Disclaimer

The suggested answers hosted do not constitute the