logistics.

Demand Forecasting Programme

This module supports a range of statistical tools and business forecasting techniques. It constantly takes into account changing market scenarios and economic factors while making decisions.

Transportation Logistics Programme

This programme facilitates resource allocation and execution to ensure that materials and finished goods are delivered at the right time and at the right place, according to the planning schedule, at minimal cost.

It considers such variables as transportation mode and availability of each mode such as airlines, trains, and trucks.

Distribution Planning Programme

This is integrated with demand forecasting, manufacturing schedules and transportation logistics to reach the customer.

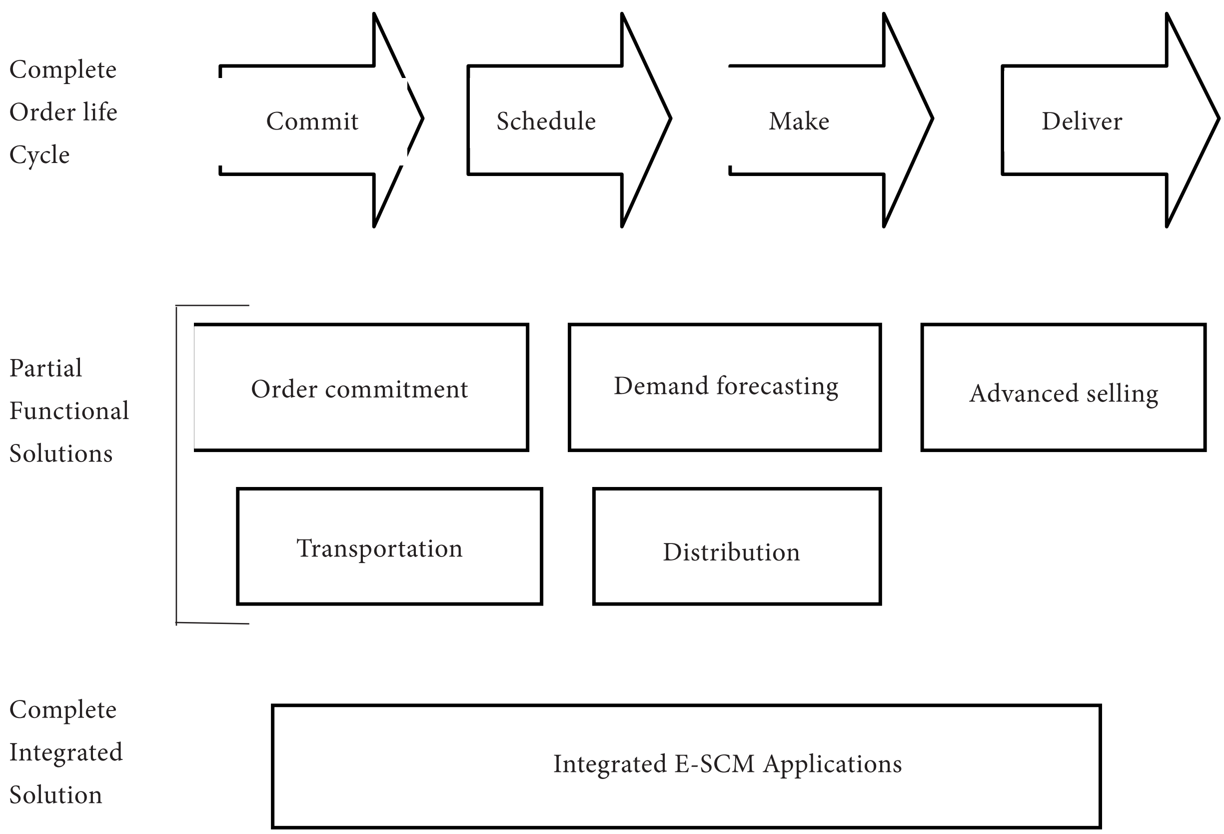
Order Commitment

Order commitment is linked to all the other modules so that accurate delivery of goods and services can be guaranteed.

E-Supply Chain Architecture

Historically, the elements in the supply chain have consisted largely of separate legacy applications at the headquarters, factory, store and distribution levels. These applications have targeted only distinct levels of supply chain and not the entire supply chain levels.

So this three-tier architecture as found in Figure shows a bottom-up view of the entire supply chain management.



E-Supply chain architecture

For food and other quick-turnaround businesses, as their time quotas shrink, customers look for companies that serve them fast. The message to the market place is clear To succeed, companies must reduce time between search, selection, order entry, and order fulfillment. Delays at any step of the process are unacceptable!

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Lesson 3.2 - E-Commerce Systems

Learning Objectives

In this lesson, we will introduce you to e-commerce systems. After you work out this lesson, you should be able to

- Understand the components of an e-commerce system
- Explain the trends in e-commerce
- Identify the important features of a web storefront

In this lesson, we will discuss the following

- E-commerce process
- Electronic payment options
- Web store requirements
- Mobile commerce

Introduction

Electronic commerce or e-commerce refers to a wide range of online business activities for products and services. It also pertains to "any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact".

E-commerce is usually associated with buying and selling over the Internet, or conducting any transaction involving the transfer of ownership or rights to use goods or services through a computer-mediated network. Though popular, this definition is not comprehensive enough to capture recent developments in this new and revolutionary business phenomenon. A more complete definition is

E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals.

Types of E-Commerce

The major different types of e-commerce are business-to-business (B2B); business-to-consumer (B2C); consumer-to-consumer (C2C).

B2B E-Commerce

B2B e-commerce is simply defined as e-commerce between companies. This is the type of e-commerce that deals with relationships between and among businesses. About 80% of e-commerce is of this type, and most experts predict that B2B e-commerce will continue to grow faster than the B2C segment.

The B2B market has two primary components e-frastructure and e-markets. E-frastructure is the architecture of B2B, primarily consisting of the following

- Logistics - transportation, warehousing and distribution (e.g., Procter and Gamble);
- Application service providers - deployment, hosting and management of packaged software from a central facility (e.g., Oracle);
- Outsourcing of functions in the process of e-commerce, such as Web- hosting, security and customer care solutions (e.g., outsourcing providers such as eShare);
- Auction solutions software for the operation and maintenance of real- time auctions in the Internet (e.g., OpenSite Technologies);
- Content management software for the facilitation of Web site content management and delivery (e.g., ProcureNet); and
- Web-based commerce enablers (e.g., Commerce One, a browser-based, XML enabled purchasing automation software).

E-markets are simply defined as Web sites where buyers and sellers interact with each other and conduct transactions.

The more common B2B examples and best practice models are IBM, Hewlett Packard (HP), Cisco and Dell. Cisco, for instance, receives over 90% of its product orders over the Internet.

Most B2B applications are in the areas of supplier management (especially purchase order processing), inventory management (i.e., managing order-ship- bill cycles), distribution management (especially in the transmission of shipping documents), channel management (i.e., information dissemination on changes in operational conditions), and payment management (e.g., electronic payment systems).

B2C E-Commerce

Business-to-consumer e-commerce, or commerce between companies and consumers, involves customers gathering information; purchasing physical goods (i.e., tangibles such as books or consumer products) or information goods (or goods of electronic material or digitized content, such as software, or e- books); and, for information goods, receiving products over an electronic network.

It is the second largest and the earliest form of e-commerce. Its origins can be traced to online retailing (or e-tailing). Thus, the more common B2C business models are the online retailing companies such as Amazon.com. Some of the Indian B2C e-commerce firms are futurebazaar.com (from Big Bazaar), thehindushopping.com, indiaverta.com, fabmart.com and so on. Other B2C examples involving information goods are Travelocity and Expedia.

The more common applications of this type of e-commerce are in the areas of purchasing products and information, and personal finance management, which pertains to the management of personal investments and finances with the use of online banking tools (e.g., Quicken).

B2C e-commerce reduces transactions costs (particularly search costs) by increasing consumer access to information and allowing consumers to find the most competitive price for a product or service.

B2C e-commerce also reduces market entry barriers since the cost of putting up and maintaining a Web site is much cheaper than installing a “brick-and-mortar” structure for a firm. In the case of information goods, B2C e-commerce is even more attractive because it saves firms from factoring in the additional cost of a physical distribution network. Moreover, for countries with a growing and robust Internet population, delivering information goods becomes increasingly feasible.

C2C E-Commerce

Consumer-to-consumer e-commerce or C2C is simply commerce between private individuals or consumers.

This type of e-commerce is characterized by the growth of electronic marketplaces and online auctions, particularly in vertical industries where firms/businesses can bid for what they want from among multiple suppliers. It perhaps has the greatest potential for developing new markets.

This type of e-commerce comes in at least three forms

- Auctions facilitated at a portal, such as eBay, which allows online real- time bidding on items being sold in the Web;
- Peer-to-peer systems, such as the Napster model (a protocol for sharing files between users used by chat forums similar to Internet Relay Chat) and other file exchange and later money exchange models; and classified ads at portal sites such as Sulekha.com and justdial.com classifieds.

Consumer-to-business (C2B) transactions involve reverse auctions, which empower the consumer to drive transactions. A concrete example of this when competing airlines gives a traveler best travel and ticket offers in response to the traveler's post that she wants to fly from one place to another as in www.priceline.com.

Components of a Typical Successful E-Commerce Transaction Loop

E-commerce does not refer merely to a firm putting up a Web site for the purpose of selling goods to buyers over the Internet. For e-commerce to be a competitive alternative to traditional commercial transactions and for a firm to maximize the benefits of e-commerce, a number of technical as well as enabling issues have to be considered. A typical e-commerce transaction loop involves the following major players and corresponding requisites

The Seller should have the following components

A corporate Web site with e-commerce capabilities (e.g., a secure transaction server);

A corporate intranet so that orders are processed in an efficient manner; and

IT-literate employees to manage the information flows and maintain the e-commerce system.

Transaction partners include

Banking institutions that offer transaction clearing services (e.g., processing credit card payments and electronic fund transfers);

National and international freight companies to enable the movement of physical goods within, around and out of the country. For business-to- consumer transactions, the system must offer a means for cost-efficient transport of small packages (such that purchasing books over the Internet, for example, is not prohibitively more expensive than buying from a local store); and

Authentication authority that serves as a trusted third party to ensure the integrity and security of transactions.

Consumers (in a Business-to-Consumer Transaction) who

Form a critical mass of the population with access to the Internet and disposable income enabling widespread use of credit cards; and

Possess a mindset for purchasing goods over the Internet rather than by physically inspecting items.

Firms/Businesses (in a business-to-business transaction) that together form a critical mass of companies (especially within supply chains) with Internet access and the capability to place and take orders over the Internet.

Government, to establish

A legal framework governing e-commerce transactions (including electronic documents, signatures, and the like); and

Legal institutions that would enforce the legal framework (i.e., laws and regulations) and protect consumers and businesses from fraud, among others.

And finally, the Internet, the successful use of which depends on the following

A robust and reliable Internet infrastructure; and

A pricing structure that doesn't penalize consumers for spending time on and buying goods over the Internet (e.g., a flat monthly charge for both ISP access and local phone calls).

For e-commerce to grow, the above requisites and factors have to be in place. The least developed factor is an impediment to the increased uptake of e- commerce as a whole.

For instance, a country with an excellent Internet infrastructure will not have high e-commerce figures if banks do not offer support and fulfillment services to e-commerce transactions. In countries that have significant e-commerce figures, a positive feedback loop reinforces each of these factors.

Advantages of E-Commerce for Businesses

E-commerce serves as an “equalizer”. It enables start-ups and small- and medium-sized enterprises to reach the global market.

However, this does not discount the point that without a good e-business strategy, e-commerce may in some cases discriminate against SMEs because it reveals proprietary pricing information. A sound e-business plan does not totally disregard old economy values. The dot-com bust is proof of this.

E-commerce makes “mass customization” possible. E-commerce applications in this area include easy-to-use ordering systems that allow customers to choose and order products according to their personal and unique specifications. For instance, a car manufacturing company with an e-commerce strategy allowing for online orders can have new cars built within a few days (instead of the several weeks it currently takes to build a new vehicle) based on customer’s specifications. This can work more effectively if a company’s manufacturing process is advanced and integrated into the ordering system.

E-commerce allows “network production.” This refers to the parceling out of the production process to contractors who are geographically dispersed but who are connected to each other via computer networks. The benefits of network production include reduction in costs, more strategic target marketing, and the facilitation of selling add-on products, services, and new systems when they are needed. With network production, a company can assign tasks within its non- core competencies to factories all over the world that specialize in such tasks (e.g., the assembly of specific components).

Payments on Internet

Most of online purchases are paid for by a credit card. Merchants like credit card payments because an instant authorization guarantees that the card is valid (as opposed to a check which may bounce). Customers like paying by credit cards because they can easily cancel a transaction in case when they don't receive products or services according to the agreement in the transaction.

While some of credit card payments for online services are performed by phone, most of such payments are made by filling in an online form.

Credit card information submitted by the customer is sent to the bank which has issued the credit card to verify.

If the transaction is approved, the merchant notifies the customer that the order has been placed. The actual transfer of money from the credit card bank to the merchant may happen in a few hours, or even in a few days.

Merchants who accept credit card payments pay fee (between 1 and 7 percent of the card charge) for each card charge. In addition, in some cases merchants pay authorization fee for each credit card authorization attempt, as well as other fees related to credit card processing.

In case when a customer is not satisfied with the product or a service, or for other reasons, merchants may issue a refund or a charge-back to the customer's account.

Technical Issues

There are several technical issues involved in online credit card payments as described below

Quick Check for Typos

Since the merchant may be charged for each credit card authorization, it is convenient to check that the credit card number makes sense before sending it to the issuing bank to authorize.

There is an easy algorithm to verify a credit card number the last digit of the credit card number is computed from the other digits using a simple procedure. The details are given here.

The algorithm is public, and therefore can be used only to catch typos and disallow random data, but not to check the validity of a credit card number.

Authenticating the User — Protection from Customer Fraud

Since the card is not physically present during the transaction, it is practically impossible for a merchant to distinguish a legitimate credit card user from a thief. In online transactions the user is usually asked to provide additional information, such as their address and phone number, and the card's billing address, if different from the customer's address.

However, this information can be easily mistyped. While in a telephone transaction an operator can use their judgment to approve or reject a transaction based on how much of the information has matched and how confident the customer sounds, in an online transaction the level of "tolerance" of typos and mistakes must be set automatically.

Another way of verifying a card number is to ask the user to provide the additional digits on the card (the digits which do not appear on the magnetic strip or on a carbon paper when the print of the card is taken). However, online customers may be reluctant to provide this information because of fear of merchant's fraud (see below) or of eavesdropping.

Protecting Card Numbers in Transmission

Since information transmitted in an online transaction is sufficient for approval of a credit card charge, it is essential that this information is protected from eavesdropping. The most common way of doing it is to encrypt data in transmission. This is done via SSL. However, many online businesses do not use SSL when transmitting credit card numbers and other customer information, or do not make SSL the default for such transmissions. While it is theoretically possible to obtain credit card information sent in plain text (in an e-mail message or via an online form), so far there hasn't been a known case when a credit card number was stolen this way.

Protecting Card Numbers on the Merchant's Site

In practice, the main vulnerability of dealing with credit card numbers is not the transmission, but the storage. Security experts agree that storing credit card numbers at the merchant's site is a risky practice, and should be avoided. If credit card numbers need to be stored, they should be stored on a secure machine, and preferably in an encrypted form. They should not be stored in a database which is (at least partially) accessible to customers, nor should they be stored (in any form) on the web server.

It is the merchant's responsibility to protect customer's information from fraud. An e-commerce web site may suffer large losses, including those caused by the loss of customer's trust; it fails to protect confidential customer information.

Protecting From Merchant Fraud

The other side of protecting a merchant from a customer's fraud is protection of a customer against a merchant's fraud. If the merchant knows enough of the customer's credit card information to be able to authorize a transaction, then the merchant (including many of the merchant's employees) know enough to be able to use the credit card themselves! In the majority of cases the highest priority of the merchant is to protect the reputation of the business and their own, and a fraud is not in the merchant's interests. However, there may be exceptions, such as a desperate owner whose business is about to go broke a disgruntled employee, or an online scam which uses a fake online business as a cover up for collecting credit card information.

An online customer has to be careful not to be a victim of a merchant's fraud. Using SSL to verify the site's name is a way to avoid sites that pretend to be a part of a respected business, but in fact are not.

To verify that a business is legitimate, a customer may try calling the phone number or sending an e-mail. It is always important to check carefully the credit card statement and immediately investigate an unauthorized charge (and possibly cancel the credit card if theft is suspected).

If a merchant runs a new business which has not yet established customer's trust, they might want to provide a way for the user submit their credit card number directly to a trusted agency which authorizes a transaction. This is done by redirecting the user to a web page of the agency for authorization.

An example of such product is VeriSign PayflowLink. The customer enters information on the agency's page, and the agency sends the response back to the merchant with the authorization information. This way the merchant doesn't know the customer's credit card number.

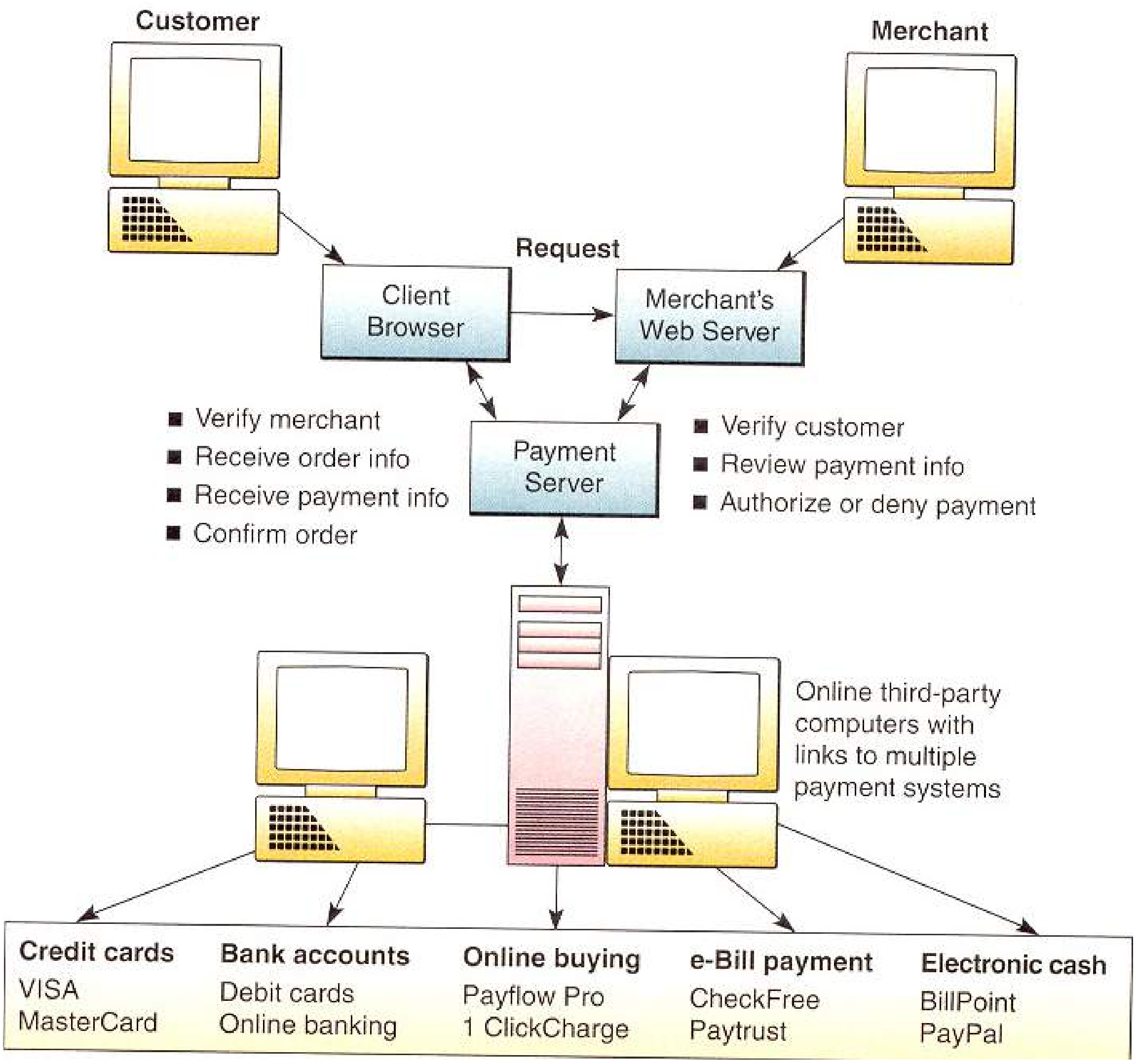
However one has to check carefully the software that implements this feature, because poorly written code for redirection may expose the merchant's ID or allow the customer to change the amount of the transaction in the request.

Electronic Payment Systems

Electronic payment systems are non-credit-card online payment systems. The goal of their development is to create analogs of checks and cash on the Internet, i.e. to implement all or some of the following features

1. Protecting customers from merchant's fraud by keeping credit card numbers unknown to merchants.
2. Allowing people without credit cards to engage in online transactions.
3. Protecting confidentiality of customers.
4. In some cases providing anonymity of customers ("electronic cash").

Figure explains the process involved in electronic payment as part of an e-commerce transaction



Electronic payment process

The problems in implementing electronic payment systems, especially anonymous electronic money, are

1. Preventing double-spending copying the "money" and spending it several times. This is especially hard to do with anonymous money.
2. Making sure that neither the customer nor the merchant can make an unauthorized transaction.
3. Preserving customer's confidentiality without allowing customer's fraud.

While electronic payment systems have not gained a very wide popularity, except for PayPal system used on online auctions, such as eBay, they may become more popular in the future if more businesses start using them.

Electronic payment systems may be more convenient for international online business due to differences in credit card customer protection laws in different countries.

Virtual PIN

Virtual PIN, started in 1994 by a company called First Virtual Holding, was a system for making credit card payments over the Internet without exposing the credit card number to the merchant. It required no special software for a customer to make a purchase. Virtual PIN relied on difficulty of intercepting and forging e-mail. To enroll, a customer gives their credit card information and their e-mail address to the First Virtual (this was done by phone). After the credit card information has been verified, the customer receives their PIN by e-mail.

The procedure for purchasing an item using Virtual PIN is as follows

- The customer gives the merchant their Virtual PIN.
- The merchant sends the Virtual PIN and the amount of transaction to First Virtual.
- First Virtual sends an e-mail to the customer asking to confirm the purchase.
- The customer answered "Yes", "No", or "Fraud". If the answer is "Yes", the merchant is informed that the charge has been accepted. If "No", the charge is declined. If the answer is "Fraud", the charge is investigated.

Even though no encryption was involved, an eavesdropper could not use a virtual PIN without being able to intercept and answer the e-mail message to confirm the purchase.

Unlike credit cards which carry the customer's name, Virtual PIN provided a customer's anonymity from the merchant. The e-mail confirmation of the transaction served as a protection against merchant's fraud.

Unfortunately, while the system has been created for all kinds of online business, the main use of Virtual PIN at the time was for buying and selling pornography. Virtual PIN tried to disassociate itself from this market. Eventually the company abandoned the Virtual PIN and became specialized in sending promotional e-mail.

DigiCash (or E-Cash)

DigiCash (also known as E-cash) is an electronic payment system developed by Dr. David Chaum, who is widely regarded as an inventor of digital cash. The system was based on digital tokens called digital coins. DigiCash operated as follows

- A customer establishes an account with the bank or other organization that could mint and receive digital coins. The customer's account was backed by real money in some form, for instance it could be linked to the customer's checking account.
- The customer also needs to download and install a software called electronic wallet.
- To obtain DigiCash, the customer uses the electronic wallet to create digital coins. The coins are sent to the bank to sign. When the coins are signed, the equivalent amount of money is withdrawn from the customer's account.

In the proposed protocol the customer also had an option of "blinding" the coins. To blind a coin, the customer multiplies it by a random number r before sending it to the bank to sign. The bank signs the data.

After the data and its digital signature are sent to the customer, the customer computes the digital signature of the original (non-multiplied) coin by dividing the bank's signature by r. This way the bank doesn't know the coin, but the customer, who knows r, can trace his/her payments. Blind signatures have not been implemented.

To find out why blind signatures work, read the article Cryptography and Number Theory for Digital Cash by Orlin Grabbe. This article explains mathematics behind blind signatures. This material is optional.

- When the customer wants to make a purchase, he/she sends signed digital coins to the merchant. The merchant verifies the bank's signature and deposits the coins to the bank, where they are credited to the merchant's account.

The DigiCash (or E-cash), produced by the company DigiCash BV based in Amsterdam, has never created a market. The company eventually declared bankruptcy. However, the algorithms used in DigiCash are considered fundamental in development of digital money.

CyberCash/CyberCoin

CyberCash is a system that allows customers to pay by a credit card without revealing the credit card number to the merchant. To achieve this, a credit card number is sent to the merchant in an encrypted form.

To enroll, a customer installs software called CyberCash wallet on their computer. At the time of the installment the wallet generated a pair of a public and a private key. The wallet was protected by a passphrase, and a backup key was stored encrypted on a floppy disk.

A CyberCash account was linked to the customer's credit card. A variation of this scheme called CyberCoin was linked to the customer's checking account.

A purchase was conducted the following way

- When the purchase was initiated, the CyberCash wallet displayed the amount, the merchant's name, and other information. After the customer approved the transaction, an encrypted payment order was sent to the merchant.
- The merchant could decrypt some of the information in the order, such as the product list, the address, etc., but not the other (such as the credit card information). The merchant's software would add its own payment information to the order, digitally sign it, and then send it to the CyberCash gateway.
- The CyberCash gateway would decrypt the information. The order would be checked for duplicate requests. The gateway would verify that the customer's and the merchant's order information match (i.e. no fraud was committed on either side). Then it would perform the money transfer and send the approval message to the merchant.

The main point of this scheme was to prevent merchant's fraud, and thus allow customers to do business with more merchants without fear of scam. However, CyberCash and CyberCoin were not able to find the market. The main reasons for the failure were the large size of customer's software and the fact that very few merchants would accept CyberCash payment. The company was eventually bought by VeriSign.

SET (Secure Electronic Transactions)

SET is the Secure Electronic Transaction protocol for sending money over Internet. It has been developed jointly by MasterCard, Visa, and several computer companies. SET uses mechanisms similar to CyberCash. However, being a standard protocol, it is built into a wide variety of commercial products.

In SET the order information consists of two parts the part which is private between the customer and the merchant (such as the items being ordered) and information which is private between the customer and the bank (such as the included in a single signed transaction the part private between the customer and the merchant is encrypted using the merchant's private key, and the part private between the customer and the bank is encrypted using the bank's public key.

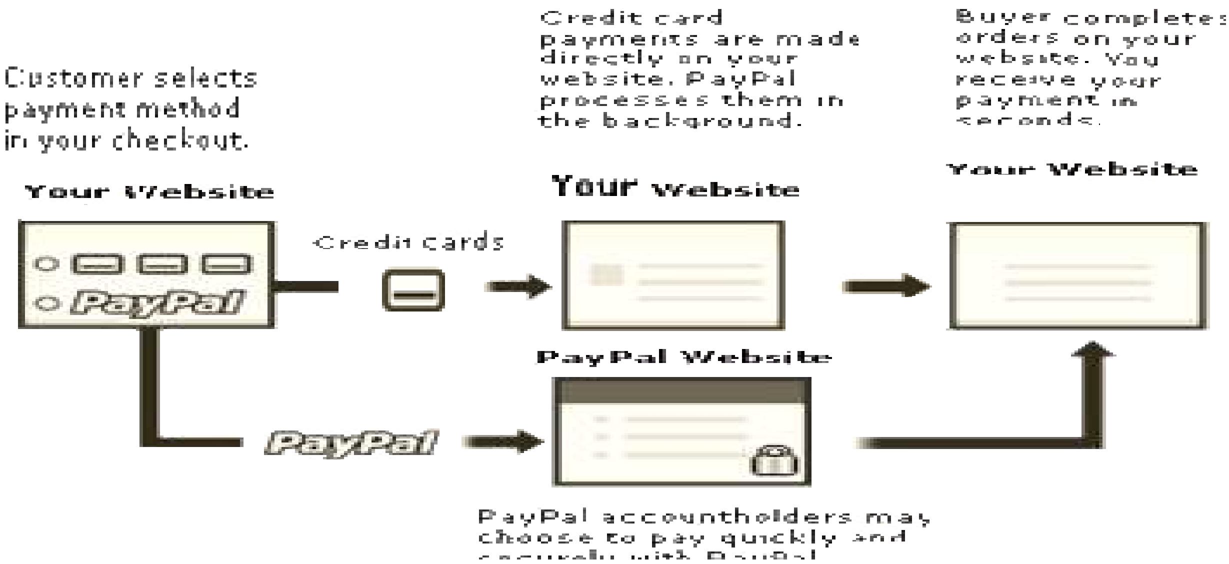
To prevent changing the order information, the customer computes message digests of each part of the message separately, then takes the message digest of the two message digests, and then signs the resulting message digest.

This mechanism, called a dual signature, allows either the merchant or the bank to read and validate the signature on its half of the purchase request without having to decrypt the other half.

The reason why SET never became popular was pretty much the same as for CyberCash the trouble of getting a digital wallet software and setting it up for each credit card was not worth it for a customer, because very few merchants would accept SET payments.

PayPal is an electronic payment system which can transfer money between its accounts. In order to use PayPal, one has to obtain a PayPal account, which is associated either with the customer's credit card or with their regular bank account. The validity of a credit card is checked by the usual ways. The validity of a checking account is checked as follows the customer gives PayPal their account number; PayPal makes two small-amount (less than $1) deposits to the account. If the customer is able to tell PayPal the value of these deposits, then the customer is assumed to be a legitimate user of the account.

PayPal



The working of PayPal service

PayPal provides easy interface to send money to anyone by giving the person's e-mail account. In order for the person to retrieve the money, they must have a PayPal account. To avoid fraud, PayPal sends an e-mail message to both the initiator and the recipient of the transaction.

PayPal is used to settle online auctions, such as eBay auctions. The ease of use and the fact that no credit card is required to use it makes PayPal increasingly popular.

Example

Indian Railways online reservation system (operated by IRCTC) is very impressive and it supports a wide range of Internet banking services, credit card payments and other payment systems as can be seen below.

Payment by Credit Cards:		
ICICI PG	HDFC PG	CITI PG
AXIS PG	American Express	
Payment by Credit Cards EMI Option:		
ICICI Bank EMI	CITI Bank EMI	
Payment by Direct Debit facility:		
ICICI Bank	HDFC Bank	CITI Bank
AXIS Bank	ABN Amro Bank	IDBI Bank
State Bank Of India	Punjab National Bank	Federal Bank
Syndicate Bank	Indusind Bank	Karnataka Bank
Andhra Bank	Oriental Bank Of Commerce	Corporation Bank
Bank Of India	Rajasthan Bank	Indian Bank
SBI Associate Bank's	Union Bank Of India	Canara Bank
Bank of Baroda	Centurion Bank Of Punjab	
Payment by Cash Cards:		
ITZ Cash Card	Done Cash Card	I Cash Card

Different online payment services offered at IRCTC website [Courtesy www.irctc.co.in]

Smart Cards

Smart cards are cards that look like credit cards, but store information on a microprocessor chip instead of magnetic strips. A microchip can hold significantly more information than a magnetic strip. Because of this capacity, a single smart card can be used for many different purposes.

Unlike magnetic strip cards which can be read by any magnetic reader, and are therefore vulnerable to loss or theft, a smart card can be password-protected to guarantee that it's only used by the owner.

Smart cards can run RSA encryption and can be programmed to generate a pair of public/private keys. The public key is made publicly readable, but the private key is be stored on the card without anyone being able to copy it. Therefore, to use the private key, the user must physically possess the card.

Smart cards are used in European telephones, and are gaining popularity for other purposes both in Europe and in the US.

Advantages and Disadvantages of Online Payment Systems

Typically, Internet merchant accounts are provided through an acquiring bank (or acquirer) that lets you accept credit cards, and sometimes other types of payments, online. As is the case with any business decision, there are advantages and disadvantages to online payment systems and other types of credit card processors.

In general, advantages tend to revolve around having direct control of the payment processing system. Disadvantages tend to revolve around mechanics, security, and logistics of being responsible for the entire payment process.

Advantages of Merchant Accounts and Other Online Payment Systems Merchant accounts and third party payment processors provide needed online services. Advantages include

- Customer convenience - Online merchant accounts save site visitors the extra step of writing and sending a check or calling in an order.
- Increased functionality - Internet processors also enable Web sites to be direct sales generators rather than simply lead generators or online brochures.
- Additional direct sales channel - Credit card processors help you add Internet sales as a revenue stream.
- Immediate authorization - With automation, you know immediately if an Internet payment is valid. No waiting for checks to clear.
- Streamline payment process - With Internet merchant accounts and other payment providers, there are fewer steps necessary to assure valid payment as compared to less automated processes.

Disadvantages of Internet Merchant Accounts

Like any other technology, there are disadvantages to online payment systems. Some of the disadvantages of having your own Internet merchant account include

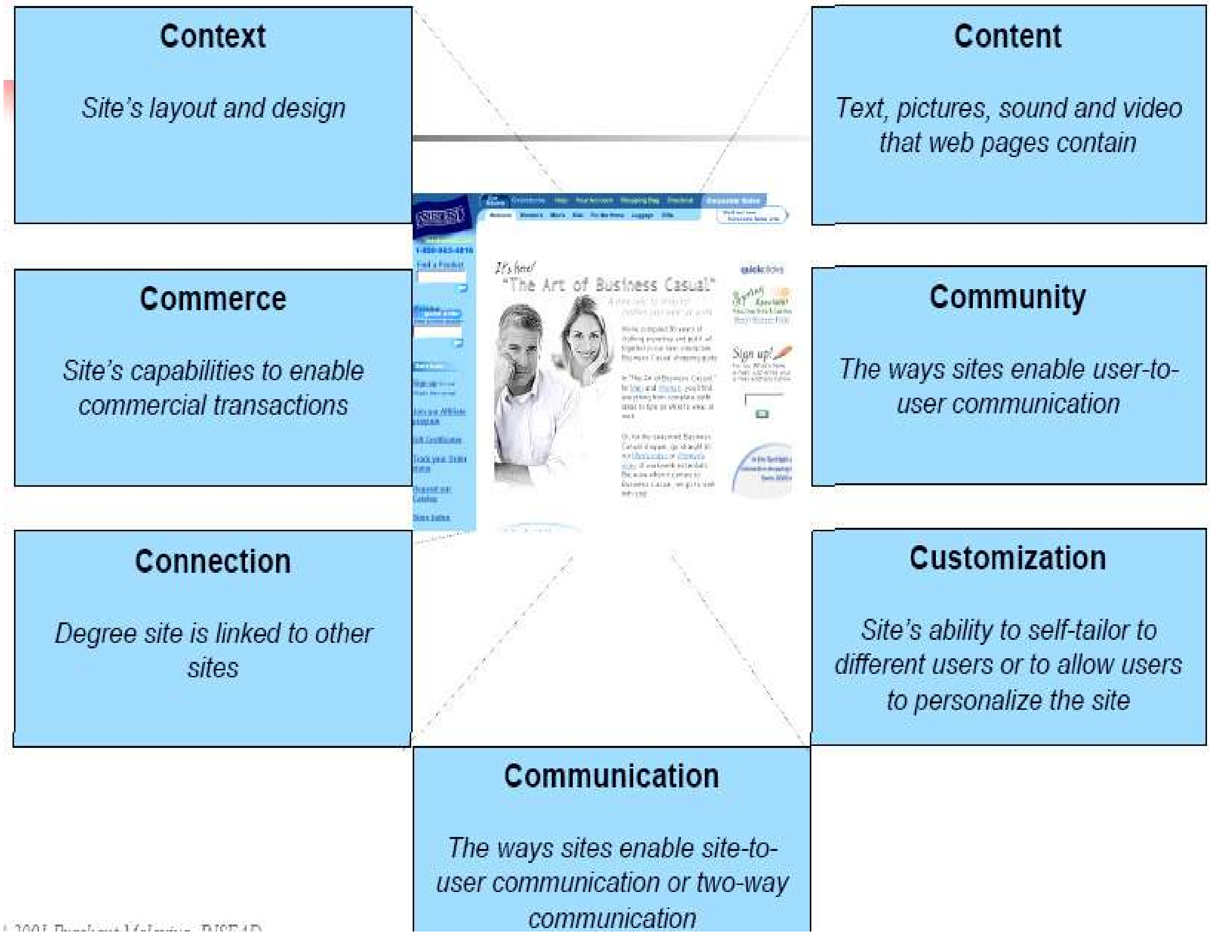
- You are responsible - With your own Internet merchant account, it is your responsibility to maintain site function, resolve field service issues, etc.
- Fees - Various monthly fees are associated with Internet merchant accounts.
- Fraud - As a merchant, you may have to directly deal with credit card fraud.
- Security issues - Internet merchant accounts are only one piece of a reliable, secure payment system. Private, sensitive information such as credit card numbers can be stolen or altered; system integrity can be breached; and Web site spoofing are all risks with weak security systems.
- Agreements - Internet merchant accounts come with long agreements. Often, you are committed to minimum time frames and/or dollar minimums.

Designing an E-Commerce Website Using 7Cs Framework

Figure provides a simple representation of the **7Cs framework** for e- commerce website design. The interface is the virtual (and, to date, largely visible) representation of a firm's chosen value proposition. Similar to a retail storefront, the virtual website provides significant information to current and prospective target market customers.

If designed effectively, the site quickly answers a number of basic questions that confront such users. Is this site worth visiting? What products or services does it sell? What messages does the site communicate

Exclusivity? Low price? Ease of use? Consistent with a tightly constructed business model, well-designed sites should simultaneously attract target segment customers and repel (or not to appeal) non-targeted customers. Compelling sites communicate the core value proposition of the company and provide a rationale for buying from and/or visiting the site. The following sections briefly describe the 7*C*.



The 7*Cs* framework of website design (customer interface)

Context

The Context of the website is aesthetic and functional look-and-feel. Some sites have chosen to focus heavily on interesting graphics, colors, and design features, while others have emphasized more simply utilitarian goals, such as ease of navigation. Figure illustrates a webpage from Landsend.com. Lands' End balances aesthetic (pastel colors; simple, warm visuals) and functional (crisp, uncluttered) design elements to communicate its core benefits—traditionally designed clothing, great service, and moderate prices. In sharp contrast, an online apparel retailer - Luckyjeans.com will appear more hip, nontraditional brand; its website is comparatively more edgy, with bolder colors, humor (the "get lucky" slogan), and a more focused product line. Lands' End customers might not find the Luckyjeans.com site appealing, purely because of its look- and-feel. Luckyjeans.com suggests a younger, more urban, and fashion-forward target segment. Compare the homepages (shown below) of these two online retailers.

A webpage from Landsend.com

Content

Content is defined as all digital subject matter on the site. This includes the form of the digital subject matter—text, video, audio, and graphics—as well as the domains of the digital subject matter, including product, service, and information offerings. While context largely focuses on the "how" of site design, content focuses on "what" is presented. Visit Landsend.com site. The Lands' End site includes content pertaining to its product offerings (e.g., overstocks, kids, luggage, gifts), services, and offline support (e.g., 1-800 phone number). In terms of media, the site uses a combination of text, photographs, and graphics to convey its content.

Community

Community is defined as the interaction that occurs between site users. It does not refer to site-to-user interactions. User-to-user communication can occur between two users (e.g., e-mails, joint game-playing) or between one user and many (e.g., chat rooms).

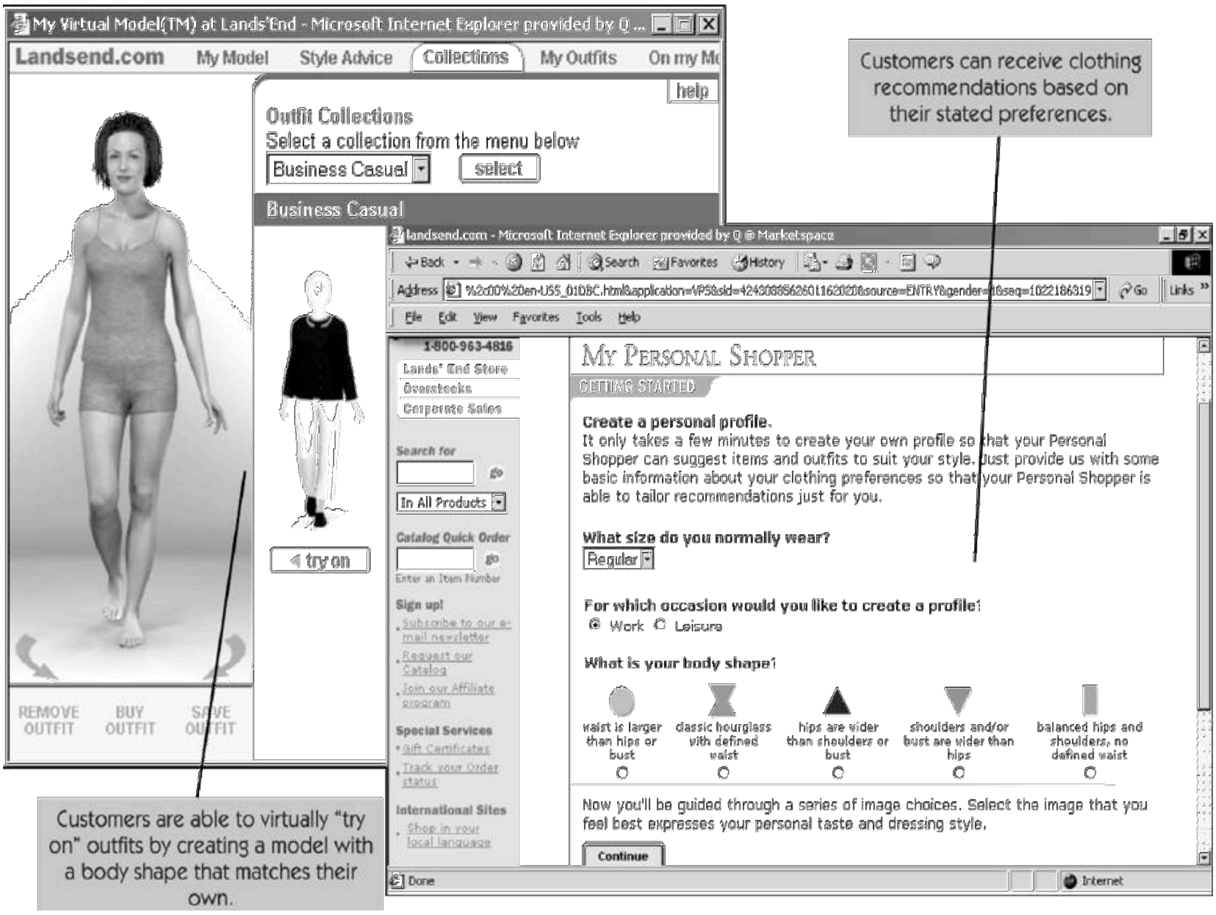
Ladsend.com has an innovative community feature that allows two users to shop simultaneously on its site. This trademarked service termed "shop with a friend," enables two users to view the site at the same time, browse together, and purchase the product. It is a virtual shopping experience.

Customization

Customization is defined as the site's availability to tailor itself or to be tailored by each user. When the customization is initiated and managed by the firm, termed as tailoring. When the customization is initiated and managed by the user, termed it as personalization. Let us consider two examples as shown in Figure.

On Landsend.com, the user is able to personalize the site to a limited degree, using a feature called the personal shopping account. This feature allows the user to enter basic personal information, complete an address book for potential recipients of purchases, and enter key dates in the remainder service.

In turn, once personal profile data is entered and consumers begin to use the site, the site uses this data to tailor e-mail messages, banner ads, and the content of the site to the individual.



Customization and personalization at Landsend.com

Communication

Communication refers to the dialogue that unfolds between the site and its users. This communication can take three forms; site-to-user communication (e.g., e- mail notification), user-to-site (e.g., customer service request), or two-way communication (e.g., instant messaging).

Landsend.com has introduced a communication feature called "Lands' End Live" that enables the user to talk directly with the customer service representative while shopping on the site. Clicking on the Lands' End Live button results in two options (1) connection by phone (this assumes the user has two phone lines, a direct internet connection by DSL, or a cable modem) or (2) connection by live text chat.

Connection

Connection is defined as the extent of the formal linkages between the site and the other sites. Landsend.com does not have any connections to other sites; however, it does have an affiliates program that allows other sites to connect to Lands' End. In particular, Landsend.com supplies the affiliate site with banner ads to link visitors form the site to the Landsend.com store. The affiliate partner earns 5 percent on every sale that occurs on a click-through from the site. If a customer is a first-time Lands' End buyer, the affiliate earns an additional finders' fee.

Commerce

Commerce is defined as the sale of goods, products, or services on the site. The Landsend.com site obviously has transactional capability. It has the typical shopping-basket feature along with shipping information. The shopping basket can be viewed at any point in the shopping experience. It includes such information as quantity, description, size, prices, and availability, and also provides options to "delete the item" and "order more of this".

As a summary feature, the site displays the total price of items, extra service taxes (if applicable), shipping costs (if the shipping choice has been already selected), and the grand total. The customer can choose to check out if everything in the shopping basket is acceptable. The acceptance step accesses a secure server where the customer inputs billing information (e.g., shipping address, e-mail contact address, and daytime phone number). Finally, the customer inputs the choice of credit card along with credit-card details and submits the final order.

Building Fit and Reinforcement Among the 7*Cs*

In the previous section, the basic overview of each of the 7Cs is provided. However, the success of a particular business such as Landsend.com depends on the extent that all of the Cs work together to support the value proposition and business model. Two concepts—fit and reinforcement—are particularly helpful in explaining how it is possible to gain synergy among the 7Cs. *Fit* refers to the extent to which each of the 7Cs individually supports the business model. Reinforcement refers to the degree of consistency between each of the Cs.

Consider, once again, Landsend.com. It largely targets the middle-class consumer, with its traditionally designed clothing, great service, and moderate prices. The content of the site "fits" this value proposition by providing mainstream and conservative fashion. Its innovative live chat "fits" the moderate pricing strategy.

With respect to *reinforcement*—the aesthetic context of the site—the Lands' End site works well. The site's picture of a smiling customer-service representative, light-blue tones, and soft-sell approach helps to focus the customer on the ease of product searches and navigation and on the clean and clear visual displays of clothing. The elements of context, content, customization, and commerce all work well together to provide a clear, reinforcing statement of the value proposition.

M-Commerce The Next Big Thing

Four main forces underpin the mobile-commerce revolution third-generation technologies, the Wireless Application Protocol (WAP) and iMode platforms, handset penetration, and personalized services.

Third-Generation (3G) Technologies

Unfortunately, the current (second) generation of wireless networks and handsets supports data rates of only 9.6 kilobits per second, far below the 64- kilobit-per-second capacities of landline copper wires.

That situation will improve this year, however, as GSM (Global System for Mobile Communication), the most common cellular standard, is extended by the General Packet Radio System.

GPRS can support data rates of 112 kilobits per second, almost twice the rate of a standard computer modem and enough to support high-quality streamed audio. True third-generation networks, based on the UMTS (Universal Mobile Telephone System) standard, will raise the rate to 2 megabits per second —one-fifth of the bandwidth available on the standard

Ethernet in Today's Offices

The high speed at which Internet data can be downloaded is only one important characteristic of the new networks. In current wireless networks, most data communication, apart from the limited Short Message Service (SMS), requires a circuit-switched connection a user must connect to a server to check e-mail, for example.

This limitation has two drawbacks. First, users find themselves on-line even when they are not sending data (while reading or composing e-mail, for example), so they pay higher costs and network capacity is wasted. In addition, since the connection can be initiated only from the mobile handset, asynchronous services, such as automatic forwarding of e-mail, are not possible.

Like the wired Internet, GPRS networks use a connectionless (packet-switched) communications mechanism. Data are split into chunks called packets, to which an address uniquely identifying the destination is appended. This means that although a GPRS handset is, in effect, permanently connected to the network, it uses network capacity only when packets are actually being sent.

The WAP and iMode

Two of the leading platforms for delivering Internet content to mobile telephones and other wireless devices—the Wireless Application Protocol and iMode—were designed to take into account the constraints of wireless communications limited bandwidth and end-system processing as well as a constrained user interface.

Each platform defines a standard markup language that permits an application's user interface to be specified independently of the end device. The delivery of these services is independent of the underlying networking technology, so applications can be used on different networks, just as Internet applications can.

Handset Penetration

The uptake of mobile telephones has been nothing short of phenomenal, and the trend is expected to continue (Exhibit B). Nokia predicts that within three years people will use mobile telephones to access the Internet more often than they use personal computers.

Personalization

The wireless Internet has three main features that permit mobile interactive services to be more personalized than traditional Internet applications are.

First, mobile telephones are carried by their owners almost everywhere and kept switched on most of the time (especially in Europe, where mobile users aren't charged for incoming calls). Consumers can thus not only gain access to wireless services wherever there is a network presence but also keep tabs on time-critical information, such as stock market reports or urgent messages.

Second, wireless-network operators—at least those using the GSM standard— are uniquely able to determine the identity of a user. Since mobile telephones are not usually shared, and a personal-identification number often protects them, the telephone itself can be used as a means of identification. Finally, operators can detect a user's exact location, enabling a whole range of new applications.

In theory, mobile operators could compete at all levels of the m-commerce value chain, from the provision of basic technical services to the supply of lucrative, customer-facing content. The high stock market valuations of Internet-related companies, their powerful financial muscle, and the absence of strong competition at all levels in the new industry might even tempt them to try.

The danger is that they will spread their skills and resources too thin. Moreover, given the first-mover advantages associated with much Internet-related business, such companies risk forfeiting long-term shareholder value unless they concentrate on areas in which they naturally hold a strong competitive advantage.

Operators thus need to make difficult decisions about which parts of the value chain to compete in—and how—and which parts to avoid.

The M-Commerce Value Chain

There are seven links in the m-commerce value chain.

At the bottom is transport the maintenance and operation of the infrastructure that provides for data communication between mobile users and application providers.

The second link consists of basic enabling services, such as server hosting, data backup, and systems integration. Vendors wishing to target wireless customers need these services to make products available via mobile telephones.

Transaction support is the third link of the value chain. Many wireless services will require some form of payment—usually from the user to the service provider to pay for, say, books or CDs—but possibly also in the other direction, for refunds or customer reward schemes. Transaction support provides the mechanisms for assisting those transactions, for security, and for billing users.

The fourth link is presentation services. Providers convert the content of Internet-based applications, which are formatted in a standard known as HTML (HyperText Markup Language), into a standard such as WML (Wireless Markup Language), an HTML subset suitable for the small, low- resolution screens of wireless devices. Content that isn't already on the Internet can be formatted directly into a wireless standard.

Personalization support is the fifth link of the chain. One of the main value propositions of m-commerce is its ability to personalize applications for individual users. Providers that wish to offer the best m-commerce services need information such as the user's name, address, location, and billing details (the number of a credit card or a bank account, for example) and even—because the size of the screen affects the kind of information that can be viewed—the type of device used to connect to the service. Companies that can provide such information will form a valuable link.

User applications are the sixth link of the value chain. Possible applications range from those currently available on the wired Internet (including banking, book purchasing, e-mail, news, and travel) to new services designed specifically for mobile consumers (information about where to find the nearest coffee shop, for example, or the automatic notification of nearby friends).

At the highest point in the chain are the content aggregators businesses that design and operate portals, which provide information in a category or search facilities to help users find their way around the Internet.

This function is particularly important for m-commerce because mobile telephones have small screens and limited input mechanisms—notably, no mouse and a non-QWERTY keypad. Users will want portals that simplify the search, avoid throwing up too much information, and require minimum input.

Opportunities for Operators

Few industries offer the opportunity to compete in every link of a value chain, but mobile operators have the necessary technical skills, particularly at the lower end. They also have the billing systems for payments, as well as brands that potentially position them well for customer-related activities higher up the chain.

In addition, their control of the wireless infrastructure and their ability to configure subscribers' handsets to make themselves the default Internet access provider give them the power to limit subscribers' access to competitors' services —at least initially—and therefore to build their own branded ones.

Early indications are that operators will indeed try to use these advantages to capture value in many parts of the chain. Sonera and Cellnet, for example, have already launched portals; Vodafone AirTouch and Cellnet have application services;

Telenor and Sonera offer transaction facilities; and NTT DoCoMo supplies basic enabling services, presentation services, and personalization facilities.

To withstand the competition from Internet players, mobile operators should concentrate on the four areas in which they have a strong advantage—transport, personalization support, content aggregation, and transaction support—and move quickly to capture these opportunities by adopting four strategies.

Drive Traffic Growth by Offering a Wide Variety of Data Services

Data traffic (mostly driven by the simple text-messaging service called the Short Message Service, or SMS) already contributes 10 percent of the revenues of some wireless operators and, according to forecasts, will soon overtake voice traffic as the main source of revenue for mobile operators as a whole.

In response, some operators have used their control of the network infrastructure to try to lock in value at stake elsewhere in the chain. By presetting their subscribers' telephones to make themselves the default Internet access provider and blocking unauthorized services, operators have the opportunity both to charge application providers for access to their subscriber base and to build their own branded services.

This "walled-garden strategy" might provide higher revenues in the short term, but in the longer term it is flawed. First, it fails to maximize demand for data traffic, because users may be barred from their favorite on-line services. Second, it runs the risk of driving away those dissatisfied subscribers, who may switch to a competitor to get exactly what they want.

Since consumers increasingly choose their wireless providers on the basis of the data services available, this second point is an important one. McKinsey research in the Asia-Pacific region, for example, indicates that half of all subscribers (and up to 70 percent of high-value ones in some countries) would switch operators to get better wireless data services. It follows that the first operator in a region to offer unrestricted access to data services could capture a lucrative portion of the subscribers of other networks.

The best way to go on profiting from transport is therefore to increase traffic on the network. This can be done only by offering subscribers access to the widest possible range of data services, an approach that has been validated in the Japanese market by the success of NTT DoCoMo's iMode service.

Attract Content Providers by Offering Good User Information

Customer data are a valuable asset in the off- and on-line worlds alike, for the more a vendor knows about a customer, the more it can personalize the information or service it provides. The end result is likely to be a more valuable service, reckoned both by price charged and by the vendor's ability to attract and retain customers.

In the wired world, Internet vendors use various techniques to personalize a customer's visit to their sites. These techniques range from "cookies" pushed to the user's computer to ensure that repeat visitors are recognized and appropriate data recalled, on the one hand, to complex collaborative filters that predict the preferences of customers from their behavior, on the other. (An example is

Amazon.com's "customers who bought this book also bought . . ." service, which exploits the purchasing patterns of similar customers to suggest books or CDs that users might enjoy.)

In the wireless world, personalization will be even more important, for screens are small, limiting the amount of information that can be shown, and information can be tailored with the help of a few personal details. (A search for a restaurant, say, might be refined by the user's location and spending bracket.)

The kind of device that is used will also determine the kind of information that can be sent a stock quotation service, such as Yahoo! Finance, could supply share-price graphs to devices with sufficiently large screens.

Input capabilities too are limited, which means that users will benefit if input forms can be filled in automatically on their behalf. A CD vendor, for example, could simply ask customers to verify payment information and a shipping address rather than have them fill out forms from scratch.

Mobile operators hold plenty of this kind of personal information on subscribers and are well placed to supply application providers with the data they require (subject to legal restrictions, which differ from country to country).

Mobile operators can also use this information to drive traffic growth, for application providers are likely to be attracted to the networks whose operators supply the most useful customer data.

A larger number of application providers will in turn attract more customers to the network. The upturn in traffic will attract more application providers, more customers, and so on in a virtuous circle.

Assume the Role of a Wireless Portal

Like portals in the wired world, wireless portals have a degree of control over what users see on the Internet, so the portal provider can charge service providers and advertisers high fees. Given the projected penetration rates of mobile devices and mobile consumers' increased reliance on portal services, many observers expect wireless portals to be as highly valued on the stock market as their established Internet equivalents.

Operators enjoy some natural advantages in providing portal services. First, the operators can control the configuration of telephones for all their new subscribers and thus make their portals the default start screen.

Second, the operators' information about subscribers permits them to tailor the content provided. Indeed, the way portals use this personal information could turn out to be the main factor distinguishing well from mediocre portals. (A good one, for example, wouldn't require users to fill in personal details for each site they visited —an off-putting task on a small keypad.) But Internet experience indicates that operators will have to move quickly to succeed as portal providers.

Operators must also decide whether to build the portal alone or with a partner. Despite some natural strength as portal providers, operators have so far shown limited skill in selecting, aggregating, and customizing content, for though they are good on the technical side, they are light on the kind of media and marketing skills that characterize successful Internet portal providers.

And the value at stake at this level of the chain ensures that operators will face stiff competition, not least from existing Internet portals with strong brands, a large subscriber base, and plenty of experience. Several established companies, including Microsoft, Yahoo!, Excite@Home, and America Online, have already launched wireless portals.

Provide Transaction Support with a Wide Range of Payment Choices

All operators have systems to bill and charge their subscribers. The same systems can be used to bill subscribers for goods and services sold by third-party vendors on the network and to levy a per-transaction charge to vendors.

Some operators have already spotted this opportunity. Sonera makes it possible for subscribers to buy soft drinks from vending machines by dialing a number, and the cost is then charged to the subscriber's mobile telephone account. Subscribers to NTT DoCoMo can add all of their m-commerce transactions to their monthly mobile bills.

Not surprisingly, this role is being contested by credit card companies that have their own billing systems, established relationships with service providers, and expertise in making customers' credit and transactions secure.

These credit card companies are even threatening to bypass operators altogether by forming relationships directly with handset vendors. Visa and Nokia, for example, are jointly developing a system permitting consumers to pay for goods and services using bank information stored in a telephone's memory.

Yet mobile consumers will probably demand a choice of payment mechanisms their credit card account, their bank account, and their monthly telephone bill, for example. To offer customers a choice of payment methods, smart operators are thus likely to join up with one or more banks or credit card companies. Sonera recently did precisely this with MasterCard.

In the Indian m-commerce scenario, mobile payment services such as paymate.com and ngpay.com are gaining popularity. Redbus.in, a website for booking bus tickets allows mobile payments through ngpay.com.

Annexure

Mobile Services Boom in India [Source accessed at http//businessweek.com/print/globalbiz/content/apr2008/gb2008044_497327.ht m]

Indians are using their cell phones—some 300 million have subscriptions, vs. only 30 million

PCs—as a "one-stop shop" for everything from e-mailing to banking

Two years ago, Mumbai call center employee Vijay Parihar used his Nokia mobile phone for calls and sending occasional text messages to friends, spending about $7 monthly.

Today the 24-year-old, who earns $450 a month and lives in a one-bedroom apartment in suburban Mumbai, forks over about $20 a month—for calls, of course, but also for ring tones of Bollywood hits, movie tickets, e-mail, and mushy text messages to his girlfriend.

If he had enough money to invest, Parihar says, stock market quotes, too, would beep on his phone. "My handset is an extension of myself, a cool, one-stop shop for my personal needs," he says.

Parihar is part of a growing group of Indian consumers who want more from their phone than just talk time. That's a blessing for Indian carriers that are looking seriously at new services to enhance revenues.

The numbers are huge Indians spent some $250 million on extra services for their mobile phones last year—including text messaging, music, wallpaper for phone screens, cricket scores, games, and Web surfing—and that number is expected to reach $1.7 billion by 2010.

Cell Phones Trump

Why is demand for such services particularly great in India? For starters, there are just 30 million PCs in the country, so e-commerce on the Internet still has a long way to go. Cell phones, on the other hand, are becoming pervasive.

Nearly 300 million Indians now have phones—making it the No. 2 mobile market on earth—and some 8 million new subscribers sign up every month.

These young, mobile-savvy folks have high aspirations but are under served in everything from banking to entertainment. Getting to them via their cell phones is the best way to provide much-needed and valued services.

"We have to look at ingenious ways to reach out to these customers," says Pankaj Sethi, who oversees such offerings at Tata Teleservices, the telecom arm of $50 billion Tata Group.

Mobile Content Providers

The demand for these services has given birth to a slew of companies that develop mobile content in English and regional Indian languages. The market in India is so hot that even multinationals such as Google (GOOG),

Yahoo! (YHOO), and Microsoft's (MSFT) MSN have become major participants. These players have tied up with more than a dozen top telecom providers including Bharti Airtel, Vodafone, Reliance Communications, and Tata Teleservices, to offer local information such as movie schedules, taxi services, stock quotes, news, and hospital and business listings.

The range of offerings is vast. Some companies offer downloads of prayers from Indian guru Sri Sri Ravi Shankar for the New Age set, and for the more traditional, recitations from Hindu religious text the Bhagavad Gita are available for 75¢ a month.

Airtel, India's leading cellular operator, offers weather updates and crop prices to farmers, and sells mobile banking services, which allow customers to make purchases in stores and book train and flight tickets using their mobile phone instead of a credit card.

Revenue Direction

There are some complications, however. About 25% of India's 1.1 billion citizens own a phone. These new users, who use cheaper handsets but want the same services available on premium handsets, are largely from fast-growing smaller cities and towns. India's average revenue per user is $10—one of the lowest in the world—compared with $12 in China and $30 in the U.S. A cellular phone call can cost as little as 1.2¢ a minute, vs. 8.4¢ in Pakistan and 3.5¢ in

China. So while there's scope for making profits beyond the basics, most services remain a luxury for many Indians. "Companies, however, are convinced that non-voice data revenue is the direction," says Ray Tsuchiyama, Tokyo- based head of emerging markets at Nuance mobile and consumer services.

It helps that Indians are text-message crazy. Indians sent some 25 billion short text messages last year, and together with ring tones they make up about 80% of the services Indians use. While India's rates may not seem like much in a global context—it costs 25¢ to book a flight on the mobile phone and 75¢ for a music download—given the numbers of Indians now using phones, those numbers can add up fast.

Consequently, mobile companies want to increase the share of their income that comes from these services, currently 10% of revenues and 13% of profits on average, to about 20%. That would put Indian carriers near the top among worldwide cellular companies. Says Manoranjan Mohapatra, chief executive officer at carrier Bharti Telesoft "India is leading the way for mobile solutions globally."

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UNIT – IV

Unit Structure

Lesson - 4.1: IT and Competitive Advantage
Lesson - 4.2: Developing Business/IT Solutions
Lesson - 4.3: Implementing New Business Systems

Lesson 4.1 - IT and Competitive Advantage

Learning Objectives

In this lesson, we will introduce you IT and its role played in MIS. After you work out this lesson, you should be able to

- Define Business Model and the components of Business Model
- Understand the role of E- Business and E- Business Development Process
- Construct a strategic Positioning Matrix

In this lesson, we will discuss the following

- Marketing and competitive advantage
- Business Model and its components
- Business Planning
- E- Business and E- Business Development Process
- Strategic Positioning Matrix

The Strategic Planning Process

In today's highly competitive business environment, budget-oriented planning or forecast-based planning methods are insufficient for a large corporation to survive and prosper.

The firm must engage in strategic planning that clearly defines objectives and assesses both the internal and external situation to formulate strategy, implement the strategy, evaluate the progress, and make adjustments as necessary to stay on track.

Marketing and Competitive Advantage

‘Marketing is the Guardian of the customer’ and therefore best placed to determine the deliverables that will contribute most to building strong relationships between customers and organization.

Fluctuating customer requirements and competitive forces are putting more pressure on marketing andare demanding superior sales and marketing strategy and tactical execution. The cycle time from product creation, to product launch, for a winning go- to- market strategy, leaves no margin for error.

Two means by which competitive advantage can be gained are

- **Through differentiation** A focus on differentiation was and always would have been the vehicle to achieve Sustainable Competitive Advantage. There are different ways with which the organizations can achieve differentiation and can create competitive advantage. These are-

  1. Consider marketing in the bigger picture context to maximize the uncovering of differentiation opportunities.
  2. Differentiation can arise from a wide range of areas of an organization, in its interaction with customers, including, achieving competitive advantage from products, brands, pricing, promotion, geographic location, communication, manufacturing efficiencies, sales capabilities, distribution, financial strength, proper business performance measurement, people etc.
  3. Recognize that differentiation in marketing initiatives changes the ‘value equation’ for customers when they make choices between a firm and its competitors.
  4. Understand the relevance and importance of differentiation opportunities to customers before making them part of strategy to maximize impact and the profitable appropriation of marketing funds.
  5. Make market knowledge a critical and ongoing part of the marketing disciplines

and ensure this knowledge is interpreted by people with appropriate marketing experience able to convert it into actionable differentiation strategies.

- **Using web technology** Many firms underestimate the value of using their websites to gain significant competitive advantage in their given markets. Most businesses only utilize their website as a means of displaying their corporate profile, list of products as well as things like their contact details and email address. But a firm's website, when used as an effective Internet Marketing Channel, can enhance competitive advantage.

It is fairly safe to say that managers should always view web technology in light of the whole marketing mix instead of merely as an extension of their existing advertising efforts. A firm's website indeed can positively impact each of these marketing mix elements – product, price, place and promotion.

Business Model

Business model converts innovation to economic value for the business. The business model spells-out how a company makes money by specifying where it is positioned in the value chain. It draws on a multitude on business subjects including entrepreneurship, strategy, economics, finance, operations, and marketing. In short, a business model is nothing else than a representation of how an organization makes (or intends to make) money. Simply put, a business model describes how a business positions itself within the value chain of its industry and how it intends to sustain itself that is to generate revenue.

Components of the Business Model

According to Chesbrough and Rosenbloom (2000), there are six components of the business mode, viz.

1. Value Proposition – a description of the customer problem, the solution that addresses the problem, and the value of this solution from the customer's perspective.
2. Market Segment – the group to target, recognizing that different market segments have different needs. Sometimes the potential of an innovation is unlocked only when a different market segment is targeted.

3. Value Chain Structure – the firm's position and activities in the value chain and how the firm will capture part of the value that it creates in the chain.
4. Revenue Generation and Margins – how revenue is generated (sales, leasing, subscription, support, etc.), the cost structure, and target profit margins.
5. Position in the Value Network – identification of competitors, complementors, and any network effects that can be utilized to deliver more value to the customer, and
6. Competitive Strategy – how the company will attempt to develop a sustainable competitive advantage and use it to improve the enterprise's competitive position in the market.

Business planning

Business planning is the process of setting goals, explaining the objectives and then mapping out a document to achieve these goals and objectives. A well- written Business Plan lays out the best growth path and strategy, as well as the rationale for the selection of the strategy over other alternatives.

In essence, a Business Plan is the articulation and explanation of why the chosen game plan for building the company makes sense, what resources it will need to implement the vision, who will comprise the team (those who will have the skills and leadership to execute the vision), and what path they will follow to get there.

As the document that tells the company's story, the Business Plan also helps shape and modifies the entrepreneurial company's Business Model, the elements of which will be driven by the answers to the following questions

- Who are we? (Team)
- What are we trying to do? (Mission)
- What problem do we solve? (Faster/Better/Easier/Cheaper)
- How are we going to get it done? (Operations)
- How do we reach our customers? (Sales/Marketing/Distribution Channel)
- Who else is doing this? How do we obtain our initial customers?

  Which are the easiest to reach? What are the target customers' decision-making processes? What relationships do they currently have in place that will need to be terminated for them to do business with us? (Competition/Competitive Analysis)

- What market research have we done to be sure that anyone wants to buy this product or service at this price - or at all? (Substantiation)
- Do we truly modify the way business is being done in our industry (as a change agent) or is this more of a fad or a trend? (Market Trends/First Mover Advantage (FMA))
- Are these targeted customer relationships profitable? How do we make money? (Business Model)
- What do we need to accomplish our goals? (Budget/Resources)
- When are we profitable? (Breakeven/Timetable)

What is E-Business?

E-Business and E-commerce are often used interchangeably. The difference lies in the integration and end user. E-business is the conduct of business on the Internet, not only buying and selling but also servicing customers and collaborating with business partners.

E-commerce is considered more of a presentation layer dealing with getting the message out to the consumer, along with means to create an ordering interface.

E-business is concerned with the total internetworking of organizational systems for the purpose of producing totally automated business commercial processes.

Steps of E-Business Development Process

There are five phases in the development process of establishing an E-Business, viz. Opportunity Analysis, Website Development, E-Marketing Program, Implementation and Expansion/E-Commerce.

PHASE I Opportunity Analysis

The purpose of Phase I in the E-business development process is to assess how ready the organization for E-business is. An analysis on the potential benefits of

E-biz and the investment required is performed. The necessity of E-business may stem from the customers who want the firm to have a Web presence or from the competitors who do their businesses online.

Phase I is the strategic planning stage of an E-business development process. This phase prepares for further development of the E-business plan by positioning one's E-business successfully with competitive advantages as follows

Step1 Assess E-Business Readiness

- Find out reasons for establishing an E-business
- Conduct a cost/benefit analysis

Step2 Identify a Unique E-Business Opportunity

- Conduct a market analysis for one's E-business
- Find out online customer needs
- Decide if the product or service sold is a good fit for the Web
- Check out the online competition
- Review traditional business/marketing plans for one's E-business fit
- Develop the E-business concept

Step3. Prepare a Unique Selling Proposition

- Identify online customers for one's E-business
- Find out one's competitive advantages
- Identify Critical Success Factors for the E-business
- Select a domain name for the E-business

PHASE II Web Site Development

Phase II is the technology side of E-business development process. In this phase, one will determine what kind of Web presence is desired and how to develop the Web site, e.g., in-house or outsourcing.

Also, an Internet Service Provider (ISP) for one's E-business is selected and actual Web content based upon the goals of the Web site is developed.

Step1

- Determine Web Site Type & E-Business Model
- Determine financial needs and secure the resources
- Determine type of Web site for the E-business
- Decide on the E-business models such as information sharing/corporate site/E-commerce site (direct selling or intermediaries)
- Forecast revenue for advertising, referral, or sales

Step2.Decide on How to Construct the Web Site

- Review various options of in-house and outsourcing Web site development
- Review different types of Web hosting services
- Select an Internet Service Provider
- Estimate developments costs

Step3. Develop Content for the Web site

- Specify goals of the Web site
- Determine what content to include in the Web site
- Edit content to ensure a Web-friendly style
- Contact ISP for hard ware advice on having the pages designed

Phase III E-Marketing Program

Phase III is the planning stage of E-marketing programs. A firm will develop pricing, distribution and promotion strategies adapted to E-business, including online advertising and search engine strategies.

Developing the Internet marketing goals and strategies before the actual Web site development will allow to check how well the Web site can serve the goals of the E-marketing programs, before one actually makes long-term financial commitment.

Step1 Clarify the E-Marketing Objectives & Develop Strategies

- Develop E-Marketing objectives and show how the use of Web will strengthen the existing business

- Develop product, price, promotion and distribution strategies adapted to E-Marketing plan
- Develop time line chart showing E-marketing activities alongside traditional marketing activities and necessary costs

Step2 Develop an Evaluation System

- Review the various measurement options for the E-marketing objectives and budget
- Rate each option for its relevance to the current needs
- Download or install a shareware program that measures Web traffic or
- Hire an outside agency to design a customer package that meets the evaluation needs

Phase IV Implementation

In Phase IV, a firm will implement E-business by building, testing and registering the Web site as well as executing various E-marketing programs from Phase III. If it is selling on-line, then it should also set up a shopping cart program, an account payment system and tools for online customer service.

Step1. Develop a Detailed Budget

- Review the traditional business budget
- Estimate E-business costs

Step2. Construct Web Site

- Design the structure of Web site
- Generate Web site
- Arrange for Hosting and post pages to site
    - Register the domain name
    - Test pages, links, and scripts to assure a well run Web site
- Publish the URL and list with search engines
- Maintain the Web site

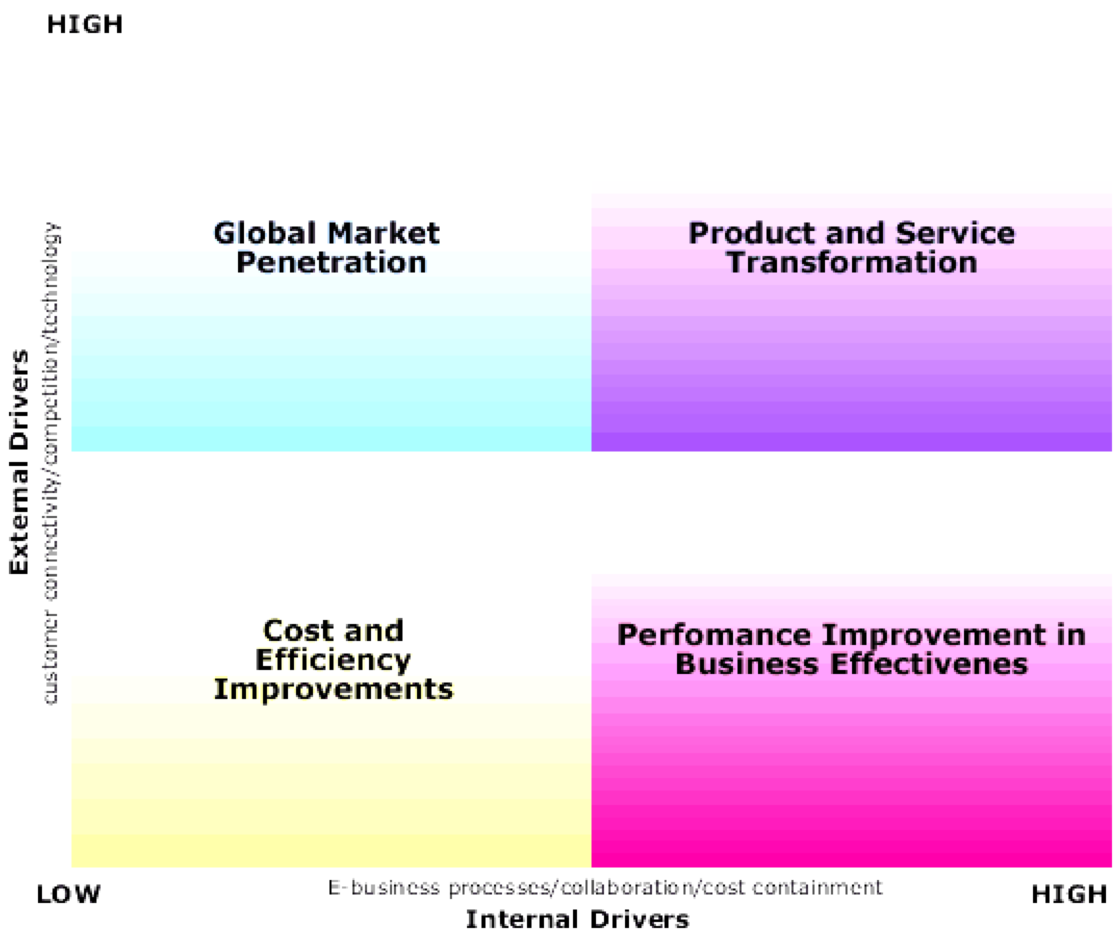
Step3. Execute E-Marketing Programs

- Implement E-marketing strategies
- Set up an account payment system and a shopping cart program, if the firm sells online
- Deliver products/services/information efficiently
- Provide excellence service to the customers
- Measure Internet marketing results in a timely manner

PHASE V Expansion / E-commerce

Phase V is the expansion stage of the E-business development process. A firm may expand its current E-business by upgrading its Web site to a higher level, or just simply by enhancing its current E-marketing programs.

- Execute enhanced E-business marketing programs
- Move to a higher level of E-business by adding new features to the Web site



Strategic positioning matrix

A strategic positioning matrix (Figure) can help a firm identify where to concentrate its use of Internet technologies to gain competitive advantage with E-business and E-commerce.

It describes the drivers of a firm's E-business strategy and advises how far a firm may go with its E-business as illustrated in the following figure.

Cost and Efficiency Improvements

This quadrant represents a low amount of internal company, customer, and competitor connectivity and use of web systems via the Internet and other networks. One recommended strategy would be to focus on improving efficiency and lowering costs by using Internet and web systems to communicate and interact with customers, suppliers, and business partners.

The use of E-mail, chat systems and discussion forums on your company website are typical examples.

Performance improvement in Business Effectiveness

Here a company has a high degree of internal connectivity and pressures to substantially improve its business process, but external connectivity by customers and competitors is still low.

A strategy of making major improvements in business effectiveness is recommended. For example, widespread use of web-based technologies like intranets and extranets can substantially improve information sharing and collaboration within the business and with its trading partners.

Global Market Penetration

A company that enters this quadrant of the matrix must capitalise on a high degree of customer and competitor connectivity and use of web systems. Developing E-business and E-commerce applications to optimise interaction with customers and build market share is recommended.

For example, E- commerce websites with value added information services and extensive services and extensive online customer support would be one way to implement such a strategy.

Product and Service Transformation

Here a company and its customers, suppliers, and competitors are extensively networked. Web-based technologies including E-commerce websites, and E- commerce intranets and extranets, must now be implemented through the company's operations and business relationships.

This enables a company to develop and deploy new web-based products and services that strategically reposition it in the marketplace. Using the internet for electronic commerce transaction processing with customers at company websites, and E-commerce auctions and exchanges for suppliers are typical examples of such E-business applications.

Thus a strategic positioning matrix helps a company optimise the strategic impact of web-based technologies for electronic business and commerce applications.

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Lesson 4.2 - Developing Business/IT Solutions

Learning Objectives

In this lesson, we will introduce Developing Business/IT Solutions in MIS. After you work out this lesson, you should be able to

- Able to understand about Information Systems
- Understand the Role of Management Information System
- Understand the Management Challenges in E-Business Enterprise
- Systems development methodologies

In this lesson, we will discuss the following

- Components of Information Systems
- Challenges in E- Business Enterprise
- Systems Thinking and approach
- System Development Cycle and various phases of it
- Prototyping

Introduction

The Wikipedia encyclopedia has defined the Management Information System as– the subset of the overall internal controls of a business covering the application of people, documents, technologies, and procedures by management accountants to solving business problems such as costing a product, service or a business-wide strategy. In a larger view, a Management Information System is a system or process that provides the information necessary to manage an organization effectively.

MIS and the information it generates, are generally considered essential components of prudent and reasonable business decisions. MIS is also popularly known as the Information System, the Information and Decision System, the Computer-based Information System.

Information System (IS) refers to a system of people, data records and activities that process the data and information in an organization, and it includes the organization's manual and automated processes.

In a narrow sense, the term information system (or computer-based information system) refers to the specific application software that is used to store data records in a computer system and automates some of the information-processing activities of the organization.

Computer-based information systems are in the field of information technology. The discipline of business process modeling describes the business processes supported by information systems.

The term information system refers to information technology that is used by people to accomplish a specified organizational or individual objective. The technology may be used in the gathering, processing, storing and/or dissemination of information, and the users are trained in the use of that technology, as well as in the procedures to be followed in doing so.

The specific technologies that collectively comprise information technology are computer technology and data communications technology. Computers provide most of the storage and processing capabilities, while data communications - specifically networks - provide the means for dissemination and remote access of information.

Advances in computer hardware, software, and networking technologies have spurred an evolution in the structure, design, and use of corporate information systems.

Computer Hardware

When computers first began moving into the business world in the late 1950s and early 1960s, the computing environment was best described as centralized, host-based computing. In this environment, the typical organization had a large mainframe computer (the centralized host) connected to a number of "dumb" terminals scattered throughout the organization or at remote sites. The mainframe did all the data processing for all the user terminals connected to it.

In the mid-1960s, Digital Equipment Corporation (DEC) announced the development of the mini-computer. Smaller than the mainframe, the mini- computer ushered in the era of distributed data processing (DDP). In this new processing environment, an organization could connect one or more minicomputers to its mainframe. Thus, the organization's data-processing function was no longer localized in a single, centralized computer (the mainframe) but, rather, distributed among all the computers.

The commercial introduction of the personal computer by IBM in the early 1980s revolutionized organizational data processing. The personal computer carried the distributed processing concept even further within organizations— it brought data processing to the desktop.

Also, it eclipsed the dumb terminal as the terminal of choice by users. The commercial success of the IBM personal computer led other computer manufacturers to develop their own personal computers that were compatible with the IBM PC (these are usually described as IBM clones or IBM-compatible computers).

One notable exception is Apple Computers, Inc., which developed its own line of non-IBM-compatible computers, namely the Apple and Macintosh line of computers. The all- inclusive term microcomputer is sometimes used to encompass all makes and models of desktop computers, including the IBM PC (and its clones) and the Apple/ Macintosh computers.

It is important to note that, despite their proliferation and ubiquity, personal computers have not replaced minicomputers or mainframes. A large number of organizations still rely on these larger computers for significant aspects of their day-to-day operations.

Computer Software

Computer software is the set of programs and associated data that drive the computer hardware to do the things that it does, such as performing arithmetic calculations or generating and printing a report. Software typically comes in one of two forms custom-written application programs or off-the-shelf software packages.

Custom-written application programs are usually written by an organization's own programming team or by professional contract programmers to satisfy unique organizational requirements. Off-the-shelf software packages are produced by software development companies and made commercially available to the public. They usually fall in one of two main categories, namely system software or application software.

The former includes such specialized programs as operating systems, compilers, utility programs, and device drivers. While these programs are important—and necessary— to the overall performance of an information system (especially from the "machine" perspective), they are not the primary focus of corporate information systems. Their basic functions are more machine-oriented than human-oriented.

Application software is designed to more directly help human users in the performance of their specific job responsibilities, such as business decision making, inventory tracking, and customer record keeping. From a software perspective, this is what corporate information systems are primarily concerned with.

One of the very important information systems functions is systems analysis and design, that is, analyzing a client's business situation (or problem), with respect to information processing, and designing and implementing an appropriate—usually computerized—solution to the problem. Information systems professionals who specialize in this area are known as systems analysts. The process begins with a detailed determination of the client's information requirements and business processes. The solution frequently involves some programming, as well as the use of an appropriate application software package(s), such as a database management system (DBMS) for designing and implementing a database for the client. It may also involve some networking considerations, depending on the user's requirements and goals. Some typical organizational information systems that can result from a systems analysis and design effort include the following.

Computer Networks

Together with computer technology, data communications technology has had a very significant impact on organizational information processing. There have been tremendous increases in the bandwidths (i.e., signal-carrying capacities) of all data communications media, including coaxial cables, fiber-optic cables, microwave transmission, and satellite transmission.

Wide area networks (WANs) provide access to remote computers and databases, thus enabling organizations to gain access to global markets, as well as increase their information sources for decision making purposes. The Internet in particular— the worldwide network of computer networks— has greatly facilitated this globalization phenomenon by making it possible to connect any computer to virtually any other computer in any part of the world. Advances in networking technologies have also enabled organizations to connect their in-house personal computers to form local area networks (LANs). This greatly facilitates organizational communication and decision-making processes.

Role of Management Information System

Role of MIS in organization can be compared with the role of heart in the body. It plays following important roles in the organization.

- It ensures that the appropriate data is collected from the various sources, proceeds and sent further to all needy destinations.
- It helps in Strategic Planning, Modeling Systems, Decision Support Systems, Management Control, Operational Control and Transaction Processing etc.
- It helps junior management personnel by providing the operational data for planning, scheduling and control and helps them further in decision- making at the operational level to correct and out of control situation.
- It helps the top management in goal setting, strategic planning and evolving the business plans and their implementation.
- It plays the role of information generation, communication, problem identification and helps in the process of decision-making.

Impact of Management Information System

With a good MIS support the management of marketing, finance, production and personnel becomes more efficient. The tracking monitoring of the functional targets becomes easy.

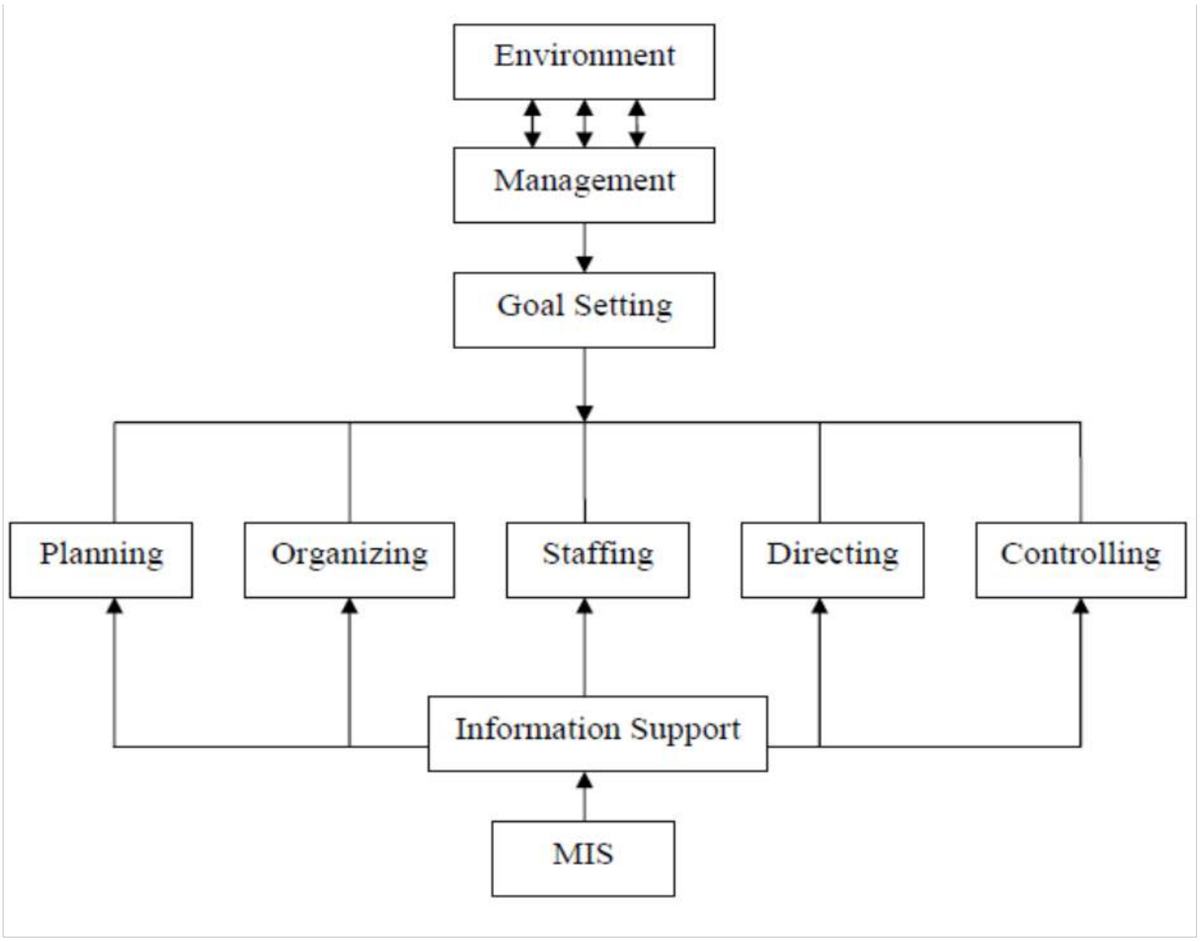
Since Management Information System uses a dictionary, there is a common understanding of terms and terminology in the organization bringing clarity in the communication and similar understanding of an event in the organization. It calls for a systemization of the business operation for an effective system design.

That is it helps indirectly to pull the entire organization in one direction towards the corporate goals and objectives by providing the relevant information to the people in the organization.

The MIS has a direct impact on many overheads in the organization. It creates an information-based work culture in the organization.

Management and Management Information System

The MIS has a strong support to the management as illustrated in the figure below



MIS support for the management process

Information System Framework

The field of information system encompasses many complex technologies, abstract behavioral concepts and specialized applications in several business and non-business areas.

The figure above illustrates a useful conceptual framework that organizes the knowledge presented and outlines what needs to be known about information systems, i.e. five areas of IS knowledge, viz.

- Foundation Concepts
- Information Technologies
- Business Applications
- Development Processes
- Management Challenges

Management Challenges in E-Business Enterprise

Today most of the business organizations are using internet technology, network and wireless technology for improving the business performance measured in terms of cost, efficiency, competitiveness and profitability. They are using e- commerce and e-business solutions. But the actual challenges to be faced are convoluted using the process of Management Information Systems.

Competing with Information Technology

Information systems can play several strategic roles in business. The Internet, intranets, extranets, and other Internet-based technologies can be used strategically for E-Business and E-Commerce that provide a competitive advantage. A key strategic use of Internet technologies is to build an E-Business which develops its business value by making customer value its strategic focus. IT is a key ingredient in reengineering business operations, by enabling radical changes to business processes that dramatically improve their efficiency and effectiveness. IT can be strategically used to improve the quality of business performance. A business can use IT to help it become an agile company that can respond quickly to changes in its environment.

Systems Thinking

Systems thinking offer a powerful new perspective, a specialized language, and a set of tools that one can use to address the most stubborn problems in everyday life and work. Systems thinking is a way of understanding reality that emphasizes the relationships among a system's parts, rather than the parts themselves. Based on a field of study known as system dynamics, Systems thinking has a practical value that rests on a solid theoretical foundation.

One of the major breakthroughs in understanding the complex world of organizations is the field of systems theory. The field studies systems from the perspective of the whole system, its various subsystems and the recurring patterns in the relationships between the subsystems. Systems theory has greatly influenced how we understand and change organizations.

The application of this theory is called systems analysis. One of the major tools of systems analysis is systems thinking. Basically, Systems thinking is a way of helping a person to view systems from a broad perspective that includes seeing overall structures, patterns and cycles in systems, rather than seeing only specific events in the system. This broad view can help to quickly identify the real causes of issues in organizations and know just where to work to address them. Systems thinking has produced a variety of principles and tools for analyzing and changing systems.

By focusing on the entire system, consultants can attempt to identify solutions that address as many problems as possible in the system. The positive effect of those solutions leverages improvement throughout the system. Thus, they are called "leverage points" in the system. This priority on the entire system and its leverage points is called whole Systems thinking.

What are Systems?

A system is a group of interacting, interrelated, and interdependent components that form a complex and unified whole. Systems are everywhere—for example, the R&D department in an organization, the circulatory system in our body, the predator/prey relationships in nature, the ignition system in a car, and so on.

Ecological systems and human social systems are living systems; human-made systems such as cars and washing machines are nonliving systems. Most systems thinkers focus their attention on living systems, especially human social systems. However, many systems thinkers are also interested in how human social systems affect the larger ecological systems in our planet.

Systems have several defining characteristics

- Every system has a purpose within a larger system.
    - Example The purpose of the R&D department in an organization is to generate new product ideas and features for the organization.
- All of a system's parts must be present for the system to carry out its purpose optimally.

- Example The R&D system in an organization consists of people, equipment, and processes. If any one of these components are removed, this system could no longer function.

➢ A system's parts must be arranged in a specific way for the system to carry out its purpose.

- Example If the reporting relationships in the R&D department are rearranged so that the head of new-product development reported to the entry-level lab technician, the department would likely have trouble carrying out its purpose.

➢ Systems change in response to feedback. The word feedback plays a central role in systems thinking. Feedback is information that returns to its original transmitter such that it influences that transmitter's subsequent actions.

➢ Systems maintain their stability by making adjustments based on feedback.

Systems Thinking as a Perspective

Systems thinking is a perspective because it helps us see the events and patterns in a new light—and respond to them in higher leverage ways. This is why looking at the world through Systems thinking "lens" is so powerful It lets one actually make the world a better place.

Systems Thinking as a Special Language

As a language, Systems thinking has unique qualities that help to communicate with others about the many systems around and within

➢ It emphasizes wholes rather than parts, and stresses the role of interconnections—including the role we each play in the systems at work in our lives.

➢ It emphasizes circular feedback (for example, A leads to B, which leads to C, which leads back to A) rather than linear cause and effect (A leads to B, which leads to C, which leads to D, . . . and so on).

➢ It contains special terminology that describes system behavior, such as reinforcing process (a feedback flow that generates exponential growth or collapse) and balancing process (a feedback flow that controls change and helps a system maintain stability).

Systems Thinking as a Set of Tools

The field of systems thinking has generated a broad array of tools that let

1. Graphically depict the understanding of a particular system's structure and behavior.
2. Communicate with others about one's understandings.
3. Design high-leverage interventions for problematic system behavior. These tools include causal loops, behavior over time graphs, stock and flow diagrams, and systems archetypes—all of which let depiction of a system which help to test the potential impact of one's interventions

The Systems Approach

The term "systems" is derived from the Greek word "synistanai," which means "to bring together or combine." The term has been used for centuries. Components of the organizational concepts referred to as the "systems approach" have been used to manage armies and governments for millennia.

However, it was not until the Industrial Revolution of the 19th and 20th centuries that formal recognition of the "systems" approach to management, philosophy, and science emerged (Whitehead 1925, von Bertalanffy 1968). As the level of precision and efficiency demanded of technology, science, and management increased the complexity of industrial processes, it became increasingly necessary to develop a conceptual basis to avoid being overwhelmed by complexity. The systems approach emerged as scientists and philosophers identified common themes in the approach to managing and organizing complex systems.

Properties of a System

Inputs, outputs and processes are defined in relation to each of the systems. A change in one part will affect all other parts. Each decision is justified in terms of pre planed objectives. Systems models are used which show how each phase fits into the next and feedback loops facilitate revision and preview.

The systems approach is a problem-solving method which helps to

1. Define the problem as clearly as possible.
2. Analyse the problem and identify alternative solutions.

3. Select from the alternatives and develop the most viable solution mix.
4. Implement and test the solution.
5. Evaluate the effectiveness and worth of the solution.

A classical systems and software engineering approach is recommended to assure the development of a management information system that is fully responsive to a client's performance objectives and resource constraints. This approach includes the following major components

1. Systems analysis, which includes information, needs assessment, requirements analysis, and requirements specification

2. Systems design, includes synthesis of alternatives, cost-effectiveness analysis of alternatives, specification of criteria for selecting a preferred alternative, selection of a preferred alternative, top-level design, and detailed design

3. Systems implementation, includes forms development, specification of data collection and entry procedures, development of editing and quality control procedures, software coding and testing, development of training materials and training, integration of the software components with other system components (e.g., personnel, communications, data transfer and assembly, report preparation and distribution, feedback), and system- level testing

4. Systems operation and support, which includes not only routine operating procedures but also provision for on-going system financing and management, quality control, software maintenance and updating, personnel training, and system maintenance and improvement (including periodic review of system performance and diagnosis and correction of problems) While the preceding system development phases are completed in sequence, there is some time overlap between them. The following paragraphs discuss aspects of each of the above major components. Our approach to management information system design is based on the modern software/system engineering discipline, which consists of structured analysis and structured design (top-down design).

The first step in an MIS development task is the development of an MIS management plan, which describes the major tasks and schedule of work for the MIS activity.

Systems Development Cycle

The systems development cycle is a management technique that divides complex projects into smaller, more easily managed segments or phases. Segmenting projects allows managers to verify the successful completion of project phases before allocating resources to subsequent phases.

Software development projects typically include initiation, planning, design, development, testing, implementation, and maintenance phases. However, the phases may be divided differently depending on the organization involved. For example, initial project activities might be designated as request, requirements- definition, and planning phases, or initiation, concept-development, and planning phases. End users of the system under development should be involved in reviewing the output of each phase to ensure the system is being built to deliver the needed functionality.

Initiation Phase

Careful oversight is required to ensure projects support strategic business objectives and resources are effectively implemented into an organization's enterprise architecture. The initiation phase begins when an opportunity to add, improve, or correct a system is identified and formally requested through the presentation of a business case. The business case should, at a minimum, describe a proposal's purpose, identify expected benefits, and explain how the proposed system supports one of the organization's business strategies. The business case should also identify alternative solutions and detail as many informational, functional, and network requirements as possible.

The presentation of a business case provides a point for managers to reject a proposal before they allocate resources to a formal feasibility study. When evaluating software development requests (and during subsequent feasibility and design analysis), management should consider input from all affected parties.

Management should also closely evaluate the necessity of each requested functional requirement. A single software feature approved during the initiation phase can require several design documents and hundreds of lines of code. It can also increase testing, documentation, and support requirements. Therefore, the initial rejection of unnecessary features can significantly reduce the resources required to complete a project.

If provisional approval to initiate a project is obtained, the request documentation serves as a starting point to conduct a more thorough feasibility study. Completing a feasibility study requires management to verify the accuracy of the preliminary assumptions and identify resource requirements in greater detail.

Primary issues organizations should consider when compiling feasibility study support documentation include

Business Considerations

- Strategic business and technology goals and objectives
- Expected benefits measured against the value of current technology
- Potential organizational changes regarding facilities or the addition/reduction of end users, technicians, or managers
- Budget, scheduling, or personnel constraints
- Potential business, regulatory, or legal issues that could impact the feasibility of the project

Functional Requirements

- End-user functional requirements
- Internal control and information security requirements
- Operating, database, and backup system requirements (type, capacity, performance)
- Connectivity requirements (stand-alone, Local Area Network, Wide Area Network, external)
- Network support requirements (number of potential users; type, volume, and frequency of data transfers);
- Interface requirements (internal or external applications).

Project Factors

- Project management methodology
- Risk management methodology
- Estimated completion dates of projects and major project phases;
- Estimated costs of projects and major project phases

Cost/Benefit Analysis

- Expected useful life of the proposed product

- Alternative solutions (buy vs. build)
- Nonrecurring project costs (personnel, hardware, software, and overhead)
- Recurring operational costs (personnel, maintenance, telecommunications, and overhead)
- Tangible benefits (increased revenues, decreased costs, return-on- investments)
- Intangible benefits (improved public opinions or more useful information)

The feasibility support documentation should be compiled and submitted for senior management or board study. The feasibility study document should provide an overview of the proposed project and identify expected costs and benefits in terms of economic, technical, and operational feasibility. The document should also describe alternative solutions and include a recommendation for approval or rejection. The document should be reviewed and signed off on by all affected parties. If approved, management should use the feasibility study and support documentation to begin the planning phase.

Planning Phase

The planning phase is the most critical step in completing development, acquisition, and maintenance projects. Careful planning, particularly in the early stages of a project, is necessary to coordinate activities and manage project risks effectively. The depth and formality of project plans should be commensurate with the characteristics and risks of a given project.

Project plans refine the information gathered during the initiation phase by further identifying the specific activities and resources required to complete a project.

A critical part of a project manager's job is to coordinate discussions between user, audit, security, design, development, and network personnel to identify and document as many functional, security, and network requirements as possible. Primary items organizations should address in formal project plans include

Project Overview

Project overviews provide an outline of the project plan. Overviews should identify the project, project sponsors, and project managers; and should describe project goals, background information, and development strategies.

Roles and Responsibilities

Project plans should define the primary responsibilities of key personnel, including project sponsors, managers, and team members. Additionally, project plans should identify the responsibilities of third-party vendors and internal audit, security, and network personnel.

Communication

Defined communication techniques enhance project efficiencies. Therefore, management should establish procedures for gathering and disseminating information. Standard report forms, defined reporting requirements, and established meeting schedules facilitate project communications. Management should establish acceptance criteria for each project phase. Management should also establish appropriate review and approval procedures to ensure project teams complete all phase requirements before moving into subsequent phases.

Defined Deliverables

Clearly defined expectations are a prerequisite for successfully completing projects. Representatives from all departments involved in, or affected by, a project should assist in defining realistic project objectives, accurate informational, functional, and interface requirements, and objective acceptance criteria.

Control Requirements

An essential part of the planning process involves designing and building automated control and security features into applications. Identifying all required features and exactly where they should be placed is not always possible during initial project phases. However, management should consider security and control issues throughout a project's life cycle and include those features in applications as soon as possible during a project's life cycle.

Risk Management

Managing risks is an important part of the project planning process. Organizations should establish procedures to ensure managers appropriately assess, monitor, and manage internal and external risks throughout a project's life cycle. The procedures should include risk acceptance, mitigation, and/or transfer strategies.

External risks include issues such as vendor failures, regulatory changes, and natural disasters. Internal risks include items that affect budgets, such as inaccurate cost forecasting or changing functional requirements; scheduling difficulties, such as unexpected personnel changes or inaccurate development assumptions; and work flow challenges, such as weak communication or inexperienced project managers.

Change Management

Personnel often request the addition or modification of functional requirements during software development projects. Although the addition or modification of requirements may be appropriate, standards should be in place to control changes in order to minimize disruptions to the development process. Project managers should establish cut-off dates after which they defer requested changes to subsequent versions. Additionally, representatives from the same departments involved in establishing requirements should be involved in evaluating and approving proposed changes. Large, complex, or mission-critical projects should include formal change management procedures.

Standards

Project plans should reference applicable standards relating to project oversight activities, system controls, and quality assurance. Oversight standards should address project methodology selections, approval authorities, and risk management procedures. System controls standards should address functional, security, and automated-control requirements. Quality assurance standards should address the validity of project assumptions, adherence to project standards, and testing of a product's overall performance. Management should review, approve, and document deviations from established standards.

Documentation

Project plans should identify the type and level of documentation personnel must produce during each project phase. For instance, personnel should document project objectives, system requirements, and development strategies during the initiation phase. The documentation should be revised as needed throughout the project. For example, preliminary user, operator, and maintenance manuals created during the design phase should be revised during the development and testing phases, and finalized during the implementation phase.

Scheduling

Management should identify and schedule major project phases and the tasks to be completed within each phase. Due to the uncertainties involved with estimating project requirements, management should build flexibility into project schedules. However, the amount of flexibility built into schedules should decline as projects progress and requirements become more defined.

Budget

Managers should develop initial budget estimations of overall project costs so they can determine if projects are feasible. Managers should monitor the budgets throughout a project and adjust them if needed; however, they should retain a baseline budget for post-project analysis. In addition to budgeting personnel expenses and outsourced activities, it is important to include the costs associated with project overhead such as office space, hardware, and software used during the project.

Testing

Management should develop testing plans that identify testing requirements and schedule testing procedures throughout the initial phases of a project. End users, designers, developers, and system technicians may be involved in the testing process.

Staff Development

Management should develop training plans that identify training requirements and schedule training procedures to ensure employees are able to use and maintain an application after implementation.

Design Phase

The design phase involves converting the informational, functional, and network requirements identified during the initiation and planning phases into unified design specifications that developers use to script programs during the development phase. Program designs are constructed in various ways.

Using a top-down approach, designers first identify and link major program components and interfaces, then expand design layouts as they identify and link smaller subsystems and connections. Using a bottom-up approach, designers first identify and link minor program components and interfaces, then expand design layouts as they identify and link larger systems and connections.

Contemporary design techniques often use prototyping tools that build mock-up designs of items such as application screens, database layouts, and system architectures. End users, designers, developers, database managers, and network administrators should review and refine the prototyped designs in an iterative process until they agree on an acceptable design. Audit, security, and quality assurance personnel should be involved in the review and approval process.

Management should be particularly diligent when using prototyping tools to develop automated controls. Prototyping can enhance an organization's ability to design, test, and establish controls. However, employees may be inclined to resist adding additional controls, even though they are needed, after the initial designs are established.

Designers should carefully document completed designs. Detailed documentation enhances a programmer's ability to develop programs and modify them after they are placed in production. The documentation also helps management ensure final programs are consistent with original goals and specifications.

Organizations should create initial testing, conversion, implementation, and training plans during the design phase. Additionally, they should draft user, operator, and maintenance manuals.

Application Control Standards

Application controls include policies and procedures associated with user activities and the automated controls designed into applications. Controls should be in place to address both batch and on-line environments. Standards should address procedures to ensure management appropriately approves and control overrides.

Designing appropriate security, audit, and automated controls into applications is a challenging task. Often, because of the complexity of data flows, program logic, client/server connections, and network interfaces, organizations cannot identify the exact type and placement of the features until interrelated functions are identified in the design and development phases.

However, the security, integrity, and reliability of an application is enhanced if management considers security, audit, and automated control features at the onset of a project and includes them as soon as possible in application and system designs. Adding controls late in the development process or when applications are in production is more expensive, time consuming, and usually results in less effective controls.

Standards should be in place to ensure end users, network administrators, auditors, and security personnel are appropriately involved during initial project phases. Their involvement enhances a project manager's ability to define and incorporate security, audit, and control requirements. The same groups should be involved throughout a project's life cycle to assist in refining and testing the features as projects progress.

Application control standards enhance the security, integrity, and reliability of automated systems by ensuring input, processed, and output information is authorized, accurate, complete, and secure. Controls are usually categorized as preventative, detective, or corrective. Preventative controls are designed to prevent unauthorized or invalid data entries. Detective controls help identify unauthorized or invalid entries. Corrective controls assist in recovering from unwanted occurrences.

Input Controls

Automated input controls help ensure employees accurately input information, systems properly record input, and systems either reject, or accept and record, input errors for later review and correction. Examples of automated input controls include

Check Digits

Check digits are numbers produced by mathematical calculations performed on input data such as account numbers. The calculation confirms the accuracy of input by verifying the calculated number against other data in the input data, typically the final digit.

Completeness Checks

Completeness checks confirm that blank fields are not input and that cumulative input matches control totals.

Duplication Checks

Duplication checks confirm that duplicate information is not input.

Limit Checks

Limit checks confirm that a value does not exceed predefined limits.

Range Checks

Range checks confirm that a value is within a predefined range of parameters.

Reasonableness Checks

Reasonableness checks confirm that a value meets predefined criteria.

Sequence Checks

Sequence checks confirm that a value is sequentially input or processed.

Validity Checks

Validity checks confirm that a value conforms to valid input criteria.

Processing Controls

Automated processing controls help ensure systems accurately process and record information and either reject, or process and record, errors for later review and correction. Processing includes merging files, modifying data, updating master files, and performing file maintenance.

Examples of automated processing controls include

Batch Controls

Batch controls verify processed run totals against input control totals. Batches are verified against various items such as total dollars, items, or documents processed.

Error Reporting

Error reports identify items or batches that include errors. Items or batches with errors are withheld from processing, posted to a suspense account until corrected, or processed and flagged for later correction.

Transaction Logs

Users verify logged transactions against source documents. Administrators use transaction logs to track errors, user actions, resource usage, and unauthorized access.

Run-to-Run Totals

Run-to-run totals compiled during input, processing, and output stages are verified against each other.

Sequence Checks

Sequence checks identify or reject missing or duplicate entries.

Interim Files

Operators revert to automatically created interim files to validate the accuracy, validity, and completeness of processed data.

Backup Files

Operators revert to automatically created master-file backups if transaction processing corrupts the master file.

Output Controls

Automated output controls help ensure systems securely maintain and properly distribute processed information. Examples of automated output controls include

Batch Logs

Batch logs record batch totals. Recipients of distributed output verify the output against processed batch log totals.

Distribution Controls

Distribution controls help ensure output is only distributed to authorized individuals. Automated distribution lists and access restrictions on information stored electronically or spooled to printers are examples of distribution controls.

Destruction Controls

Destruction controls help ensure electronically distributed and stored information is destroyed appropriately by overwriting outdated information or demagnetizing (degaussing) disks and tapes. Refer to the IT Handbook's "Information Security Booklet" for more information on disposal of media.

Development Phase

The development phase involves converting design specifications into executable programs. Effective development standards include requirements that programmers and other project participants discuss design specifications before programming begins. The procedures help ensure programmers clearly understand program designs and functional requirements.

Programmers use various techniques to develop computer programs. The large transaction-oriented programs associated with financial institutions have traditionally been developed using procedural programming techniques.

Procedural programming involves the line-by-line scripting of logical instructions that are combined to form a program.

Primary procedural programming activities include the creation and testing of source code and the refinement and finalization of test plans. Typically, individual programmers write and review (desk test) program modules or components, which are small routines that perform a particular task within an application.

Completed components are integrated with other components and reviewed, often by a group of programmers, to ensure the components properly interact. The process continues as component groups are progressively integrated and as interfaces between component groups and other systems are tested.

Advancements in programming techniques include the concept of "object-oriented programming." Object-oriented programming centers on the development of reusable program routines (modules) and the classification of data types (numbers, letters, dollars, etc.) and data structures (records, files, tables, etc.).

Linking pre-scripted module objects to predefined data-class objects reduces development times and makes programs easier to modify. Refer to the "Software Development Techniques" section for additional information on object-oriented programming.

Organizations should complete testing plans during the development phase. Additionally, they should update conversion, implementation, and training plans and user, operator, and maintenance manuals.

Development Standards

Development standards should be in place to address the responsibilities of application and system programmers. Application programmers are responsible for developing and maintaining end-user applications. System programmers are responsible for developing and maintaining internal and open-source operating system programs that link application programs to system software and subsequently to hardware. Managers should thoroughly understand development and production environments to ensure they appropriately assign programmer responsibilities.

Development standards should prohibit a programmer's access to data, programs, utilities, and systems outside their individual responsibilities. Library controls can be used to manage access to, and the movement of programs between, development, testing, and production environments. Management should also establish standards requiring programmers to document completed programs and test results thoroughly. Appropriate documentation enhances a programmer's ability to correct programming errors and modify production programs.

Coding standards, which address issues such as the selection of programming languages and tools, the layout or format of scripted code, and the naming conventions of code routines and program libraries, are outside the scope of this document.

However, standardized, yet flexible, coding standards enhance an organization's ability to decrease coding defects and increase the security, reliability, and maintainability of application programs. Examiners should evaluate an organization's coding standards and related code review procedures.

Library Controls

Libraries are collections of stored documentation, programs, and data. Program libraries include reusable program routines or modules stored in source or object code formats. Program libraries allow programmers to access frequently used routines and add them to programs without having to rewrite the code. Dynamic link libraries include executable code programs that can automatically run as part of larger applications.

Library controls should include Automated Password Controls – Management should establish logical access controls for all libraries or objects within libraries. Establishing controls on individual objects within libraries can create security administration burdens. However, if similar objects (executable and non-executable routines, test and production data, etc.) are grouped into separate libraries, access can be granted at library levels.

Automated Library Applications – When feasible, management should implement automated library programs, which are available from equipment manufacturers and software vendors. The programs can restrict access at library or object levels and produce reports that identify who accessed a library and what, if any, changes were made.

Version Controls

Library controls facilitate software version controls. Version controls provide a means to systematically retain chronological copies of revised programs and program documentation.

Development version control systems sometimes referred to as concurrent version systems, assist organizations in tracking different versions of source code during development. The systems do not simply identify and store multiple versions of source code files. They maintain one file and identify and store only changed code. When a user requests a particular version, the system recreates that version. Concurrent version systems facilitate quick identification of programming errors. For example, if programmers install a revised program on a test server and discover programming errors, they only have to review the changed code to identify the error.

Software Documentation

Organizations should maintain detailed documentation for each application and application system in production. Thorough documentation enhances an organization's ability to understand functional, security, and control features and improves its ability to use and maintain the software. The documentation should contain detailed application descriptions, programming documentation, and operating instructions. Standards should be in place that identify the type and format of required documentation such as system narratives, flowcharts, and any special system coding, internal controls, or file layouts not identified within individual application documentation.

Management should maintain documentation for internally developed programs and externally acquired products. In the case of acquired software, management should ensure (either through an internal review or third-party certification) prior to purchase, that an acquired product's documentation meets their organization's minimum documentation standards. For additional information regarding acquired software distinctions (open/closed code) refer to the "Escrowed Documentation" discussion in the "Acquisition" section.

Examiners should consider access and change controls when assessing documentation activities. Change controls help ensure organizations appropriately approve, test, and record software modifications. Access controls help ensure individuals only have access to sections of documentation directly related to their job functions.

System documentation should include

System Descriptions

System descriptions provide narrative explanations of operating environments and the interrelated input, processing, and output functions of integrated application systems.

System Documentation

System documentation includes system flowcharts and models that identify the source and type of input information, processing and control actions (automated and manual), and the nature and location of output information.

System File Layouts

System file layouts describe collections of related records generated by individual processing applications. For example, personnel may need system file layouts to describe interim files, such as sorted deposit transaction files, in order to further define master file processing requirements.

Application Documentation Should Include

Application Descriptions

Application descriptions provide narrative explanations of the purpose of an application and provide overviews of data input, processing, and output functions.

Layouts

Layouts represent the format of stored and displayed information such as database layouts, screen displays, and hardcopy information.

Program Documentation

Program documentation details specific data input, processing, and output instructions, and should include documentation on system security. Program listings/source code and related narrative comments are the most basic items in program documentation and consist of technical programming scripts and non-technical descriptions of the scripts. It is important that developers update the listings and comment documentation when they modify programs. Many software development tools are available that automatically create source listings and narrative descriptions.

Traditionally, designers and developers have used flowcharts to present pictorial views of the sequencing of procedural programs such as COBOL and Assembler. Flowcharts provide a practical way to illustrate complex programs and routines. Flowcharting software is available that can automatically chart programs or enable programmers to chart programs dynamically without the need to draw them manually. Programming techniques, such as object-oriented programming, have contributed to the use of dynamic flowcharting products. Maintaining detailed documentation of object-oriented code is particularly important because a primary benefit of the programming technique is the reuse of program objects.

Naming Conventions

Naming conventions are a critical part of program documentation. Software programs are comprised of many lines of code, usually arranged hierarchically into small groups of code (modules, subroutines, or components), that perform individual functions within an application. Programmers should name and document the modules and any related subroutines, databases, or programs that interact with an application. Standardized naming conventions allow programmers to link subroutines into a unified program efficiently and facilitate technicians' and programmers' ability to understand and modify programs.

Operator Instructions

Organizations should establish operator instructions regarding all processing applications. The guidance should explain how to perform particular jobs, including how operators should respond to system requests or interrupts. The documentation should only include information pertinent to the computer operator's function. Program documentation such as source listings, record layouts, and program flowcharts should not be accessible to an operator. Operator instructions should be thorough enough to permit an experienced operator who is unfamiliar with the application to run a program successfully without assistance.

End-User Instructions

Organizations should establish end-user instructions that describe how to use an application. Operation manuals, online help features, and system error messages are forms of instructions that assist individuals in using applications and responding to problems.

Testing Phase

The testing phase requires organizations to complete various tests to ensure the accuracy of programmed code, the inclusion of expected functionality, and the interoperability of applications and other network components. Thorough testing is critical to ensuring systems meet organizational and end-user requirements.

If organizations use effective project management techniques, they will complete test plans while developing applications, prior to entering the testing phase. Weak project management techniques or demands to complete projects quickly may pressure organizations to develop test plans at the start of the testing phase. Test plans created during initial project phases enhance an organization's ability to create detailed tests. The use of detailed test plans significantly increases the likelihood that testers will identify weaknesses before products are implemented.

Testing groups are comprised of technicians and end users who are responsible for assembling and loading representative test data into a testing environment. The groups typically perform tests in stages, either from a top-down or bottom- up approach. A bottom-up approach tests smaller components first and progressively adds and tests additional components and systems.

A top-down approach first tests major components and connections and progressively tests smaller components and connections. The progression and definitions of completed tests vary between organizations.

Bottom-up tests often begin with functional (requirements based) testing. Functional tests should ensure that expected functional, security, and internal control features are present and operating properly. Testers then complete integration and end-to-end testing to ensure application and system components interact properly. Users then conduct acceptance tests to ensure systems meet defined acceptance criteria.

Testers often identify program defects or weaknesses during the testing process. Procedures should be in place to ensure programmers correct defects quickly and document all corrections or modifications. Correcting problems quickly increases testing efficiencies by decreasing testers' downtime.

It also ensures a programmer does not waste time trying to debug a portion of a program without defects that is not working because another programmer has not debugged a defective linked routine. Documenting corrections and modifications is necessary to maintain the integrity of the overall program documentation.

Organizations should review and complete user, operator, and maintenance manuals during the testing phase. Additionally, they should finalize conversion, implementation, and training plans.

Primary Tests Include

Acceptance Testing

End users perform acceptance tests to assess the overall functionality and interoperability of an application.

End-to-End Testing

End users and system technicians perform end-to-end tests to assess the interoperability of an application and other system components such as databases, hardware, software, or communication devices.

Functional Testing

End users perform functional tests to assess the operability of a program against predefined requirements. Functional tests include black box tests, which assess the operational functionality of a feature against predefined expectations, or white box tests, which assess the functionality of a feature's code.

Integration Testing

End users and system technicians perform integration tests to assess the interfaces of integrated software components.

Parallel Testing

End users perform parallel tests to compare the output of a new application against a similar, often the original, application.

Regression Testing

End users retest applications to assess functionality after programmers make code changes to previously tested applications.

Stress Testing

Technicians perform stress tests to assess the maximum limits of an application.

String Testing

Programmers perform string tests to assess the functionality of related code modules.

System Testing

Technicians perform system tests to assess the functionality of an entire system.

Unit Testing

Programmers perform unit tests to assess the functionality of small modules of code.

Implementation Phase

The implementation phase involves installing approved applications into production environments. Primary tasks include announcing the implementation schedule, training end users, and installing the product. Additionally, organizations should input and verify data, configure and test system and security parameters, and conduct post-implementation reviews. Management should circulate implementation schedules to all affected parties and should notify users of any implementation responsibilities.

After organizations install a product, pre-existing data is manually input or electronically transferred to a new system. Verifying the accuracy of the input data and security configurations is a critical part of the implementation process. Organizations often run a new system in parallel with an old system until they verify the accuracy and reliability of the new system. Employees should document any programming, procedural, or configuration changes made during the verification process.

Project Evaluation

Management should conduct post-implementation reviews at the end of a project to validate the completion of project objectives and assess project management activities. Management should interview all personnel actively involved in the operational use of a product and document and address any identified problems.

Management should analyze the effectiveness of project management activities by comparing, among other things, planned and actual costs, benefits, and development times. They should document the results and present them to senior management. Senior management should be informed of any operational or project management deficiencies.

Maintenance Phase

The maintenance phase involves making changes to hardware, software, and documentation to support its operational effectiveness. It includes making changes to improve a system's performance, correct problems, enhance security, or address user requirements. To ensure modifications do not disrupt operations or degrade a system's performance or security, organizations should establish appropriate change management standards and procedures.

Change management (sometimes referred to as configuration management) involves establishing baseline versions of products, services, and procedures and ensuring all changes are approved, documented, and disseminated.

Change controls should address all aspects of an organization's technology environment including software programs, hardware and software configurations, operational standards and procedures, and project management activities. Management should establish change controls that address major, routine, and emergency software modifications and software patches.

Major modifications involve significant changes to a system's functionality. Management should implement major modifications using a well-structured process, such as an SDLC methodology.

Routine changes are not as complex as major modifications and can usually be implemented in the normal course of business. Routine change controls should include procedures for requesting, evaluating, approving, testing, installing, and documenting software modifications.

Emergency changes may address an issue that would normally be considered routine, however, because of security concerns or processing problems, the changes must be made quickly. Emergency change controls should include the same procedures as routine change controls. Management should establish abbreviated request, evaluation, and approval procedures to ensure they can implement changes quickly.

Detailed evaluations and documentation of emergency changes should be completed as soon as possible after changes are implemented. Management should test the routine and, quickly notify affected parties of all changes. If management is unable to thoroughly test emergency modifications before installation, it is critical that they appropriately backup files and programs and have established back-out procedures in place.

Software patches are similar in complexity to routine modifications. This document uses the term “patch” to describe program modifications involving externally developed software packages.

However, organizations with in-house programming may also refer to routine software modifications as patches. Patch management programs should address procedures for evaluating, approving, testing, installing, and documenting software modifications. However, a critical part of the patch management process involves maintaining an awareness of external vulnerabilities and available patches.

Maintaining accurate, up-to-date hardware and software inventories is a critical part of all change management processes. Management should carefully document all modifications to ensure accurate system inventories. (If material software patches are identified but not implemented, management should document the reason why the patch was not installed.)

Management should coordinate all technology related changes through an oversight committee and assign an appropriate party responsibility for administering software patch management programs.

Quality assurance, security, audit, regulatory compliance, network, and end-user personnel should be appropriately included in change management processes. Risk and security review should be done whenever a system modification is implemented to ensure controls remain in place.

Disposal Phase

The disposal phase involves the orderly removal of surplus or obsolete hardware, software, or data. Primary tasks include the transfer, archiving, or destruction of data records. Management should transfer data from production systems in a planned and controlled manner that includes appropriate backup and testing procedures.

Organizations should maintain archived data in accordance with applicable record retention requirements. It should also archive system documentation in case it becomes necessary to reinstall a system into production.

Management should destroy data by overwriting old information or degaussing (demagnetizing) disks and tapes.

Prototyping

Prototyping is the process of building a model of a system. In terms of an information system, prototypes are employed to help system designers build an information system that are intuitive and easy to manipulate for end users. Prototyping is an iterative process that is part of the analysis phase of the systems development life cycle.

During the requirements determination portion of the systems analysis phase, system analysts gather information about the organization's current procedures and business processes that are related to the proposed information system. In addition, they study the current information system, if there is one, and conduct user interviews and collect documentation. This helps the analysts develop an initial set of system requirements.

Prototyping can augment this process because it converts these basic, yet sometimes intangible, specifications into a tangible but limited working model of the desired information system. The user feedback gained from developing a physical system that the users can touch and see facilitates an evaluative response that the analyst can employ to modify existing requirements as well as developing new ones.

Prototyping comes in many forms - from low tech sketches or paper screens (Pictive) from which users and developers can paste controls and objects, to high tech operational systems using CASE (computer-aided software engineering) or fourth generation languages and everywhere in between.

Many organizations use multiple prototyping tools. For example, some will use paper in the initial analysis to facilitate concrete user feedback and then later develop an operational prototype using fourth generation languages, such as Visual Basic, during the design stage.

Some Advantages of Prototyping

- Reduces Development Time.
- Reduces Development Costs.
- Requires User Involvement.
- Developers receive Quantifiable User Feedback.
- Facilitates System Implementation since users know what to expect.
- Results in Higher User Satisfaction.
- Exposes Developers to Potential Future System Enhancements.

Some Disadvantages of Prototyping

- Can lead to insufficient analysis.
- Users expect the performance of the ultimate system to be the same as the prototype.
- Developers can become too attached to their prototypes
- Can cause systems to be left unfinished and/or implemented before they are ready.
- Sometimes leads to incomplete documentation.

Software Development Process

A software development process is a structure imposed on the development of a software product. Synonyms include software life cycle and *software process*. There are several models for such processes, each describing approaches to a variety of tasks or activities that take place during the process.

Software development activities include

1. Requirements analysis
2. Design
3. Implementation
4. Verification and
5. Maintenance

The activities of the software development process are represented in the waterfall model. There are several other models to represent this process.

Requirements Analysis

The important task in creating a software product is extracting the requirements or requirements analysis. Customers typically have an abstract idea of what they want as an end result, but not what software should do. Incomplete, ambiguous, or even contradictory requirements are recognized by skilled and experienced software engineers at this point. Frequently demonstrating live code may help reduce the risk that the requirements are incorrect.

Once the general requirements are gleaned from the client, an analysis of the scope of the development should be determined and clearly stated. This is often called a scope document. Certain functionality may be out of scope of the project as a function of cost or as a result of unclear requirements at the start of development. If the development is done externally, this document can be considered a legal document so that if there are ever disputes, any ambiguity of what was promised to the client can be clarified.

Design

Domain Analysis is often the first step in attempting to design a new piece of software, whether it be an addition to an existing software, a new application, a new subsystem or a whole new system. Assuming that the developers (including the analysts) are not sufficiently knowledgeable in the subject area of the new software, the first task is to investigate the so-called "domain" of the software.

The more knowledgeable they are about the domain already, the less work required. Another objective of this work is to make the analysts, who will later try to elicit and gather the requirements from the area experts, speak with them in the domain's own terminology, facilitating a better understanding of what is being said by these experts. As a result, a system design specification precisely describing the software can be arrived at.

Implementation, Testing and Documenting

Implementation is the part of the process where software developers actually program the code for the project.

Software testing is an integral and important part of the software development process. This part of the process ensures that bugs are recognized as early as possible.

Documenting the internal design of software for the purpose of future maintenance and enhancement is done throughout development. This may also include the authoring of an API, be it external or internal.

Deployment and Maintenance

Deployment starts after the code is appropriately tested, is approved for release and sold or otherwise distributed into a production environment.

Software Training and Support is important because a large percentage of software projects fail because the developers fail to realize that it doesn't matter how much time and planning a development team puts into creating software if nobody in an organization ends up using it. People are often resistant to change and avoid venturing into an unfamiliar area, so as a part of the deployment phase, it is very important to have training classes for new clients of your software.

Maintenance and enhancing software to cope with newly discovered problems or new requirements can take far more time than the initial development of the software. It may be necessary to add code that does not fit the original design to correct an unforeseen problem or it may be that a customer is requesting more functionality and code can be added to accommodate their requests. It is during this phase that customer calls come in and you see whether your testing was extensive enough to uncover the problems before customers do.

Bug Tracking System tools are often deployed at this stage of the process to allow development teams to interface with customer/field teams testing the software to identify any real or perceived issues. These software tools, both open source and commercially licensed, provide a customizable process to acquire, review, acknowledge, and respond to reported issues.

Other Popular Software Development Models

Iterative Processes

Iterative development prescribes the construction of initially small but ever larger portions of a software project to help all those involved to uncover important issues early before problems or faulty assumptions can lead to disaster. Iterative processes are preferred by commercial developers because it allows a potential of reaching the design goals of a customer who does not know how to define what they want.

Agile Software Development

Agile software development processes are built on the foundation of iterative development. To that foundation they add a lighter, more people-centric viewpoint than traditional approaches. Agile processes use feedback, rather than planning, as their primary control mechanism. The feedback is driven by regular tests and releases of the evolving software.

XP Extreme Programming

Extreme Programming (XP) is the best-known iterative process. In XP, the phases are carried out in extremely small (or "continuous") steps compared to the older, "batch" processes. The (intentionally incomplete) first pass through the steps might take a day or a week, rather than the months or years of each complete step in the Waterfall model. First, one writes automated tests, to provide concrete goals for development. Next is coding (by a pair of programmers), which is complete when all the tests pass, and the programmers can't think of any more tests that are needed. Design and architecture emerge out of refactoring, and come after coding. Design is done by the same people who do the coding. (Only the last feature - merging design and code - is common to *all* the other agile processes.) The incomplete but functional system is deployed or demonstrated for (some subset of) the users (at least one of which is on the development team). At this point, the practitioners start again on writing tests for the next most important part of the system.

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Lesson 4.3 - Implementing New Business Systems

Learning Objectives

In this lesson, we will introduce you how to the Implementation of New Business Systems. After you work out this lesson, you should be able to

Understand how a system is implemented.

- Acquisition of Hardware, Software and Services
- Software Development or Modification
- End User Training
- System Documentation
- Conversation (Parallel, Pilot, Phased, Plunge)

In this lesson, we will discuss the following

- Challenges in Implementing New Business Systems
- Evaluating Hardware, Software and Services
- Conversion Methods
- Maintenance of the System
- End User Resistance and Involvement

Introduction

Many organizations are reviewing business practices and upgrading information technology (IT/ICT).The need to achieve a smooth system implementation, free of omissions and delays, is obvious for successful business management.

Unfortunately, past implementation exercises may not have gone smoothly. Many staff will know of situations that have become folklore within the organization. Sometimes, departments/business units have suffered a loss of credibility that has affected their reputation for months or years. Whilst a smooth and error free implementation can never be guaranteed, particularly where new technology is involved, there are processes and actions that can maximize the positives and minimize the problems.

Factors that need to be considered include

- The extent and complexity of the change;
- The availability of staff for the extra work and time involved;
- Staff skills and experience in implementing change, particularly technological change.

Changes, particularly those involving technology, are intensive users of resources. As resources are scarce in most organizations, special attention is required. Effective control in day-to-day administration is essential. Consequently, control is critical when complementing changes.

A difficulty experienced by some organizations has been the loss of historical knowledge and experience caused by the turnover of staff. Whilst new staff or outsourced suppliers may have mastered the normal day-to-day running of the system, they may not have had any experience in implementing changes. Sometimes this means that staff does not know the assumptions and quirks built into the system. When change is contemplated, these assumptions need to be reviewed. This is very difficult when you do not know that they are there- System documentation may be of assistance, but many have difficulty reading such documents. Extensive testing of the new system is essential in this type of environment. Software upgrades of proprietary systems can sometimes require an upgrade of the operating system/network software to the latest or later version. This may even require upgrades/ replacement of computer and network hardware. These combinations increase the complexity dramatically, as interfaces between the various components may cause operational problems. Extensive testing of the new system is essential in this type of environment.

Added to the factors discussed above are the normal time and budget constraints faced by most organizations. Budgets may have considered the capital costs involved with the new system implementation. Often, the additional time requirements are not. This particularly occurs in contract environments, where staff numbers have been trimmed to the extent that extras' cannot be accommodated. Sometimes the contract has not considered the impact of system changes. Extra costs, particularly for outsourced suppliers, may be incurred by the organization.

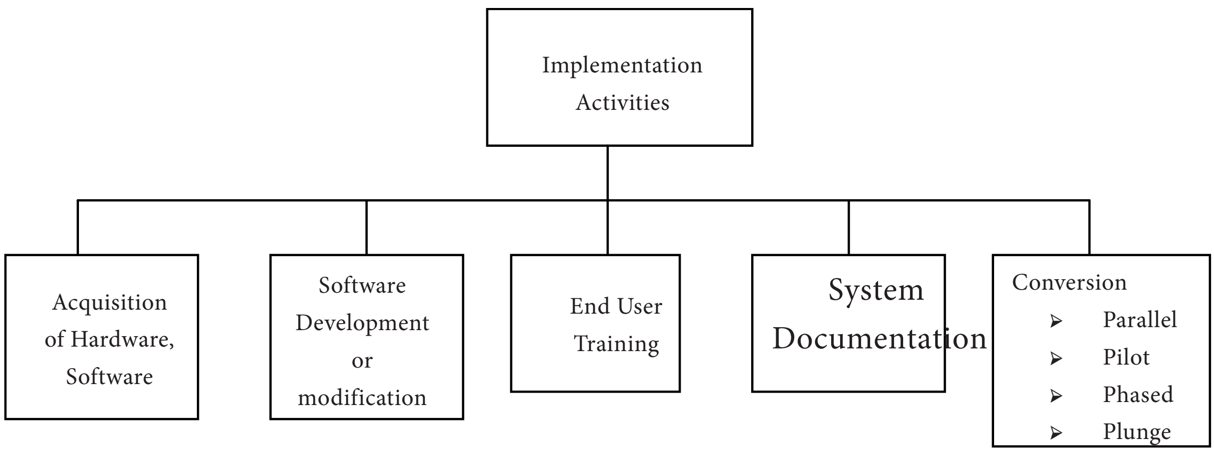
System implementations can be tied to specific dates. If these dates are missed, additional effort can be required e.g. running the 'old' system, then having to transfer the same data to the 'new' system. A planned approach is essential to system implementation. Well-planned projects consistently demonstrate significant time savings and cost containment because of appropriate project management.

Once the planning is done, the implementation process can be executed smoothly. The steps in the process include organizing for implementation, developing procedures for implementation, training the users, acquiring hardware and software, developing forms for data collection, developing files for storage of data, testing the system, cutover, and documenting the system.

The implementation process should be followed by evaluation of the implementation. The MIS can be evaluated for the efficiency with which the allocated resources are utilized in the development/implementation and the effectiveness of its usage after the implementation. Typically, there are challenges galore in implementing the MIS.

The top management's commitment toward the MIS implementation is the strongest defense that can be built up against all these challenges. The top management's support helps the organization to win over the different challenges and problems that can surface during the implementation.

Implementation should be viewed as a process that carries out the operational plans developed at the end of the IS planning process. The implementation process is a major stage that follows the investigation, analysis, and design stages of the systems development process. Implementation involves a variety of activities as shown in Figure.



Implementation Activities

Acquiring Hardware, Software, and Services

Acquiring hardware, software, and external IS services are a major implementation activity. These resources can be acquired from many sources in the computer industry.

Hardware and Software Suppliers

Computer manufacturers produce many types of computer systems, as well as peripheral equipment and software.

You can also buy software packages directly from large software developers such as Microsoft and Lotus Development, or through computer-retailers and mail order companies. Other buying methods include

Corporate Buying Plans

Corporate buying plans allow employees to purchase hardware and software at substantial discounts directly from hardware manufacturers and software companies.

OEM Original Equipment Manufacturers (OEMs) - produce and sell computers by assembling components produced by other hardware suppliers.

PCMs Plug-Compatible Manufacturers (PCMs) - manufacture computer mainframes and peripheral devices that are specifically designed to be compatible (just “plug in”) with other computers.

VARs Value-Added Resellers (VARs) - specialize in providing industry-specific hardware and software from selected manufacturers.

Evaluating Hardware, Software, and Services

To evaluate and select hardware and software, computer-using organizations typically

1. Require suppliers to present bids and proposals based on system specifications developed during the information systems design stage.
2. Minimum acceptable physical and performance characteristics for all hardware and software requirements are established. Government agencies and most large businesses use a document called an RFP (request for proposal) or RFQ (request for quotation), which lists all the required specifications.

3. When several competing proposals for hardware or software acquisition need to be evaluated, a scoring system may be used, giving a numerical score for each of several evaluation factors. Each competing proposal is assigned points for each factor, depending on how well it meets the specifications.

Hardware Evaluation Factors

When evaluating computer hardware, you should investigate specific physical and performance characteristics for each hardware component to be acquired. This is true whether you are evaluating mainframes, microcomputers, or peripheral devices. Hardware evaluation factors are listed in the table below

Hardware Evaluation Factors	Rating
Performance What is its speed, capacity, and throughput?	
Cost What is its lease or purchase price? What will be its cost of operations and maintenance?	
Reliability What are the risk of malfunction and its maintenance requirements? What are its error control and diagnostic features?	
Compatibility Is it compatible with existing hardware and software? Is it compatible with hardware and software provided by competing suppliers?	
Technology In what year of its product life cycle is it? Does it use a new untested technology or does it run the risk of obsolescence?	
Ergonomics Has it been "human factors engineered" with the user in mind? Is it user-friendly, designed to be safe, comfortable, and easy to use?	
Connectivity Can it be easily connected to wide area and local area networks that use different types of network technologies and bandwidth alternatives?	
Scalability Can it handle the processing demands of a wide range of end users, transactions, queries, and other information processing requirements?	
Software Is system and application software available that can best use this hardware?	
Support Are the services required to support and maintain it available?	
Overall Rating	

Software Evaluation Factors

Evaluating software requires evaluation factors that are listed in the table below

Software Evaluation Factors	Rating
Quality Is it bug free, or does it have many errors in its program code?	
Efficiency Is the software a well-developed system of program code that does not use much CPU time, memory capacity, or disk space?	
Flexibility Can it handle our e-business processes easily, without major modification?	
Security Does it provide control procedures for errors, malfunctions, and improper use?	
Connectivity Is it *Web-enabled* so it can easily access the Internet, intranets, and extranets, on its own, or by working with Web browsers or other network software?	
Maintenance Will new features and bug fixes be easily implemented by our own software developers?	
Documentation Is the software well documented? Does it include help screens and helpful software agents?	
Hardware Does existing hardware have the features required to best use this software?	
Other Factors What are its performance, cost, reliability, availability, compatibility, modularity, technology, ergonomics, scalability, and support characteristics? (Use the hardware evaluation factor questions in Figure 10.22)	
Overall Rating	

Evaluating IS Services

Suppliers of hardware and software products and many other firms offer a variety of IS services to end users and organizations. Evaluating IS services include factors such as

1. Performance
2. Systems Development
3. Maintenance
4. Conversion
5. Training
6. Backup
7. Accessibility
8. Business Position
9. Hardware
10. Software

End user training

One of the major issues related to EUC is training individuals in colleges and in businesses to adapt to the new technology. This study is motivated by the issues created by end-user computing (EUC) and its growing importance within organizations.

As a result, both researchers and practitioners are challenged to find new ways to train end users. Researchers have studied a number of key variables such as training support, delivery techniques, and individual differences that can be manipulated to enhance training program design in response to this challenge.

Massive investments in computing technology by universities and corporations and subsequent impact on return on investment, and the dynamic nature of information systems (IS) technology change cause a continual assessment of the management of IS. There is also a critical need for computer literacy and aptitude by all students and employees due to the pervasiveness of computers in the workplace.

More specifically organizations are concerned about the long- term effect of training on individual performance. This study proposes an end- user training meta-model that organizations, trainers and researchers could use to devise effective training systems. This study reports the result of longitudinal study conducted in an industrial setting but relevant to other settings from higher education to private agencies and businesses.

Organizational needs and training methods are becoming more complex as organizations attempt to reengineer their administrative and production systems. End user training to meet these needs imposes an increase in the complexity and scope on training systems. The skills and knowledge workers need on the job are rapidly changing and require improvement in Training Systems.

As a result, both industry managers and researchers are challenged to find new ways to train employees. In response to this challenge, researchers have studied key variables such as training support, training delivery techniques, individual differences of the trainees, and technology that can be used to enhance effective training program design.

The need for effective training programs and a variety of approaches to train and develop employees compete for organizational resources.

In order to achieve the maximum benefits of change, management must realize that workers are generally capable of performing above the level their jobs require or allow. In response, corporate interest in providing training in basic workplace skills has increased.

For example, corporations such as Texas Instruments require their employees to take mandatory training in the job areas where they lack ability. Consequently, many corporations have opted to make rather than buy productive employees by investing in training programs.

Other Implementation Activities

Testing, documentation, and training are keys to successful implementation of a new system.

System Testing involves

1. Testing hardware devices
2. Testing and debugging computer programs
3. Testing information processing procedures

Documentation serves as a method of communicating among the people responsible for developing, implementing, and maintaining a computer-based system. Documentation is extremely important in diagnosing errors and making changes.
Documentation involves developing

1. Manuals for operating procedures
2. Sample data entry display screens
3. Sample forms
4. Sample reports

Training is a vital implementation activity. End users must be trained to operate a system or its implementation will fail. Training may include

1. Data entry
2. All aspects of the proper use of a new system
3. Managers and end users must be educated in the fundamentals of information systems technology and its application to business operations and management.
4. Training programs for specific hardware devices, software packages, and end user applications.

Conversion Methods

1. Converting data elements from old database to new database
2. Correcting incorrect data
3. Filtering out unwanted data
4. Consolidating data from several databases
5. Organizing data into new data subsets

Four major forms of system conversion include

1. Parallel Conversion
2. Phased Conversion
3. Pilot Conversion
4. Plunge or direct cutover

Parallel Conversion

Both the old and the new system are operated until the project development team and end user management agree to switch completely over to the new system.

Phased Conversion

Only parts of a new application or a few departments, offices at a time are converted.

Pilot Conversion

Where one department serves as a test site.

Plunge/Direct Cutover

Use the system immediately, and totally abandon the old system.

Maintenance

Once a system is fully implemented and being operated by end users, the maintenance function begins. System maintenance is the monitoring, evaluating, and modifying of operational information systems to make desirable or necessary improvements. The maintenance function includes

1. A post implementation review process to ensure that newly implemented systems meet the systems development requirements established earlier.
2. Correcting errors in the development or use of a system. This includes a periodic review or audit of a system to ensure that it is operating properly and meeting its objectives.
3. Making modifications to a system due to changes in the business organization or the business environment.

End User Resistance and Involvement

In information technology, the term end user is used to distinguish the person for whom a hardware or software product is designed from the developers, installers, and servicers of the product. The "end" part of the term probably derives from the fact that most information technologies involve a chain of interconnected product components at the end of which is the "user." Frequently, complex products require the involvement of other-than-end users such as installers, administrators, and system operators. The term end user thus distinguishes the user for which the product is designed from other users who are making the product possible for the end user.

End-user's resistance to information technology (IT) is a common occurrence when new information systems are implemented and can greatly contribute to failure of newly implemented systems (Adams, Berner & Wyatt, 2004). IT systems have become larger and more complex. They involve large sets of challenges that impact organizations and people on many levels. Overcoming these challenges is not only essential but it is a must for a successful IT project. Human factors contribute to some of the most important issues that play a part in a project's success or failure. One of the indicators of a successful IT project is determined by how much it is used by its users.

End-user resistance could be a result of various factors such as innate resistance to change, lack of involvement in the development and implementation processes, lack of management support, poor technical quality which makes the system appear "unfriendly", inadequate or improper training, unclear benefits of the new system, lack of user support and poor interaction between the designers and users.

A number of strategies that could be used for dealing with end-user resistance, such as

- End-user support Some examples of end-user support involve helping users with internally developed or purchased applications, helping them with hardware use or problems and providing support for work performed on a computer.
- Participation Some examples of user participation include leadership of project team, participating in cost and benefit evaluation, defining requirements, evaluating system prototypes and performing user acceptance testing.
- Communication Communication can take place in several forms such as oral, written and non-verbal. Some examples of communication are newsletters, e-mails, notice boards, making information available on the intranet and direct face-to-face meetings.
- Training Some examples of training include conceptual training (presenting end-users with an overview of how the system is organized and how it works), procedural training (involves explaining to end- users how to use specific set of the system functionality), self-taught (involves end-users learning a new system by themselves by means of trial and discovery), just-in-time (training occurs just prior to implementation of the new information system) and staged training (involves breaking up training into smaller training sessions).

- Consultant involvement on a project IT consultants serve as a catalyst for change by influencing a client's IT decisions. They can help to implement applications successfully and ensure that users adapt to new changes

Research shows that IT project managers use all identified strategies on their IT projects; various forms of communication, end-user participation and support have been rated as the most frequently used strategies; and, IT project managers rated end-user participation and communication strategies as the most effective for dealing with end-user resistance.

Glossary of Terms

Address - Unique identifier to the location of a stored file, data source, or device as part of a computer system or network.

Applet - Programs downloaded over a network and launched on the user's computer.

Application - A program that performs a specific function for a user.

Audio/Video Interleaved (AVI) - Common format for video files.

Bandwidth - How much data you can send through a connection, measured in bits per second.

Bitmap - A common image format based on a rectangular pattern of pixels.

Bookmark - A browser tool that acts as a pointer to a defined web site.

Bounce - Failed delivery of an email and its subsequent return to sender as undeliverable.

BPS – (Bits per second) The measure of data speed through a network, modem or Internet connection.

Broadband - High capacity communication paths capable of supporting a wide range of frequencies and multiple signals over independent channels usually with a speed greater than 1.544 Mbps.

Browser - Graphically interactive software used to find, view and mange information over a network.

Bulletin Board System (BBS) - A computer system which provides information and messaging services for dial up users.

Capacity - The highest transmission speed that can be reliably carried through a circuit.

Compressed Files - Data files that have been compacted to save space and reduce transfer times.

Cookies - Files which contain information about a user's browsing habits which are stored on a system by Web browsers.

Crackers - Users with malicious intentions who gain unauthorized access to computer.

Dedicated Line - A private leased line from a telecommunications provider.

Dialup - A commonly used method of establishing temporary access to the Internet using standard phone lines and a modem.

Domain - Subsets or logical regions of the internet which include the

.com, .org, .net, .edu domains.

Download - The act of transferring data from a remote computer to a local computer.

E-mail - A method for the exchange of messages with other computer servers over a network.

E-mail address - The domain-based address used to direct email to a specific destination.

Electronic Commerce - Commonly used term to describe emerging technologies used to conduct business over networks rather than through more traditional communication paths.

Encryption - Network security based on the encoding of network data packets to prevent anyone but the intended recipient from accessing the data.

File Transfer Protocol (FTP) - A standardized system for transferring files across the Internet. Most commonly used for downloading software.

Firewall - A method of protecting one network from another network.

Frame - A named, scrollable region in which pages can be displayed.

Front End - In the client/server model, the front end refers to the client side or user.

Graphics Interchange Format (GIF) - A standard and popular format for image files on the web.

Hacker - A person with an in-depth understanding of computer systems and networks.

Home Page - The first page display of a Web site.

Hypertext - A term coined by computer author Ted Nelson to describe text that is linked, via an underlying URL, to other text, sound, video, or graphical images.

Hypertext Markup Language (HTML) - A tag language used as the standard for creation of web pages.

Hypertext Transfer Protocol (HTTP) - Communications instruction set for the transfer of data between a server and a Web client.

Information Superhighway - Commonly used term to describe the Internet and the access users will have to the networks that provide the information.

Integrated Services Digital Network (ISDN) - Communication line that carries a combination of voice and data across a single line.

Internet - The worlds largest network sharing a common address scheme.

Joint Photographic Experts Group (JPEG)- A popular compressed format for photographic images used on Web pages.

Keyword - An indexed word that defines a document.

Local Area Network (LAN) - A network of computers in a relatively small area such as an office, department, or building.

Modem - Shortened version of Modulated/DEModulator which is a device that enables a computer to transmit data over a phone line.

Network - A group of computers interconnected so they can transfer and share information between individual computers.

Plug-In - Helper applications accessed by Web browsers to play multimedia and other resources.

Portals - A Web site or service, such as AOL, that offers an array of resources and services, such as e-mail, forums, search engines, and on- line shopping malls.

Real Time -The transmission and processing of transactional data as they occur, rather than in batches.

Secure Sockets Layers (SSL) - A protocol for transmitting private documents and confidential information via the Internet. Developed by Netscape, it is supported by both Netscape and Internet Explorer.

Secure Electronic Transaction (SET) - A relatively new standard that will enable secure credit card transactions on the internet. SET employs digital signatures which enables merchants to verify that buyers are who they claim to be. It also protects buyers by transferring their credit card number directly to the credit card issuer for verification and billing without the merchant being able to seeing it.

Uniform Resource Locater (URL) - The technical name of Internet addresses which include both the address of the Web server and the specific directory structure to locate an individual Web page.

Usenet - Collection of thousands of bulletin boards/newsgroups on the internet.

Wide Area Network (WAN) - A network or system of connected computers covering a large geographic area.

World Wide Web (WWW or W3) - The subset of the Internet which uses text, graphics and multimedia (audio and video) to communicate.

WYSIWYG (wizzy-wig) -A WYSIWYG application enables you to see on the monitor exactly what the document will appear like when printed.

ZIP (.zip) - A compressed file format used to reduce storage requirements and data transfer times.

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UNIT - V

Unit Structure

Lesson - 5.1: Security and ethical challenges
Lesson - 5.2: Enterprise and Global Management of IT

Lesson 5.1 - Security and ethical challenges

The objectives of this lesson are to

- Explain the challenge of security threats faced by information systems (IS),
- Explain the challenge of privacy and health issues faced by information systems, and
- Describe the security management tools available for IS professionals

In this lesson we will discuss the following

- Ethical responsibility of a business
- Approached to business ethics
- Types of computer crimes

Ethical Responsibility of a Business

Ethics are the moral code by which people live and conduct business. An entrepreneur should develop a written code of ethics to reduce the chance of unethical behavior occurring in his or her business. Employees should be involved in developing the code of ethics. Businesses often face ethical problems when there are conflicts of interest, when their economic survival is threatened, and when doing business abroad (where ethical practices may differ).

Approaches to Business Ethics

When business people speak about "business ethics" they usually mean one of three things

(1) Avoid breaking the criminal law in one's work-related activity;
(2) Avoid action that may result in civil law suits against the company; and
(3) Avoid actions that are bad for the company image.

Businesses are especially concerned with these three things since they involve loss of money and company reputation. In theory, a business could address these three concerns by assigning corporate attorneys and public relations experts to escort employees on their daily activities. Anytime an employee might stray from the straight and narrow path of acceptable conduct, the experts would guide him back.

Obviously this solution would be a financial disaster if carried out in practice since it would cost a business more in attorney and public relations fees than they would save from proper employee conduct. Perhaps reluctantly, businesses turn to philosophers to instruct employees on becoming "moral." For over 2,000 years philosophers have systematically addressed the issue of right and wrong conduct. Presumably, then, philosophers can teach employees a basic understanding of morality will keep them out of trouble.

However, it is not likely that philosophers can *teach* anyone to be ethical. The job of teaching morality rests squarely on the shoulders of parents and one's early social environment. By the time philosophers enter the picture, it is too late to change the moral predispositions of an adult. Also, even if philosophers could teach morality, their recommendations are not always the most financially efficient.

Although being moral may save a company from some legal and public relations nightmares, morality in business is also costly. A morally responsible company must pay special attention to product safety, environmental impact, truthful advertising, scrupulous marketing, and humane working conditions. This may be more than a tight-budgeted business bargained for.

This cannot easily resolve this tension between the ethical interests of the money-minded business person and the ideal-minded philosopher. In most issues of business ethics, ideal moral principles will be checked by economic viability. To understand what is at stake, look at three different ways of deriving standards of business ethics.

a. Deriving Business Ethics from the Profit Motive

Some business people argue that there is a symbiotic relation between ethics and business in which ethics naturally emerges from a profit-oriented business. There are both weak and strong versions of this approach. The weak version is often expressed in the dictum that *good ethics results in good business*, which simply means that moral businesses practices are profitable. For example, it is profitable to make safe products since this will reduce product liability lawsuits. Similarly, it may be in the best financial interests of businesses to respect employee privacy, since this will improve morale and thus improve work efficiency.

Robert F. Hartley's book, *Business Ethics*, takes this approach. Using 20 case studies as illustrations, Hartley argues that the long-term best interests of businesses are served by seeking a trusting relation with the public (Hartley, 1993). This weak version, however, has problems. First, many moral business practices will have an economic advantage *only* in the long run. This provides little incentive for businesses that are designed to exclusively to seek short-term profits.

As more and more businesses compete for the same market, short-term profits will dictate the decisions of many companies simply as a matter of survival. Second, some moral business practices may not be economically viable even in the long run. For example, this might be the case with retaining older workers who are inefficient, as opposed to replacing them with younger and more efficient workers. Third, and most importantly, those moral business practices that are good for business depend upon what *at that time* will produce a profit. In a different market, the same practices might not be economically viable. Thus, any overlap that exists between morality and profit is both limited and incidental.

The strong version of this profit approach takes a reverse strategy and maintains that, in a competitive and free market, the profit motive will in fact *bring about* a morally proper environment. That is, if customers demand safe products, or workers demand privacy, then they will buy from or work for only those businesses that meet their demands. Businesses that do not heed these demands will not survive.

Since this view maintains that the drive for profit will create morality, the strong version can be expressed in the dictum that *good business results in good ethics*, which is the converse of the above dictum. Proponents of this view, such as Milton Friedman, argue that this would happen in the United States if the government would allow a truly competitive and free market. But this strong view also has problems, since it assumes that consumers or workers will demand the morally proper thing. In fact, consumers may opt for less safe products if they know they will be saving money. For example, consumers might prefer a cheaper car without air bags, even though doing so places their own lives and the lives of their passengers at greater risk, which is morally irresponsible. Similarly, workers may forego demands of privacy at work if they are compensated with high enough wages. In short, not every moral business practice will simply emerge from the profit principle as suggested by either the weak or strong views.

b.Business Ethics Restricted to Following the Law

A second approach to business ethics is that moral obligations in business are restricted to what the law requires. The most universal aspects of Western morality have already been put into our legal system, such as with laws against killing, stealing, fraud, harassment, or reckless endangerment. Moral principles beyond what the law requires – or *supra-legal* principles — appear to be optional since philosophers dispute about their validity and society wavers about its acceptance. For any specific issue under consideration, such as determining what counts as responsible marketing or adequate privacy in the workplace, we will find opposing positions on our supra-legal moral obligations. It is, therefore, unreasonable to expect businesses to perform duties about which there is so much disagreement and which appear to be optional.

The unreasonableness of such a moral requirement in our society becomes all the more evident when considered societies that *do* have a strong external source of morality. Islam, for example, contains a broad range of moral requirements such as an alms mandate, prohibitions against sleeping partners that collect unearned money and restrictions on charging interest for certain types of loans, particularly for relief aid. Thus, in Muslim countries that are not necessarily ruled by Islamic law, there is a strong source of external morality that would be binding on Muslim businesses apart from what their laws would require.

Similarly, Confucianism has a strong emphasis on filial piety; thus, in Chinese and other Confucian societies, it is reasonable to expect their businesses to maintain a respect for elders even if it is not part of the legal system. In Western culture, or at least in the United States, we lack a counterpart to an external source of morality as is present in Muslim or Confucian societies. One reason is because of cultural pluralism and the presence of a wide range of belief systems. Even within Christianity, the diversity of denominations and beliefs prevents it from being a homogeneous source of Christian values. In short, without a widely recognized system of ethics that is external to the law, supra-legal moral obligations in our society appear to be optional; and, it is unreasonable to expect business people to be obligated to principles which appear to be optional.

In culturally pluralistic society, the only business-related moral obligations that are majority-endorsed by national social group are those obligations that are already contained in the law. These include a range of guidelines for honesty in advertising, product safety, safe working conditions, and fair hiring and firing practices. In fact, the unifying moral force of businesses within our diverse society is the law itself.

Beyond the law we find that the moral obligations of businesses are contextually bound by subgroups, such as with a business that is operated by traditional Muslims or environmental activists. In these cases, the individual businesses may be bound by the obligations of their subgroups, but such obligations are contingent upon one's association with these social subgroups. And, clearly, the obligations within those subgroups are not binding on those outside the subgroups. If a business does not belong to any subgroup, then its only moral obligations will be those within the context of society at large, and these obligations are in the law.

Corporations that assume an obligation beyond the law, either in their corporate codes or in practice, take on responsibilities that most outsiders would designate as optional. A good example is found in the mission statement of Ben & Jerry's Ice Cream, which includes the following

Social Mission

To operate the company in a way that actively recognizes the central role that business plays in the structure of society by initiating innovative ways to improve the quality of life of a broad community — local, national, and international.

Strictly following this legal approach to business ethics may indeed prompt businesses to do the right thing, as prescribed by law. Nevertheless, there are two key problems with restricting morality solely to what the law requires.

1. Even in the best legal context, the law will lag behind our moral condemnation of certain unscrupulous, yet legal business practices. For example, in the past, drug companies could make exaggerated claims about the miraculous curative properties of their products. Now government regulations prohibit any exaggerated claims.

Thus, prior to the enactment of a law, there will be a period of time when a business practice will be deemed immoral, yet the practice will be legal. This would be a continuing problem since changes in products, technology, and marketing strategies would soon present new questionable practices that would not be addressed by existing legislation.

2. Problem with the law-based approach is that, at best, it applies only to countries such as those whose business-related laws are morally conscientious. The situation may be different for some developing countries with less sophisticated laws and regulatory agencies.

c. Deriving Business Ethics from General Moral Obligations

The third approach to business ethics is that morality must be introduced as a factor that is external from both the profit motive and the law. This is the approach taken by most philosophers who write on business ethics, and is expressed most clearly in the following from a well known business ethics essay

Proper ethical behavior exists on a plane above the law. The law merely specifies the lowest common denominator of acceptable behavior. The most convenient way to explore this approach is to consider the supra-legal moral principles that philosophers commonly offer. Five fairly broad moral principles suggested by philosophers are as follows

Harm Principle

Businesses should avoid causing unwarranted harm. *Fairness principle* business should be fair in all of their practices. *Human rights principle* businesses should respect human rights.

Autonomy Principle

Businesses should not infringe on the rationally reflective choices of people.

Veracity Principle

Businesses should not be deceptive in their practices.

The attraction of these principles is that they appeal to universal moral notions that no one would reasonably reject. But, the problem with these principles is that they are *too* general. These principles do not tell us *specifically* what counts as harm, unfairness, or a violation of human rights. Does all damage to the environment constitute harm? Does it violate an employee's right to privacy if an employer places hidden surveillance cameras in an employee lounge area? Does child-oriented advertising mislead children and thus violate the principle of veracity?

The above principles are abstract in nature. That is, they broadly mandate against harm, and broadly endorse autonomy. Because they are abstract, they will be difficult to apply to concrete situations and consequently not give clear guidance in complex situations. An alternative approach is to forget the abstract, and focus instead on concrete situations that affect the particular interests of consumers, workers, stockholders, or the community. The recent *stakeholder* approach to business ethics attempts to do this systematically. It may be expressed in the following

Stakeholder Principle

Businesses should consider all stakeholders' interests that are affected by a business practice.

A stakeholder is any party affected by a business practice, including employees, suppliers, customers, creditors, competitors, governments, and communities. Accordingly, the stakeholder approach to business ethics emphasizes that we should map out of the various parties affected by a business practice. But this approach is limited since proponents of this view give us no clear formula for how to prioritize the various interests once we map them out. Should all stakeholders' interests be treated equally – from the largest stockholder down to the garbage man who empties the factory dumpster? Probably no defenders of the stakeholder approach would advocate treating all interests equally. Alternatively, should the stockholders' interests have special priority? If we take this route, then the stakeholder principle is merely a revision of the profit principle.

Another way of looking at concrete moral obligations in business is to list them issue by issue. This is the strategy behind corporate codes of ethics that address specific topics such as confidentiality of corporate information, conflicts of interest, bribes, and political contributions.

Although corporate codes of ethics are often viewed cynically as attempts to foster good public relations or to reduce legal liability, a corporate code of ethics is a reasonable model for understanding how moral principles are articulated and introduce them into business practice. The practical advantage of this approach is that it directly stipulates the morality of certain action types, without becoming ensnared in the problem of deriving particular actions from more abstract principles, such as the harm principle. But, the limitation of the corporate code model is that the principles offered will appear to be merely rules of prudence or good manners unless we can establish their distinctly *moral* character. And this requires relying on more general principles of ethic described above, which, we've seen, comes with its own set of problems.

All these three approaches to business ethics have limitations. If one hoped to find an approach to business ethics that is free from conceptual problems, he will not likely find any. Ethics is a complex subject and its history is filled with diverse theories that are systematically refuted by rival theories.

However, following *any* of the above three approaches to business ethics will bring closer to acceptable moral behavior than might otherwise be. Close attention to one's profit motive and the moral interests of consumers might in fact generate some morally responsible business decisions. In gray areas of moral controversy that are not adequately addressed profit motives and the law, turning for guidance to a variety of general and specific moral principles is acceptable.

In addition to the above three approaches to business ethics, it also helps to examine stories of businesses that have been morally irresponsible. By citing specific cases deceptive advertising, environmental irresponsibility, or unsafe products, insight for does/don't will be learnt. Such cases often reveal blatantly crude, insensitive, or reckless attitudes of businesses, which can be viewed as warning signs of unethical conduct.

Computer Crime

There are no precise, reliable statistics on the amount of computer crime and the economic loss to victims, partly because many of these crimes are apparently not detected by victims, many of these crimes are never reported to authorities, and partly because the losses are often difficult to calculate.

Nevertheless, there is a consensus among both law enforcement personnel and computer scientists who specialize in security that *both* the number of computer crime incidents *and* the sophistication of computer criminals is increasing rapidly. Estimates are that computer crime costs victims in the USA *at least* US$ 5×10^8/year and the true value of such crime might be substantially higher. Experts in computer security, who are *not* attorneys, speak of “information warfare”. While such “information warfare” is just another name for computer crime, the word “warfare” does fairly denote the amount of damage inflicted on society.

To understand the serious implications of computer crimes consider the following excerpt from a whitepaper by Eugene Kaspersky, the developer of a popular anti-virus software

- January 2007 – Russian hackers, with the aid of Swedish middle-men, steal €800,000 from Swedish bank Nordea;
- February 2007 – Brazilian police arrest 41 hackers for using a Trojan to steal bank account details used to make $4.74 million;
- February 2007 – 17 members of internet fraud gang arrested in Turkey for stealing up to $500,000;
- February 2007 – Li Jun, arrested for the “Panda burning Incense’ virus used to steal gaming and IM account names, is thought to have made around $13,000 by selling the malware;
- March 2007 – Five eastern Europeans imprisoned in the UK for credit card fraud they stole an estimated £1.7 million;
- June 2007 – 150 cyber criminals arrested in Italy were alleged to have bombarded Italian users with fake e-mails, generating around €1,250,000 in ill-gotten gains;
- July 2007 – Russian cyber thieves allegedly used a Trojan to steal $500,000 from Turkish banks;
- August 2007 - Ukrainian Maxim Yastremsky [aka ‘Maksik’] detained in Turkey for allegedly making tens of millions of dollars from ID theft;
- September 2007 – Gregory Kopiloff charged in the US for allegedly using P2P file-sharing software Limewire and Soulseek to gather information used in ID fraud, allegedly made thousands of dollars in purchases using stolen data.

[Source The Cybercrime Ecosystem whitepaper by Eugene Kaspersky, Founder and CEO of Kaspersky Lab]

Top 5 Crimes/Scams on the Internet

1. Internet Auctions

Internet auction scams account for 75% of all complaints registered with the FBI's Internet Crime Complaint Centre. With internet auctions gaining tremendous popularity since its first appearance in 1995, it was only a matter of time before people got tricked. Scammers have been cashing in on the fact that most people don't understand exactly how these auctions work, and how to take part without being taken for a ride.

How it Works

You find an amazing deal online and rush to auction for it. After sending the money, you receive an awful piece, or worse, absolutely nothing at all!

2. Phishing Scams

Phishing represents an attempt to fraudulently acquire sensitive information, such as usernames, passwords and credit card details, by masquerading as a trustworthy entity in an electronic communication (Source Wikipedia). With a slight variation, a new kind of financial fraud has hit the market lately. It's called 'vishing'. It involves an individual getting an email or a call from a number saying his bank accounts have been deactivated due to an unauthorised transaction.

The email or the call also asks him to call up a phone number to get this rectified. Falling for this trap, the individual ends up calling up the number and sharing his confidential information over the internet, landing himself in trouble and losing a huge amount of money due to his carelessness.

3. '419' Letter Scams

The Nigerian Advance Fee scam, better known as the '419' Letter scam has been around since the early 80s. Millions have fallen for this scam and the count just keeps getting bigger. Victims of the Nigerian 419 letter scam lose USD$3000 on an average, according to the FBI. If you're wondering what 419 signifies, it's the section of Nigeria's penal code that the fraud violates.

How it Works

You receive an email from an alleged official representing a foreign government or agency, who says he's seeking an accomplice to transfer embezzled funds for a big percentage. You would be asked to travel overseas to complete the transaction.

You would then receive several documents with fake official stamps testifying to the authenticity of the proposal. To clinch the deal, you would be asked to pay thousands of dollars in advance, which would go straight to the scammers

4. Postal Forwarding/Reshipping Scams

Postal Forwarding / Reshipping scams involve the receiving and reshipping of merchandise bought online to overseas locations by gullible people hoping to make quick bucks. The catch is that the merchandise has been paid for with stolen or fraudulent credit cards by the scammers. These are scams which often start in singles online chats, where people are fooled into co-operating with the scammer

How it Works

You would be required to provide all your personal information to finalise the deal. Once the deal is on, you immediately begin receiving packages and are then responsible for reshipping the merchandise to some overseas location.

You would make good money for a while, but soon enough you would find your account emptied by the scammers.

5. Lottery Scams

Lottery scams have been increasing at an alarming rate because they succeed in tricking people the best. These scams vary with regard to the 'prize', the country of origin, the sponsoring organization and so on.

The scammers fool users by showcasing popular financial institutions and government departments on their websites. They also provide links to genuine looking websites that are designed to back up information included in the scam mails

How it Works

You receive an e-mail saying you that you've won an amazing prize and all you need to do is visit a website and give your personal information to get your prize shipped. You end up getting nothing and find your money disappearing quickly from your account

Barry Stamp, co-founder of the Credit Reporting Agency and author of the Identity Theft Kit, gives ten tips on how you can prevent online fraud

1. When you are online, don't use the same password everywhere

Don't be one of the six per cent of people who use 'password' as a password and then leave themselves wide open to identity theft.

2. Don't reveal your place of birth unless it's really Necessary

Banks and building societies often use your place of birth or your mother's maiden name to confirm your identity, so identity thieves would love to get hold of this, and any other relevant, personal information.

3. Don't ever reveal your PIN number to anyone

Try to memorise it rather than write it down.

4. Check your bank statements and credit card statements carefully

Always ensure that there has been no suspicious activity on your cards. Think about using a separate credit card to use in petrol stations and restaurants, where the risk of credit card cloning is high. It's easier to thoroughly check a separate statement which contains only high risk transactions.

5. Ignore all phone calls and emails purporting to come from your bank

Your bank will always write to you regarding any important matters.

6. Make sure that you know when to expect your bills and bank statements to arrive

Don't let thieves redirect or steal them for their fraudulent use.

7. When buying online, always ensure that the payment pages are secure

If the site isn't a reputable brand name, make sure that the company uses an approved payment provider, such as PayPal or WorldPay.

8. Keep a copy of all your transactions

Internet banking is a great way of monitoring your spending.

9. Try to keep your credit level low

If your identity does get stolen, thieves won't be able to run up thousands of pounds of debts.

10. Check your credit reports regularly to see whether your credit standing has been abused

www.annualcreditreport.co.uk also provides a completely free credit file monitoring service.

New crimes in cyberspace

There are three major classes of criminal activity with computers

1. *Unauthorized* use of a computer, which might involve stealing a username and password, or might involve accessing the victim's computer via the Internet through a backdoor operated by a Trojan horse program.
2. Creating or releasing a malicious computer program (e.g., computer virus, worm, Trojan Horse).
3. Harassment and stalking in cyberspace.

Unauthorized Use

Unauthorized use of computers tends generally takes the following forms Computer voyeur The criminal reads (or copies) confidential or proprietary information, but data is neither deleted nor changed.

In 1999, the Melissa virus infected a [possibly confidential] document on a victim's computer, and then automatically sent that document and copy of the virus via e-mail to other people. Subsequently, the SirCam and Klez malicious programs made a similar release of [possibly confidential] documents from a victim's computer. These malicious programs are a new way to release confidential information from a victim's computer, with the confidential information going *not* to the author of the malicious program, but to some person unknown to the author of the malicious program.

1. Changing data. For example, change a grade on a school transcript; add "money" to a checking account, etc. Unauthorized changing of data is generally a fraudulent act.
2. Deleting data. Deleting entire files could be an act of vandalism or sabotage.
3. Denying service to authorized users. On a modern time-sharing computer, *any* user takes some time and disk space, which is then not available to other users. By "denying service to authorized users", we mean gobbling unreasonably large amounts of computer time or disk space, for example by sending large amounts of junk e-mail in one day, a so-called "mail bomb", by having the computer execute a malicious program that puts the processing unit into an infinite loop, *or,* by flooding an Internet server with bogus requests for webpages, thereby denying legitimate users an opportunity to download a page and also possibly crashing the server. This is called a *denial of service (DoS)* attack.

Altering Websites

In recent years, there have been a large number of attacks on websites by hackers who are angry with the owner of the website. Victims of such attacks include various Government agencies.

In a typical attack, the hacker will delete some pages or graphics, then upload new pages with the same name as the old file, so that the hacker controls the message conveyed by the site.

This is not the worst kind of computer crime. The proper owner of the site can always close the website temporarily, restore *all* of the files from backup media, improve the security at the site, and then re-open the site. Nonetheless, the perpetrator has committed a computer crime by making an *un*authorized use of someone else's computer or computer account.

The Internet is a medium for freely sharing information and opinions. However the criminals who trash other people's websites are acting as self-appointed censors who deny freedom of speech to those with whom they disagree. These criminals often make the self-serving excuse for their actions that they only attack sites sponsored by bad corporations or bad people. However, this excuse makes these criminals into vigilantes who serve as legislature, judge, jury, and executioner arrogantly determining what is in the best interests of society.

Ethical Hacking

The science of testing your computers and network for security vulnerabilities and plugging the holes you find before the bad guys get a chance to exploit them

Hacker is a Word that has two Meanings

Traditionally, a hacker is someone who likes to tinker with software or electronic systems. Hackers enjoy exploring and learning how computer systems operate. They love discovering new ways to work electronically. Recently, *hacker* has taken on a new meaning — someone who maliciously breaks into systems for personal gain. Technically, these criminals' are *crackers* (criminal hackers). Crackers break into *(crack)* systems with malicious intent. They are out for personal gain fame, profit, and even revenge. They modify, delete, and steal critical information, often making other people miserable. The good-guy *(white-hat)* hackers don't like being in the same category as the bad-guy *(black-hat)* hackers. (These terms come from Western movies where the good guys wore white cowboy hats and the bad guys wore black cowboy hats.) Whatever the case, most people give *hacker* a negative connotation. Many malicious hackers claim that they don't cause damage but instead are altruistically helping others. Yeah, right. Many malicious hackers are electronic thieves.

Common hacking tactics include

- Password Crackers
- Software that can guess passwords
- Social Engineering
- Gaining access to computer systems
- By talking unsuspecting company employees out of valuable information such as passwords
- Dumpster Diving

- Sifting through a company's garbage to find information to help break into their computers

Privacy Issues

Protecting your privacy on the Internet

- E-mail can be encrypted using services like Securenym.net and PGP (Pretty Good Privacy)
- Newsgroup postings can be sent through anonymous remailers
- ISP can be asked not to sell your name & personal information to mailing list providers and other marketers
- Decline to reveal personal data & interests on online service and website user profiles

Tips for Safeguarding Privacy Online

1. Learn how to tell if a Web site is secure. When one provides credit card account number to a shopping site, make sure that the transmission is secure. Look for the *unbroken* padlock at the bottom right of the screen. Right click on the padlock to make sure the security certificate is up-to- date. If it is not, one should not order from that Web site. Also make sure the Web address has the letter's' after http in the address bar at the top of the page. The's' indicates that the financial information will be encrypted during transmission.

2. Learn how to secure and use of personal computer. Every user of a personal computer should be familiar with firewalls, anti-virus programs, and anti-spyware programs. The best protection when conducting personal business online begins with the security of ones personal computer, the network they operate on and connection to the Internet. Here are some important security tips to help to ensure computing environment is secure

Secure Your Computer

Install anti-virus, anti-spyware and personal firewall software. Regularly install updates to these software solutions.

- Regularly install security updates to the desktop operating system and

Internet browser software.

- Install and activate a pop-up "blocker."
- For extra protection, consider disconnecting PC from the network when not in use.
- Destroy all sensitive data on hard drive prior to selling, donating or discarding an old computer.

3. Start reading privacy policies. Get in the habit of reading a Web site's privacy policy. A link to the privacy policy is usually found at the bottom of the home page. This policy should alerts to how information is shared and sold. Additionally, the policy outlines what rights one possess. If a company violates its own privacy policy one can file a complaint to the FTC (Federal Trade Commission).

Encryption as a Security Measure

Encryption is a method of scrambling an e-mail message or file so that it is gibberish to anyone who does not know how to unscramble it. The privacy advantage of encryption is that anything encrypted is virtually inaccessible to anyone other than the designated recipient.

Thus, private information may be encrypted and then transmitted, stored, or distributed without fear that it will be read by others. Strong encryption programs such as PGP (Pretty Good Privacy) are available online.

What are privacy policies and Web seals?

The Federal Trade Commission urges commercial Web site operators to spell out their information-collection practices in privacy policies posted on their Web sites. Most commercial Web sites now post policies about their information- collection practices.

Look for a privacy "seal of approval," such as Trustee, on the first page of the Web site. Trustee participants agree to post their privacy policies and submit to audits of their privacy practices in order to display the logo.

Other seals of approval are offered by the Council of Better Business Bureaus

(BBB) www.bbbonline.org, and VeriSign www.verisign.com.

***How to make sure to have a Good Password*?**

Create passwords with nonsensical combinations of upper and lower case letters, numbers and symbols, for example tY8%uX. Do not use the same or variations of the same password for different applications.

One way to create a password that is easier to remember is to use the first or last letters in a favorite line of poetry. Intermingle these letters with numbers and punctuation marks. "Mary had a little lamb" becomes m*ha2ll. Or create a story that gives the clues which helps to remember the password.

Microsoft recommends that virtually "uncrackable" passwords have at least 14 characters and use upper and lower case letters plus numbers and symbols. Change password often. Don't let others watch log in. Don't print password on a post-it note and attach it to your video monitor. If it is a must to write down or record password, take steps to secure or disguise the information.

There are services and software packages that will help one to keep track of their passwords. Most are free and are worth considering. These programs are availabe at www.download.com.

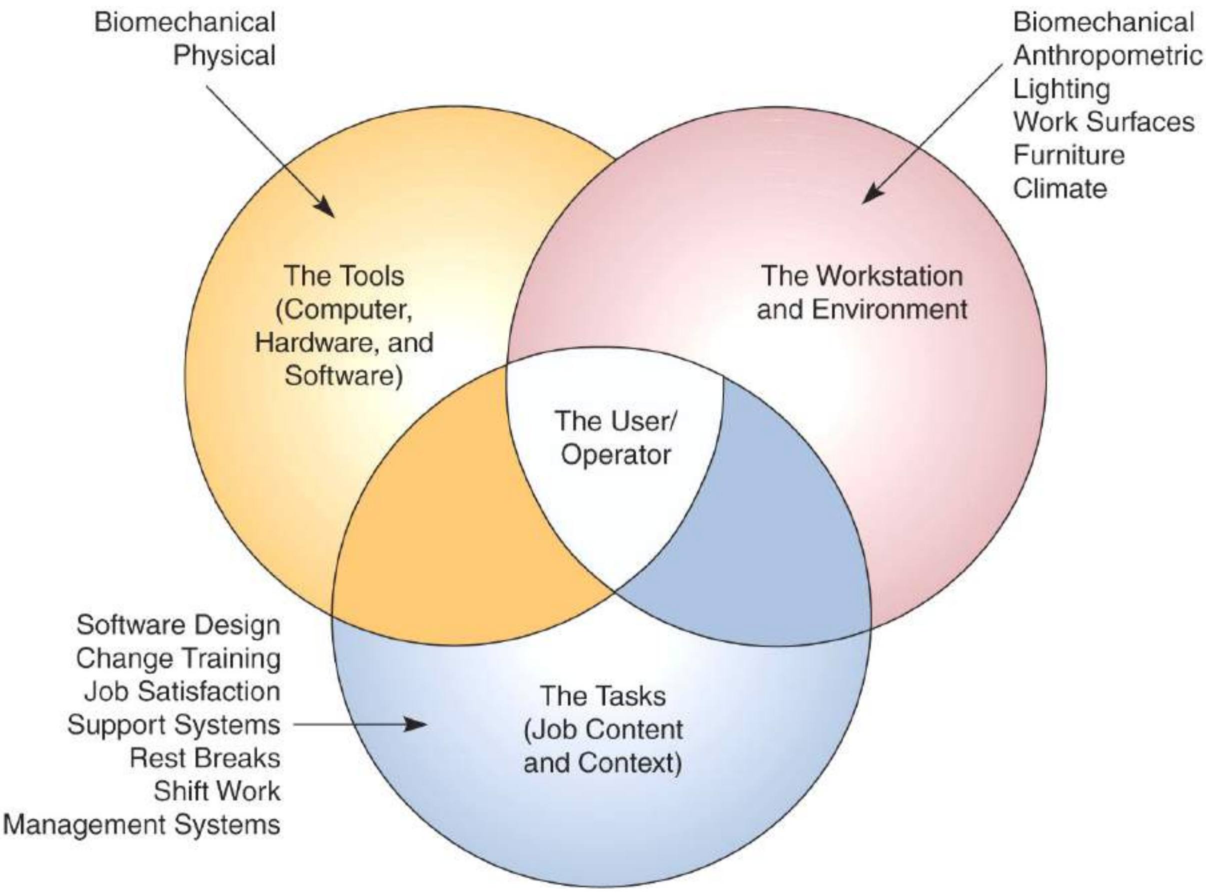
- Password Assistant 2.0
- Password Manager Plus
- RoboForm

Demands for such services are strong and innovations are likely to continue. Anonymizer is available at www.anonymizer.com.

Health Issues

Health issues in business are as critical today as they were in the mid-twentieth century. Many of the injuries and illnesses have changed but their impact is no less dramatic. The increased use of computers and job specialization have contributed to a new generation of occupational hazards, especially repetitive motion injuries, also known as cumulative trauma disorders. Please refer Figure.

These are injuries caused by repetitive hand, arm, or finger motions that cause tendons to swell and become progressively more painful. In advanced cases, workers lose the strength in their thumb and fingers and eventually become unable to complete simple tasks, such as lifting a baby or tying their shoes. Cumulative trauma disorders were the most common type of illness reported in 1997, accounting for 64 percent of the 430,000 cases of illness reported (Herington and Morse, 1995).



Health issues concerning IT professionals

Every five seconds a worker is injured on the job, and every ten seconds a worker is temporarily or permanently disabled. The estimated cost for injuries alone is $121 billion annually (Herington and Morse, 1995). This cost includes lost productivity and wages, administrative expenses, and health care. In reality, these costs may be much higher. It is virtually impossible to pinpoint exact costs due to the lack of accurate statistics on workplace injury and illness. There is no comprehensive, integrated national system for collecting data on occupational injury, illness, and fatalities. Another factor contributing to inconsistent data is the reluctance of many companies to report incidents for fear of being targeted by the Occupational Safety and Health Administration for on-site inspections.

Prevention

Employers play a vital role in the prevention of workplace injuries and illnesses. They are responsible for evaluating workplace injuries to discover possible causes and for developing prevention strategies for those injuries. Other employer responsibilities include safety and hazard training, drug testing, workstation evaluations, and enforcement of the use of protective equipment.

Ergonomics also plays a significant role in the prevention of workplace injuries and illness. Ergonomics is the science of designing and arranging tools and equipment to fit workers. The overall goal is to prevent workplace illness and injuries that result from poor workstation design or improperly designed equipment. Workstation evaluations are an example of an ergonomic program that many large companies employ. During this evaluation, a health and safety professional evaluates a worker performing daily tasks at his or her workstation. The health and safety professional observes the worker in order to evaluate the “fit” of the workspace, furniture, and equipment to the worker.

In the case of a worker who spends the majority of the day at a computer, the professional would look at several factors to determine the degree to which the workstation fits. These factors include the height and position of the computer screen and keyboard in reference to the worker’s body posture, the height and position of the worker’s chair, and the types of movements the worker makes while performing tasks. From this evaluation, changes may be made to alleviate discomfort and prevent harmful injuries. Early intervention is the key to preventing potentially disabling injuries. In addition to the evaluation, the health and safety professional gives the worker advice on how to sit, how to position hands on the keyboard, and how often to take breaks.

A final critical element in the prevention of workplace injuries and illnesses is the development of health and safety programs designed to train and educate workers on workplace hazards. Recommends the following elements for a comprehensive health and safety program

Management leadership and commitment
Meaningful employee participation
Systematic hazard identification and control
Employee and supervisor training
Medical management and program evaluation

In conclusion, the prevention of occupational injuries and illnesses is a collaborative effort involving employers, employees, federal and state agencies and health and safety professionals. The field of occupational safety and health is extremely broad and complex.

Security Management of IT

Security has become one of the primary concerns when an organization connects its private network to the Internet. Regardless of the business, an increasing number of users on private networks are demanding access to Internet services such as the World Wide Web (WWW), Internet mail, Telnet, and File Transfer Protocol (FTP). In addition, corporations want to offer WWW home pages and FTP servers for public access on the Internet.

Network administrators have increasing concerns about the security of their networks when they expose their organization's private data and networking infrastructure to Internet crackers.

Document Security – means to secure users documents

When we talk about document security we can have many different ideas as to what security is actually wanted or needed, and what it is there to achieve. Let's look at the three principal approaches used today, how they rely upon each other and where they differ. The principal approaches are encryption, DRM and collaboration.

Encryption

Underpinning all digital security systems is encryption. If prospective document security solution does not use this, then forget it because it is just smoke and mirrors. Encryption is the technology that hides documents from those who are not authorized, and verifies that the content the originator created is unchanged.

If one is authorized recipient of encrypted information they have the ability to do anything like with that information once you have removed the encryption. That is the Achilles' heel. The recipient of documents that have been encrypted can go on to use them in any way they wish, and to alter them in any way they wish.

That does not mean they can pretend that someone else originated them. And that is a valuable protection, provided the user can be bothered to look closely at the authenticity of documents received.

Encryption therefore is just the building block of document security but has limited controls

DRM – Digital Rights Management

DRM looks to take care of continuing control(s) over information. Whether it's a song, film or a book, DRM uses and then goes beyond the capabilities of pure encryption in enforcing persistent controls over the ability to use the content. It is used to limit the ability to distribute (Copyright being the right to make copies and distribute!) or to print, or to view.

Historically, DRM has been used when one entity wants to grant access to its information to another entity, but under controlled conditions. This can be for making sure employees cannot take key documents with them if they leave, or that those who have bought a book, or a training course, cannot pass it on to anyone else without the publisher's permission (and, no doubt, a fee).

The combination of digital rights management controls and encryption ensure documents cannot be shared with others, copied, modified or printed. The use of copy and paste and screen grabbing is usually prevented (depending on the vendor).

If user is looking therefore for complete control over their document security then a solution using digital rights management is what they need to purchase.

Collaboration

Collaboration is an important aspect of document security where document modification is required. Often it does not make use of encryption technology, but relies on access control mechanisms to identify who authorized users are, and to link those identities to the input they made to a specific document.

As one can guess, collaboration is really a precursor activity to DRM. The controls for collaboration are focused over making sure corporate administrators can be certain that only authorized persons had access to and could (or did) amend the document, and that it is properly authorized for distribution. The document that is distributed will appear to be a finished item, and none of the internal management matters will be made available to anyone, either internally or externally. The ability to prevent the use of simple cut and paste or screen grabbing is usually not implemented.

Security Management Tools

Tools in this category are used to manage the following Windows features

- Access control
- Authentication
- Encrypting File System
- Public Key Infrastructure
- Software restriction policies
- Windows Time service

Access Control Access control is the ability to permit or deny the use of a particular resource by a particular entity. Access control mechanisms can be used in managing physical resources (such as a movie theater, to which only ticketholders should be admitted), logical resources (a bank account, with a limited number of people authorized to make a withdrawal), or digital resources (for example, a private text document on a computer, which only certain users should be able to read).

Item control or electronic key management is an area within (and possibly integrated with) an access control system which concerns the managing of possession and location of small assets or physical (mechanical) keys.

Access control models used by current systems tend to fall into one of two classes those based on capabilities and those based on access control lists (ACLs). In a capability-based model, holding an unforgeable reference or *capability* to an object provides access to the object (roughly analogous to how possession of your house key grants you access to your house); access is conveyed to another party by transmitting such a capability over a secure channel. In an ACL-based model, a subject's access to an object depends on whether its identity is on a list associated with the object (roughly analogous to how a bouncer at a private party would check your ID to see if your name is on the guest list); access is conveyed by editing the list. (Different ACL systems have a variety of different conventions regarding who or what is responsible for editing the list and how it is edited.)

Both capability-based and ACL-based models have mechanisms to allow access rights to be granted to all members of a *group* of subjects (often the group is itself modeled as a subject).

Access control systems provide the essential services of *identification and authentication* (*I&A*), *authorization*, and *accountability* where

- identification and authentication determine who can log on to a system, and the association of users with the software subjects that they are able to control as a result of logging in;
- Aauthorization determines what a subject can do;
- Accountability identifies what a subject (or all subjects associated with a user) did.

Authentication

Authenticators are commonly based on at least one of these four factors

- *Something you know*, such as a password or a personal identification number (PIN). This assumes that only the owner of the account knows the password or PIN needed to access the account.
- *Something one have*, such as a smart card or security token. This assumes that only the owner of the account has the necessary smart card or token needed to unlock the account.
- *Something's are*, such as fingerprint, voice, retina, or iris characteristics.
- *Where one is*, for example inside or outside a company firewall, or proximity of login location to a personal GPS device.

Encrypting File System

The Encrypting File System (EFS) is a file system driver that provides file system-level encryption in Microsoft Windows (2000 and later) operating systems, except Windows XP Home Edition, Windows Vista Basic, and Windows Vista Home Premium. The technology enables files to be transparently encrypted on NTFS file systems to protect confidential data from attackers with physical access to the computer.

User authentication and access control lists can protect files from unauthorized access while the operating system is running, but are easily circumvented if an attacker gains physical access to the computer. One solution is to store the files encrypted on the disks of the computer. EFS does this using public key cryptography, and aims to ensure that decrypting the files is extremely difficult without the correct key. However, EFS is in practice susceptible to brute force attacks against the user account passwords. In other words, encryption of files is only as strong as the password to unlock the decryption key.

Internetworked Security Defenses

When a computer connects to a network and begins communicating with others, it is taking a risk. Internet security involves the protection of a computer's internet account and files from intrusion of an unknown user. Basic security measures involve protection by well selected passwords, change of file permissions and back up of computer's data.

Security concerns are in some ways peripheral to normal business working, but serve to highlight just how important it is that business users feel confident when using IT systems. Security will probably always be high on the IT agenda simply because cyber criminals know that a successful attack is very profitable. This means they will always strive to find new ways to circumvent IT security, and users will consequently need to be continually vigilant. Whenever decisions need to be made about how to enhance a system, security will need to be held uppermost among its requirements.

*How Does It Work***?**

As previously described, it takes a number of steps to detect and prevent an attack before it can shut down your network. Here we outline the process at a broad level. Some common questions may be addressed through the descriptions below.

Monitoring

VeriSign collects traffic flow data from the customer's Internet- connected routers. Samples of the customer's Internet traffic are incorporated into VeriSign's correlation engine for threat detection, alerts, and reporting. The frequency of packet sampling can be tailored based on customer size, type, and router performance. Packets are classified and analyzed using advance heuristics to profile normal versus anomalous traffic patterns.

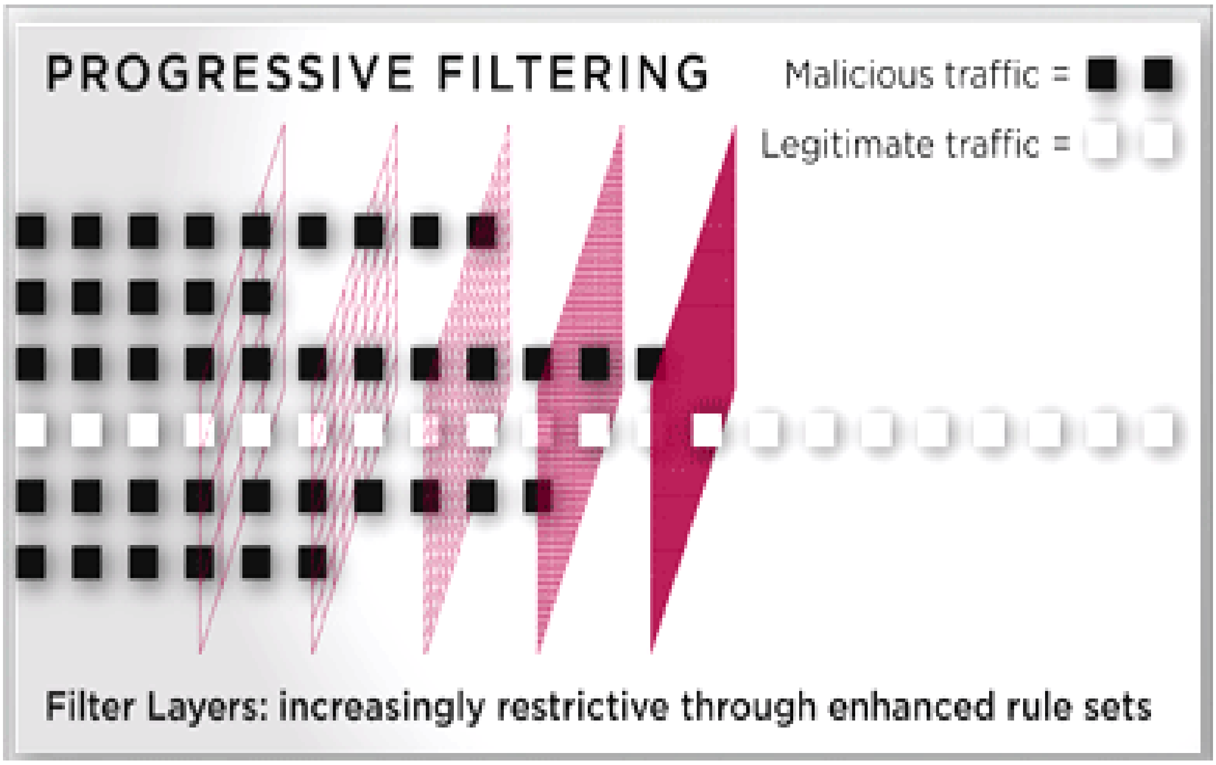
Threat detection is comprised of two primary components signature analysis and dynamic profiling.

Signature Analysis

Signature analysis looks for predefined deviations that are signs of a DDoS attack. VeriSign uses a combination of industry best practices and proprietary intelligence to identify these signatures. Since attacks are always evolving, lessons learned from mitigating them feed into our ongoing research and development to help identify new threat signatures.

Dynamic Profiling

Because all customers are different and attack profiles are constantly changing, it is vital that VeriSign understand each customer's "normal"



Progressive filtering

Traffic Patterns

To do so, VeriSign works with the customer to establish a dynamic profile of its Internet traffic. Deviations from the established customer profile that exceed pre-defined thresholds automatically activate an alert for VeriSign 24/7 security teams, enabling VeriSign to respond to new and one-of- a-kind attack profiles.

Mitigation

Because timeliness is critical to protecting Web-based services, VeriSign works with the customer during the initial set-up and testing phases to seamlessly implement a combination of off-ramping, filtering, and on-ramping as needed to address the problem.

Off-Ramping Traffic

VeriSign security experts redirect Internet traffic destined for the customer to Internet Defense Network sites, so the traffic reaches VeriSign first. VeriSign offers several methods for off-ramping traffic, including BGP announcements or changes to customer Domain Name System (DNS) records.

Optimal solutions vary by customer and depend upon the size of the customer network, the types of services they utilize, and a host of other considerations.

Progressive Filtering

VeriSign employs a layered Fig approach to traffic filtering that progressively enhances rule sets over time. Instead of blocking all traffic to a customer, VeriSign helps legitimate traffic reach its intended destination.

Multiple filters are applied at various layers of the OSI stack. Although some attacks can be mitigated by implementing filters at the network layer, complex attacks now require analysis and filtering up through the application layers. VeriSign is able to complement commercially available products with custom, in-house development to create a world-class DDoS mitigation solution.

Ultimately, malicious traffic is blocked while filtered traffic is sent to your network, helping you sustain normal business operations.

On-Ramping Traffic

Once traffic is "cleaned," VeriSign redirects it from the Internet Defense Network site to the customer's network. VeriSign network architects work with the customer to establish the best method for redirecting legitimate traffic back into its network, such as GRE tunneling, establishing a Virtual Private Network (VPN), or directly connecting to a site.

*What Can It Do***?**

It's simple. VeriSign Internet Defense Network can help protect User online operations. User will have peace of mind knowing that legitimate users— including their employees and customers—can always access User's Web Site, email, and other services.

Preventing a DDoS attack can save thousands, even millions, in lost revenue. It can also help keep your organization's brand, and reputation, strong.

Security Measures

When we talk about implementing basic security measures, one could think "And what are those?" And if that question would be asked, it would be a very, very difficult question to answer. If User is an system administrator, an IT security manager in a company, or just a regular information security enthusiast, recommended to read, as it addresses some of the most important issues in implementation of basic security measures in an IT environment.

Information security breaches have been rapidly rising over the past decade at an alarming level. For this reason, more and more IT companies have realized that securing their businesses is not something they should do, but something they have to do. The losses we read about in everyday news are too scary to let IT security of User's company be just the way it is – none! they can't do it once and for all, but rather by employing basic security measures and following some rules and policies User define for their organization. Here we are going to point out some of the steps which need to be taken if one want to do good for his/her company by implementing a serious and comprehensive security process. We will not focus on only one operating system (i.e. Linux), but rather point out general information on the subject.

According to the Internet Security Alliance (IS Alliance), there are about ten good security practices as a place to start. These ten practices include different kinds of information security, such as policy, process, people, and technology, all of which are necessary for deployment of a successful security process. With these techniques adopted, we can say we are moving towards our goal – ensuring the security of critical information assets. It is proven that through adopting commonly accepted, good security practices, every organization can begin to successfully manage their security risks. So, let's take a look over these ten practices.

General Management

Policy

Risk Management

Security Architecture & Design

User Issues

System & Network Management

Authentication & Authorization

Monitor & Audit

Physical Security

Continuity Planning & Disaster Recovery

We will cover each of these practices only generally, as I think there is quite enough information over these on the Internet, covered in detail.

General Management

In a perfect world (like the one we're not living in), every company should have a predefined, straight and ready to implement attitude over the security in the company. It is considered an advantage to recognize a problem even before a problem becomes an emergency.

On the other hand, if that is not the case, following and researching these suggestions should help every IT manager in successfully implementing basic security measures and by doing that, ensure their organization has done the basic efforts to defend themselves from the dark side of the cyberspace.

IT security managers must establish an appropriate information and Internet security policy and an auditing process. Security in their company must be seen as an essential part of their business survivability. Also, security processes must be an everyday activity, not something you do once and forget about it, as security itself is such subject that it is changing not even daily but hourly.

There are legal authorities whose job is to process complies if something goes wrong and their security forts fail to respond properly, and management must be aware of these bodies.

Policy

Security policy must provide written rules that are saying how computer systems should be configured and how organization's employees should conduct business before they use information technology. Policies have to be well controlled, and they will be the baseline for implementation. If we do not have a policy, there will be no plan upon which an organization can design and implement an effective security program.

You have to ask yourself about most important security policies, and what is their role in helping achieving business objectives. There are a number of sub policies, which we will not cover here, as this article is about implementing only basic security measures.

Risk Management

Ask yourself - how does your organization identify critical information assets and risks to those assets? What are the potential financial impacts of a successful attack against these assets? Do you have any insurance policies to mitigate and transfer potential losses for your information security risks?

Risk management is about conducting an information security risk evaluation that identifies critical information assets (i.e. systems, networks or data), threats to critical assets, assets vulnerabilities and risks. You should identify the adverse impacts when risks to critical assets are realized, and quantity the financial impact to the greatest extent possible. Do have a risk mitigation plan resulting from the evaluation, and ensure there is a regular review and management of the risks to critical information assets.

Security Architecture & Design

You should know the primary components of your organization's security architecture. How does your security architecture help your business exactly? Know what assets to secure the most and know why.

User Issues

This practice involves a few sub practices as well, such as Accountability and Training and Adequate Expertise. Regarding Accountability and Training, User should establish accountability for user actions, train for accountability and enforce it, as reflected in organizational policies and procedures. When we say users, we mean all the users with active accounts, in example employees, partners, suppliers, and vendors.

Regarding Adequate Expertise, you should ensure that there is adequate in-house expertise or explicitly outsourced expertise for all supported technologies, including the secure operation of those technologies. one have to know whom to call if User have problems with operating system, laptop, and access to new project data, passwords, security applications, or custom applications that have been developed internally? And that's not all; should also know whom to call when corporate firewall blocks accessory a service that User need, or something similar to that.

System & Network Management

This practice is built from few smaller practices, which are all very important. Those are Access Control, Software Integrity, Secure Asset Configuration and Backups. We are going to cover them only generally here.

Establish a range of security controls to protect assets residing on systems and networks. Consider use of access controls at your network, and use of data encryption technologies (VPN too) as required.

Use removable storage media for critical data so that it can be physically secured. Do regular checks and verify the integrity of installed software. Do regular checks for viruses, worms, Trojans and other malicious software or unauthorized software. Also, regularly compare all file and directory cryptographic checksums with a securely stored, maintained, and trusted baseline.

Provide procedures and mechanisms to ensure the secure configuration of all deployed assets throughout their life cycle of installation, operation, maintenance, and retirement. This means one should apply patches to correct security and functionality problems, and establish standard, minimal essential configuration for each type of computer and service.

Keep network topology up to date, and provide some levels of logging. Before applying patches, consider the security implications for every change to systems and networks.

Perform vulnerability assessments on a periodic basis, and address vulnerabilities when they are identified. Mandate a regular schedule of backups for both software and data, which means to validate software and data before and after backup, and making sure the ability to restore from backups.

Authentication & Authorization

Protect critical assets when providing network access to users working remotely and to third parties such as contractors and service providers. Should use network-, system-, file-, and application-level access controls and restrict access to authorized times and tasks, as required. Also, consider using data encryption and virtual private network technologies, if it is required.

Monitor & Audit

Use appropriate monitoring, auditing, and inspection facilities and assign responsibility for reporting, evaluating, and responding to system and network events and conditions. This means that regular use of system and network monitoring tools and examine the results they produce; also use filtering and analysis tools and examine the results they produce, and learn how to response to events that warrants a response action.

Also, making sure employees are aware of whom to contact when they notice suspicious behavior. System administrators should be advised to up to date on the latest threats and attacks, and provide them with recourses on solutions over this problem.

Physical Security

Physical security is as important as network security. It is one of the most frequently forgotten forms of security because the issues that physical security encompasses - the threats, practices, and protections available - are different for practically every different site.

The real danger in having a computer stolen isn't the loss of the system's hardware but the value of the loss of the data that was stored on the computer's disks. As with legal files and financial records, if not having a backup - or if the backup is stolen with the computer - the data lost may well be irreplaceable.

Even if there is a backup, it still needs to spend valuable time setting up a replacement system. Finally, there is always the chance that stolen information itself, or even the mere fact that information was stolen, will be used against.

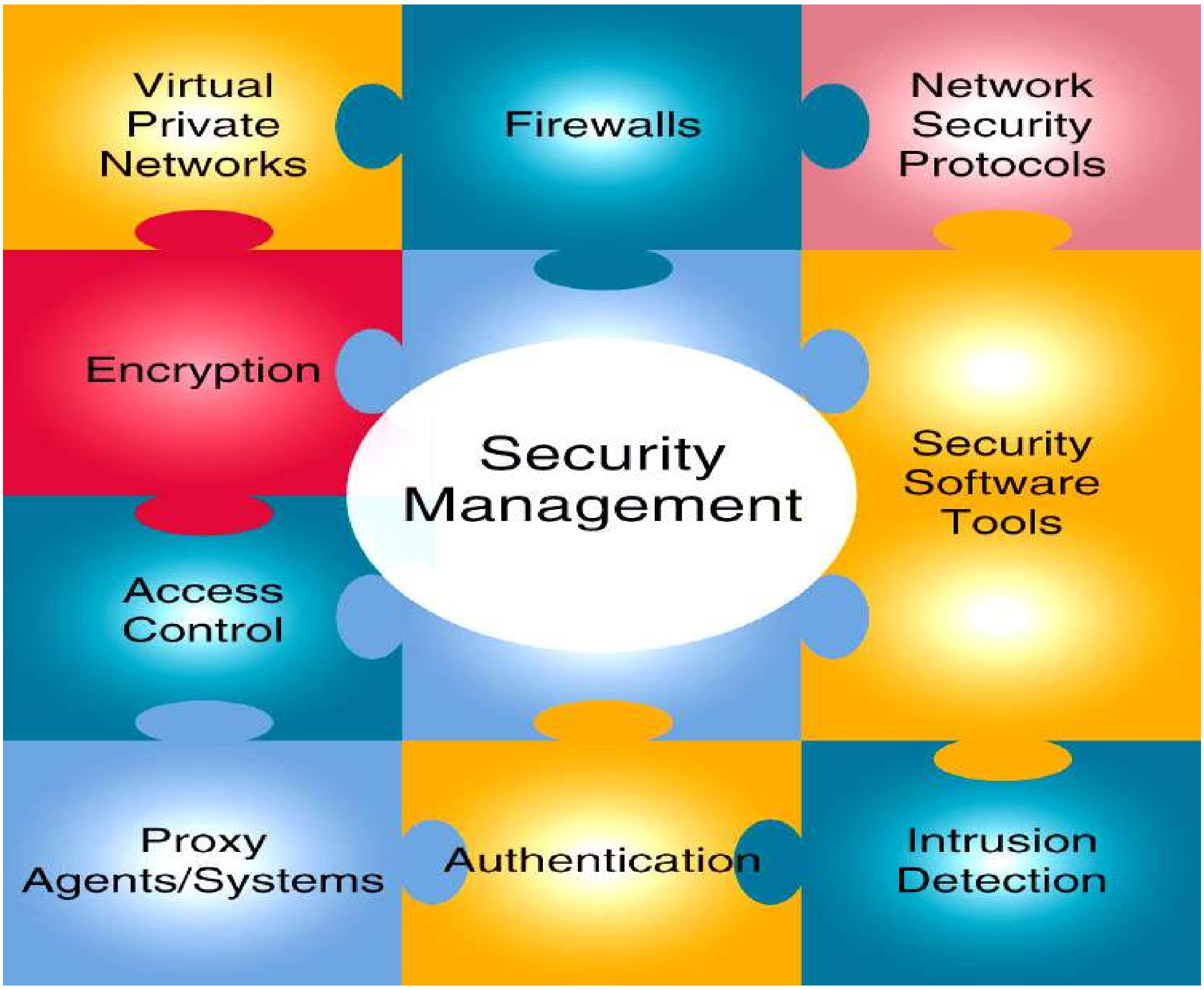
There are several measures that need to be protected for the computer system against physical threats. Many of them will simultaneously protect the system from dangers posed by nature, outsiders, and inside saboteurs. So, it is suggested to use physical access controls (e.g., badges, biometrics, keys), where required.

Also, use password-controlled electronic locks for workstations, servers, and laptops that are enabled upon login and after specified periods of inactivity. Control access to all your critical hardware assets (e.g., routers, firewalls, servers, mail hubs).

Continuity Planning and Disaster Recovery

Hopefully, by following this tips mentioned above, hope systems or networks will never be stolen or damaged. But if that happens, you should have a plan for immediately securing temporary computer equipment and for loading your backups onto the new systems. This plan is known as disaster recovery.

One should establish a plan for rapidly acquiring new equipment in the event of theft, fire, or equipment failure. Figure indicates the popular Information system security measures.



Security management tools for Information System

As the above figure illustrates, security management is a complex and challenging task. Information System security managers must acquire and integrate a variety of security tools and methods to protect a company's IT resources.

Information Technology (IT) Act (2008) in India

The IT Act of 2000, the first big step to regulate cyber transactions, e-commerce and prevent computer-based crimes, was modified in December 2008, and received Presidential go-ahead in February 2009.

Known as The Information Technology (Amendment) Act, 2008, it harmonises various e-services, strengthens laws on cyber terrorism, recognises phishing as a crime, and for the first time, identifies child porn as a separate offence.

A rapid increase in the use of computer and internet has given rise to new forms of crimes like sending offensive emails and multimedia messages, child pornography, cyberterrorism, publishing sexually explicit materials in electronic form, video voyeurism, e-commerce frauds like cheating by personation etc. So, penal provisions were required to be included in the Information Technology Act, 2000.

The government, under Section 69A of the amended IT Act, can "block public access of any information generated, transmitted, received, stored or hosted in a computer resource" in the interest of sovereignty or integrity of India; defence of India; security of the state; friendly relations with foreign states; public order; and to prevent incitement to the commission of any cognisable offence relating to the above.

The amended Act has spread its net to tackle more offences, including cyber terrorism, Wi-Fi hacking, sending and viewing child pornography, video voyeurism, identity theft and even spam. But at the same time, it allows the government to intercept information and snoop on its citizens.

The original Act had effectively just one criminal Section 66 for cyber crime and it was widely worded, but vague. The new Act covers a range of crimes that attracts punishment from a three-year jail term to a life sentence.

Section 66F is the cyber terrorism and life sentence section. It applies in cases where wi-fi is misused to send terror mail. Any electronic activity that goes against the nation falls under this section.

Online child pornography or child abuse is a strict no-no under Section 67B, and would attract a prison term of five years for the first offence. Data theft is a criminal offence as well, and cyber law experts say punishing it would increase India's standing across the globe.

With the virtual world shrinking, protection of data security and privacy assumed importance, as did protection of critical information infrastructure for national security. These areas were vulnerable under the old Act, said experts. Critics say the flip side is that it gives unfettered power to the government to monitor all e-traffic. The information could be misused, say cyber activists. The central government, though, says safeguards have been put in place to check misuse.

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Lesson 5.2 - Enterprise and Global Management of IT

The objectives of this lesson are to

- Discuss the international dimension in IT
- Explain the challenge of managing IT on a global scale
- Describe the cultural, political and geo-economic challenges in global IT management

In this lesson we will discuss the following

- Reducing failures in IT Management
- Managing the IS Function
- Managing the IT organization and the IT infrastructure.
- Cultural challenges in Global Business

Enterprise and Global Management of Information Technology

This lesson emphasizes the impact of business applications of information technology on management and organizations, the components of information systems management, and the managerial implications of the use of information technology in global business.

The strategic and operational importance of information technology in business is no longer questioned. As the 21st century unfolds, many companies throughout the world are intent on transforming themselves into global business powerhouses via major investments in global e-business, e-commerce, and other IT initiatives. Thus, there is a real need for business managers and professionals to understand how to manage this vital organizational function.

Managing Information Technology

Information technology is an essential component of business success for companies today. But information technology is also a vital business resource that must be properly managed. Managing the information systems and technologies that support the modern business processes of companies today is a major challenge for both business and IT managers and professionals. Led by the CEO and CIO, proposals are developed by business and IT managers and professionals for using IT to support the strategic business priorities of the company. This business/IT planning process aligns IT with strategic business goals.

Managing the development and implementation of new business/IT applications and technologies. This is the primary responsibility of the CIO (chief Information officer and CTO (Chief Technical officer). This area of IT management involves managing the processes for information systems development and implementation, as well as the responsibility for research into the strategic business uses of new information technologies.

Managing the IT Organization and the IT Infrastructure

The CIO and IT managers share responsibility for managing the work of IT professionals who are typically organized into a variety of project teams and other organizational subunits. In addition, they are responsible for managing the IT infrastructure of hardware, software, databases, telecommunications networks, and other IT resources, which must be acquired, operated, monitored, and maintained.

Managing the IS Function

Managing the IS function in organizations has become a very complex task. Organizations have moved from the having a centralized structure towards a decentralized structure, back towards more centralization control over the management of the IS resources of a company. Three things have influenced these shifts in structure

The Internet boom
Development of company intranets
Maintaining PC's on a network is very expensive.

Organizing IT

Modern computer-based information systems can support either the centralization or decentralization of information systems operations and decision-making within computer-using organizations

The Internet and globalization have promulgated a trans-national business culture. Though volumes have been written about the differences in how business is conducted in various cultures around the world, very little has been said about the similarities. Clearly, the Internet has been very instrumental in bringing us closer together. The World Wide Web (WWW) is in reality a global electronic bazaar where all sorts of goods and services are being bought and sold. Some businesses have obviously recognized that the changes brought about by globalization and the Internet presents some extraordinary business opportunities. Many others, however, have not only failed to take advantage of these opportunities but continue to struggle with the enormity of the changes.

This trans-nationalization of business culture, which is most clearly apparent on the World Wide Web, is for very many enterprises a double-edged sword; it cuts both ways. While presenting opportunity, at the same time it requires that businesses ingest and process extraordinary quantities of information that is being generated in all of the media. Sources of information include, but are not limited to the following

- Newspapers
- Magazines
- Journals
- Industry newsletters
- Radio and television broadcasts
- Special reports from think tanks
- E-mail and Usenet discussion groups
- Websites on the World Wide Web

Managing information, especially the information generated by the Internet, is now becoming a very important function in the business enterprise. Some business executives argue that this is just another ploy to create a new category of highly paid "specialized" employees. Others point out that much of this information has very little relevance to their business. Still others advocate that the only information of any real value to the business enterprise is the database that has the names of customers and those who could become customers. While all have valid arguments to support their viewpoints, the marketplace marks such discussions as being insignificant. So, how can one's company develop an information management strategy? Following are some guidelines that just might help

1. Decide what information is relevant to business. This is extremely important. Some companies, especially those in mature industries, do not find industry trend news or advances in technology to be important. Others are not as concerned about foreign news. Each business has different needs. What is important is that decides to evaluate information needed. Merely thinking about needs will probably change the way that one look at information entirely.

2. Reorganize the company to assimilate information better. Somebody has to really be on top of making sure that critical information gets to the proper people in the company. This may require some changes in duties and responsibilities of various employees. The most important thing to consider here is the knowledge and skill level of the person pushing information to decision-makers. In some cases, it will be very important to make certain that there is no duplication of effort. If an executive regularly reads certain publications, the person in charge of gathering for him/her can monitor other sources.

3. Develop information channels. Vendors, customers and service providers all have access to information that is vital to making decisions within the business. Sometimes, due to the informal nature of the contacts between employees, very critical information is lost. Companies that closely monitor this type of information often adjust better to changing marketplace conditions.

4. Monitor the Internet carefully. This is also essential. So much of the new and interesting information is being broadcast via the Internet, either by e-mail, Usenet and e-mail discussion lists or websites on the World Wide Web.

    1. Seek outside assistance when appropriate. Such things as clipping services can be a valuable business tool.

    2. Periodically reviews the information gathered and assess its value as compared to the effort in collecting it and do some kind of cost-benefit analysis.

Managing information is no longer optional. Developing a strategy to manage information will provide other benefits to your business as well because you will enhance inter-departmental communications. Companies are often amazed at how they are able to save money on the costs of doing business by merely getting their employees to communicate with each other in a professional manner about issues that are relevant to every employee. Those companies who fail to develop such a strategy will pay a very serious price failure.

Failures in IT Management

Managing information technology is not an easy task. The information systems function has performance problems in many organizations. The promised benefits of information technology have not occurred in many documented cases. Studies by management consulting firms and university researchers have shown that many businesses have not been successful in managing their use of information technology.

Research highlights that only one in eight information technology projects can be considered truly successful (failure being described as those projects that do not meet the original time, cost and (quality) requirements criteria).

Despite such failures, huge sums continue to be invested in information systems projects and written off. For example the cost of project failure across the European Union was €142 billion in 2004. That research looked at 214 information systems (IS) projects at the same time, interviews were conducted with a selective number of project managers to follow up issues or clarify points of interest. The period of analysis covered 1998-2005 the number of information systems projects examined across the European Union.

Key reasons why projects get cancelled

- Business reasons for project failure
- Business strategy superseded;
- Business processes change (poor alignment);
- Poor requirements management;
- Business benefits not clearly communicated or overstated;
- Failure of parent company to deliver;
- Governance issues within the contract;
- Higher cost of capital;
- Inability to provide investment capital;
- Inappropriate disaster recovery;
- Misuse of financial resources;
- Overspends in excess of agreed budgets;
- Poor project board composition;
- Take-over of client firm;
- Too big a project portfolio.

Management reasons

- Ability to adapt to new resource combinations;
- Differences between management and client;
- Insufficient risk management;
- Insufficient end-user management;
- Insufficient domain knowledge;
- Insufficient software metrics;
- Insufficient training of users;
- Inappropriate procedures and routines;
- Lack of management judgment;
- Lack of software development metrics;
- Loss of key personnel;
- Managing legacy replacement;
- Poor vendor management
- Poor software productivity;
- Poor communication between stakeholders;
- Poor contract management;
- Poor financial management;
- Project management capability;
- Poor delegation and decision making;
- Unfilled promises to users and other stakeholders.

Technical reasons

- Inappropriate architecture;
- Insufficient reuse of existing technical objects;
- Inappropriate testing tools;
- Inappropriate coding language;
- Inappropriate technical methodologies;
- Lack of formal technical standards;
- Lack of technical innovation (obsolescence);
- Misstatement of technical risk;
- Obsolescence of technology;
- Poor interface specifications;

- Poor quality code;
- Poor systems testing;
- Poor data migration;
- Poor systems integration;
- The International Dimension IT management

International dimensions have become a vital part of managing a business enterprise in the internetworked global economies and markets of today. Properly designed and managed information systems using appropriate information technologies are a key ingredient in international business, providing vital information resources needed to support business activities in global markets.

The following table summarizes the major aspects of information and knowledge management. It is mainly intended to serve as an orientation aid for the vast literature on this topic. Furthermore it should give a rough assessment of which disciplines (and professions) are engaged in which aspects of information and knowledge management. Accordingly, information systems and business informatics can be attributed to the management of information technology. Organizational and management sciences deal primarily with knowledge management (in a narrow sense). The management of (codified) information and the study of information use are the domains of records management and library and information science.

<table>
<tr><th colspan="2" rowspan="2">Objects</th><th colspan="2">Terms</th><th rowspan="2">Disciplines</th></tr>
<tr><th>Narrower terms</th><th>Broader terms</th></tr>
<tr><td rowspan="3">Information technology</td><td>data (structure)</td><td>data management</td><td rowspan="3">IT management (technology-oriented information management)</td><td rowspan="3">information systems business informatics</td></tr>
<tr><td>information system</td><td>information systems management</td></tr>
<tr><td>information infrastructure</td><td>management of information infrastructure</td></tr>
<tr><td rowspan="2">(codified) information</td><td>internal</td><td>records management</td><td rowspan="2">(content-oriented) information management</td><td rowspan="2">records management

library and information science</td></tr>
<tr><td>external</td><td>provision of external information</td></tr>
</table>

work practices that relate to knowledge generation and sharing		knowledge management	organizational sciences
intellectual assets	intellectual capital management		management sciences

The major dimensions of the job of managing global information technology include

- E-Business/It Strategies
- E-Business application portfolios
- Internet-based technology platforms
- Data resource management

Cultural Challenges in Global Business/IT Strategies

Culture is a difficult concept. We can examine organizational structures and process documentation to determine where change is possible and desirable. But the first step is to understand the culture as it exists today and how the team believes it needs to change.

The myths surrounding cultural change and provides some responses to those myths. Refer to Figure.

Myth

We can declare to our organizations that we are standardizing on an iterative process and our teams will happily adapt.

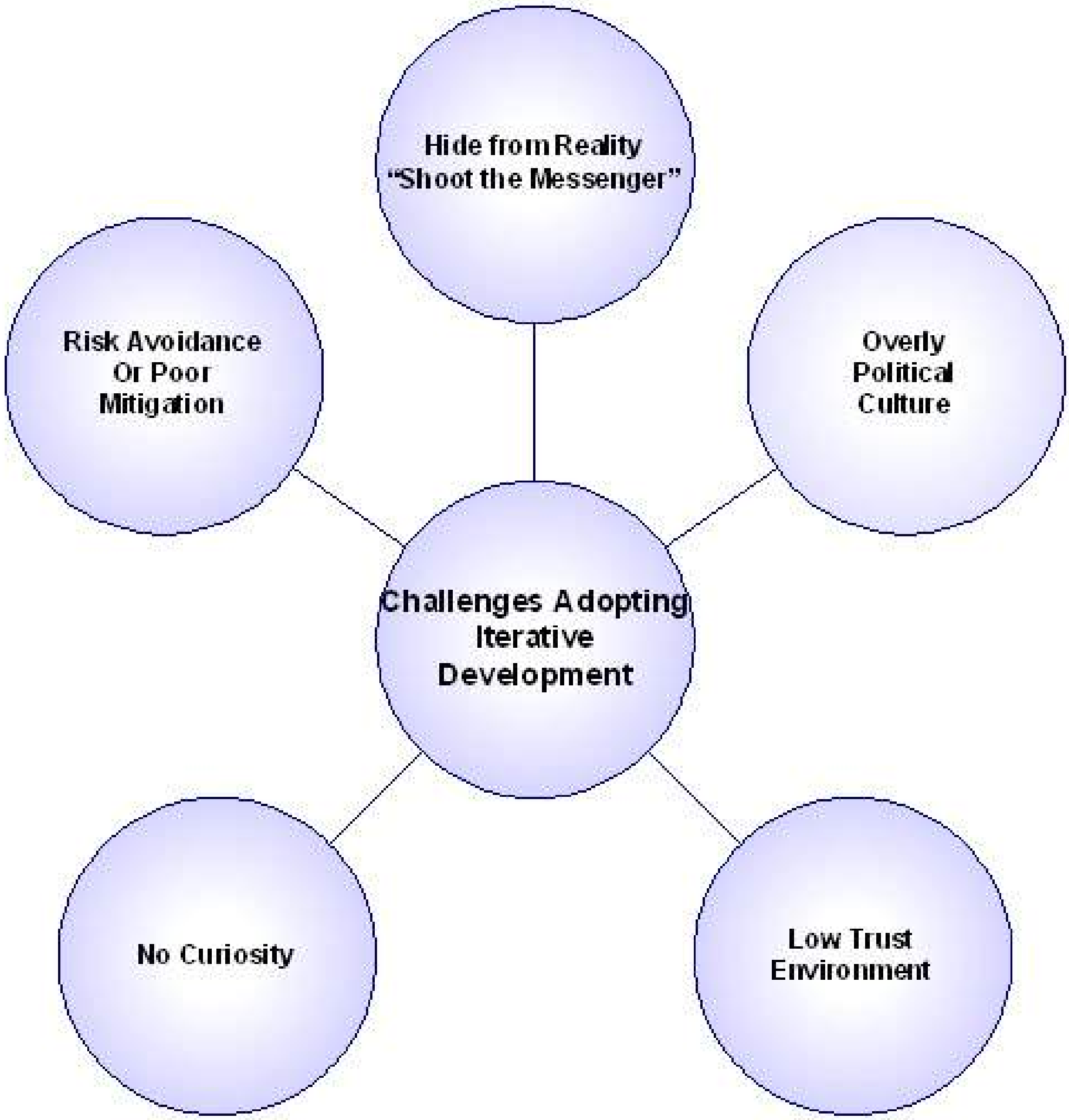
Reality

Such a declaration can be quite threatening, and is likely to be met with at least some resistance.

There are a number of reasons why teams and individuals resist change. For instance

- Fear of lost power and influence. While the change may be good for the organization, individuals may believe that they personally will suffer. Change can mean loss, which instills fear and anxiety. Fear of change is a powerful resistance factor.

- People are satisfied with the status quo. Members of team may have a compulsion to cling to our past successes, or they may not even recognize that there is room for improvement. This attitude is often expressed as "Hey, we've been doing it this way for years, why change now."
- The Law of Unintended Consequences. one may hear this expressed as "We don't know what else might happen as a side effect of making this change."



Cultural issues that act as impediments to the adoption of the iterative approach

The OCAI (Organizational Culture Assessment Instrument) assessment instrument (which can be quite helpful in assessing IT professionals posted on global or cross-cultural assignments) includes the following sections

- Dominant Characteristics. What is most important in our culture? For instance, is building really cool solutions more important than predictable results?
- Organizational Leadership. How do you characterize the leadership style? Are our managers no-nonsense aggressive competitors or are they more concerned with driving out inefficiencies?
- Management of Employees. How are employees treated — like cogs in a wheel or as valuable assets to be nurtured and grown?
- Organizational Glue. What holds the organization together?
- Strategic Emphases. What do we value? High trust? winning?
- Criteria for Success. How do we measure our success? Market share? Teamwork? Innovation?

Changing the thinking

In the style of the classic "chicken or egg first" question, one might ask "Which should come first, culture change or the adoption of iterative development?" Some one said "We don't think ourselves into a new way of acting; we act ourselves into a new way of thinking."

"Culture is not something one can manipulate easily. Attempts to grab it and twist it into a new shape never work because it can't be grabbed. Culture changes only after you have successfully altered people's actions, after the new behavior produces some group benefit for a period of time, and after people see the connection between the new actions and performance improvement."

Characteristics of a hospitable iterative culture

Is there an ideal cultural profile for iterative development? This question will only be answered definitively after more research; however, it is safe to assert that a balanced culture is important. Regardless of the exact cultural profile, there are ways to combat dysfunctional cultural elements. The following list describes the features of the culture and environment that our organization needs to build if we hope to adopt iterative development

- High trust. Customers, stakeholders, and the software team all believe they are working toward the same objective.
- Open and collaborative. Risks are openly discussed in a realistic manner.

We value coaching and building a facilitating leaders.

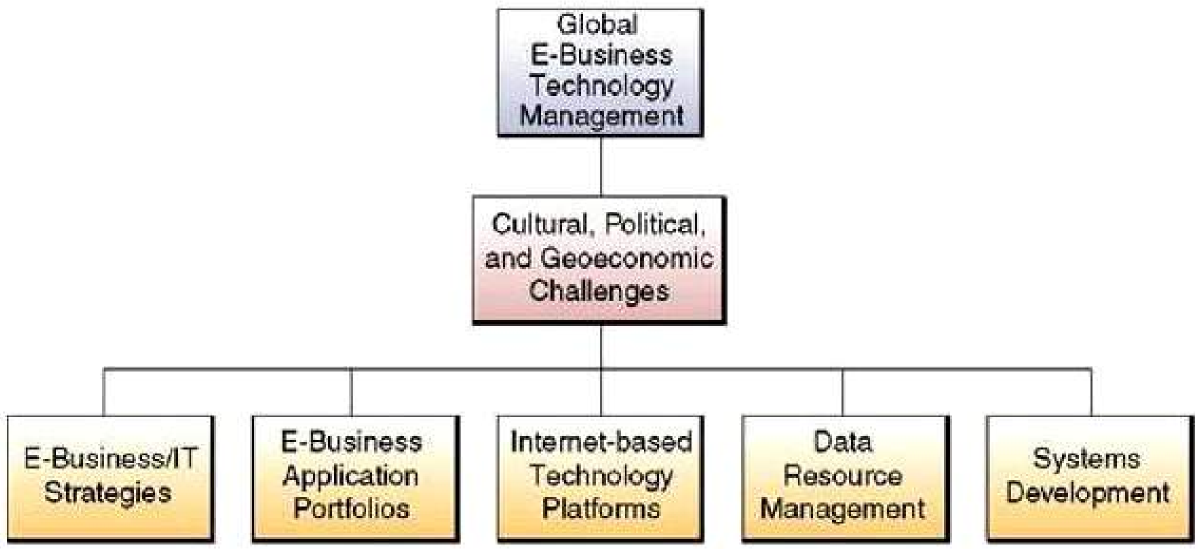
- Passion for problem solving. The team actively looks for root causes and engages in creative problem solving. We don't just build or deploy a solution because somebody said to; we truly understand the correlation between the solution and the problem.
- Curiosity is encouraged. Question everything, understand the assumptions.
- Customer results driven. What matters is that customers receive the results they need, not just what was documented as a requirement.
- Team members are empowered and accountable. Project teams are given the authority to make things happen as opposed to having their hands tied by dozens of oversight committees, functional management teams, and process cops.
- Organizational politics are spurned. The overriding value is that we share goals tied to delivering value to our customer. We care far less about who gets credit or who will be promoted after the successful completion of the project.
- Execution oriented. A preference for getting things accomplished — not simply stepping through a sequence of activities — is evident.

Many attempted adoptions of iterative development fail because the advocates do not adequately prepare to face the cultural issues that characterize the organization. You can overcome these challenges to iterative development by actively assessing, then understanding, the culture prior to the transition. Adopting process change through execution is critical to making the changes real and apparent to the key stakeholder. Changing hearts and minds is best done by changing behavior — by implementing real projects with the help of experienced practitioners of iterative development. Culture change does not come from platitudes and slogans, but from creating new success stories that become the norm.

Cultural, Political and Geo-Economical Challenges

The following figure highlights the different global IS/IT activities that take place amidst cultural, political and geo-economic challenges.

1. Many countries have rules regulating or prohibiting transfer of data across their national boundaries (Trans border data flows), especially information such as personnel records.



Challenges faced by global businesses and IT managers

2. Restrict, tax, or prohibit imports of hardware and software.
3. Local content laws that specify the portion of the value of a product that must be added in that country if it is to be sold there
4. Reciprocal trade agreements that require a business to spend part of the revenue they earn in the country in that nation's economy.

In global business and IT, one might want to consider the effects of geography on the economic realities of international business activities. These challenges include

- Physical distances involved are still a major problem
- World's 24 time zones contribute to communications problems
- Lack of telecommunications capabilities in some countries
- Lack of specialized job skills in some countries, or enticing specialists from other countries to live and work there
- Cost of living and labor costs in various countries.

Global IT Management Applications

IT applications may depend on business requirements (business drivers) caused by the nature of the industry and its competitive environmental forces. Business drivers for global IT applications include

1) Global Customers,
2) Global Products,
3) Global Operations,
4) Global Resources, and
5) Global Collaboration.

The search for systems economies was usually the initial driving force for global IT applications in many firms. For instance, an engineering firm wished to use a common engineering database to share project work between its U.S. and Asian offices. In addition to anticipated variations in engineering codes and relative costs of materials, management soon discovered that the Asian project requirements demanded far more detailed specifications for contractors than had traditionally been required of their U.S. office.

The following are the implications of some other common drivers for the global IT

- *Global customer* —Firms that serve traveling customers (airlines, hotels etc.) find it necessary to have worldwide customer databases. Corporate customers with global operations that more and more are demanding integrated worldwide services are increasingly imposing a similar requirement.

- *Global product* —The product is either the same through the world (e.g., Coco Cola) or is assembled from subsidiaries through the world (e.g., security), currency exchange etc.). Information systems can provide the ability to manage worldwide marketing programs.

- *Rationalized operation* — Different subsidiaries build different parts of the same product based on availability of skills, raw materials, or favorable business climate. For example, a computer manufacturer might build software in Japan, monitors in China, and circuit boards in Cincinnati and the U.S. MIS is used to coordinate the operations.

- *Flexible operations* — Operations al-e moved from a plant in one country to a plant in another. Fort instance, a computer vendor moves production of personal computers between plants in respond to labor strife or raw material shortages. Common systems exist across plants, which facilitates the move.

- *Joint resource* — National subsidiaries may share certain facilities or people. For instance, the Chinese subsidiaries for a petroleum company jointly own tankers or storage tanks. A material resource system is implemented to track the location of joint resource.

- *Risk reduction* — Risks associated with currency conversions, multiple global markets, and multiple traders are alleviated. For instance, a petroleum company develops a global system for bidding on crude oil contracts, or a multinational bank implements a global risk management system for currency trading.

- *Legal requirements* — Information requirements mandated by laws in one or more countries are consolidated. For instance, financial or environmental regulations imposed on a subsidiary may necessitate corporate-wide information requirements if the subsidiary intends to sell or use products manufactured elsewhere.

Conclusion

Global Information Technology spending is expected to grow rapidly, in the context of a global economic recovery and Internet penetration into the lives of businesses and customers. Because of the magnitude of this investment in the world market, many organizations will be forced to evolve into global corporations all over the world. The managers that will view these rapid changes in the global market as an opportunity rather than a burden will have considerable payoffs. Strategically placed investments in global information technology will provide an opportunity to increase control and enhance coordination to their organization while opening access to the new global market.

The size, scope, and complexity of the Global Information Technology market will present managers with problems they never imagined before. Managers will be forced to re-evaluate their Global Information Technology Management and to develop Global Information Strategy, which will help them to survive in the fast changing technology oriented global market.

Global IT Management

The emerging sub-discipline of Global Information Technology (GIT) is also referred to within the Information Systems (IS) discipline as Global Information Technology Management, as International Information Systems, and as Global Management Information Systems.

GIT encompasses multiple levels of analysis

1) The nation(s), or international policy-making body.
2) The firm(s), the Multinational Enterprise (MNE) or the IT vendors
3) The group(s) or team(s)
4) The individual
5) The technology overlay

Motivation for the Emergence of the GIT Sub-Discipline

1) The obvious reason the recent decades brought about increased levels of business globalization, international trade and competitiveness, and corresponding use of IT on a global basis including increased systems integration and convergence.

2) The not-so obvious reason GIT is a result of the traditional US-centric discipline of IS that has awoken to the practical and intellectual needs of examining IS (and IT) in the global context, rather than as a generic country-agnostic construct, or one in which US issues dominate the research agenda. This is why, in part, one finds "IT in country X," or "IT in (non-US firm) Y" as a legitimate area of research in GIT...at this stage.

3) A third reason relates to the impact of culture on the development, implementation and use of IT around the world. With the move away from ethnocentrism, so increased attention is being paid to the impacts that culture, in its myriad variations, exerts.

A study based on IS professionals charged with managing international IS outlined a global IS research agenda with four areas

(1) Matching global IS strategy to global business strategy;
(2) Issues involving the technical platform for global IS applications;
(3) Issues involved in international sharing of data; and
(4) Issues of IS projects spanning cultures.

In a "key issues" study on GIT framed out into the following categories

(1) Managerial/strategic,
(2) Technological/application,

(3) Host country social/cultural,

(4) Host country economic,

(5) Host country technological, and

(6) Host country political/legal.

The choice of technology platforms (also called the technology infrastructure) is a major dimension of global IT management. Technology platforms required to support a global business operation must consider include

1) Hardware choices,
2) Software choices,
3) Telecommunications networks, and
4) Computing facilities.

The management of technology platforms (also called the technology infrastructure) is another major dimension of global IT management. Technology platforms required to support a global business operation must consider

- Hardware
- Software
- Data resources
- Internet, intranet, extranet sites
- Computing facilities that support global e-business operations

Many businesses are becoming global companies and moving toward transnational business strategies in which they integrate the global business activities of their subsidiaries and headquarters. This requires that they build a global IT platform, i.e. an integrated worldwide hardware, software and Internet- based network architecture.

Glossary of Terms

- ✓ Vendor: someone who promotes or exchanges goods for money
- ✓ Stake holder: a person, Group who affects or affected by an organization action.
- ✓ Stock holders: one who own shares of stocks in a corporation or mutual fund.
- ✓ Decentralization: process of dispersing decision making governance closer to people.

- ✓ Act: perform an action
- ✓ Monitor: someone who supervises
- ✓ Authentication: process of determining whether some thing in fact who/
- ✓ what is done.
- ✓ Authorization: giving some one permission to do or have.
- ✓ VPN: Virtual private network; a computer network implanted in additional software.
- ✓ Access: Control list of permission attached to an object
- ✓ Software Integrity: a certification important for business
- ✓ Cyber space: the electronic medium of computer network, for online communication.
- ✓ Cyber crime: refers to criminal activity on a computer
- ✓ Hacking: act refers to clever or quick fix to a computer programme.
- ✓ Hacker: one who does Hacking.
- ✓ Deployment: distribution of forces in preparation of work.
- ✓ Mitigation: act in such a way as to cause an offense to seem less serious.
- ✓ Encrypting: activity of converting data or information into code.
- ✓ Telnet: Telecommunication network, a protocol used on local area network
- ✓ Ergonomics: science relate to man and his work embodying the anatomic principle.
- ✓ Web seals: high performance web server that applies fine grained security policy.
- ✓ Blockers: something that obstructs the passage.
- ✓ Anti-virus: protective software designed to defend computer against malicious Software.
- ✓ Anti-spyware: software to detect unwanted spy ware programme.
- ✓ Computer crime: illegal action where data in computer is used without permission.
- ✓ Supra-legal: to refer a mater under current consideration.

CASE STUDY - 1

Amazon.com's Kindle: Publishing Industry's iPod?

The publishing industry is undergoing transformation and is into blues with the proliferation of broadband. By the turn of 1990s, e-books entered the market as consumers by large started preferring them over the traditional printed books. Adding to the woes of the publishing industry, in the first decade of the 21st century, new devices for reading known as e-readers entered the markets threatening the survival of the publishing industry.

In 2007, US-based Amazon.com (Amazon) launched an e-reader called 'Kindle'. Within 2 years, by 2009, the company launched two more versions of e-readers, namely Kindle 2 and Kindle DX (DX stands for Deluxe). While on one side, e-reader is considered as a possible replacement of a book in terms of convenience, others are sceptical about the benefits provided by the e-reader and opine that e-readers cannot totally wipe away the publishing industry. keeping the prospects of the e-readers and the publishing industry in view, suggest your answer.

Question

1. Can the two survive together or would one replace the other.

CASE STUDY - 2

The New Economy

Ibm 6 Image 3It has become fashionable to talk about the new economy; e.g. the modern day economy based on the transformational power of Information and Communications Technologies (ICT). In the UK, the second half of 1999 was characterised by the arrival of .com companies in a big way.

Investors rushed to put their money into companies like lastminute.com which uses the medium of the Internet to bring together last minute buyers and sellers of items as diverse as theatre tickets and package holidays.

By Spring 2000 the investing city's and the public's honeymoon with the .coms was over, as people realised that only a relatively small number of these companies would succeed in a competitive world. The real revolution was actually taking place in the old economy. Long-established companies like banks, insurance companies, car manufacturers and retailers were using e-business to develop new links with their customers.

Research carried out by IBM shows that Internet access in Europe will increasingly be via a range of devices and not limited to the PC. Mobile applications are becoming a major driver and enabler of e-business in Europe, which according to some observers is as much as two years ahead of the US on digital mobile technology. IBM customers in Europe are therefore seeking support in building the best possible links with their own customers drawing on IBM's extensive experience in this field.

Question

1. How can we best communicate and meet the requirements of our customers, employees, vendors and suppliers using the latest e-business technology?'

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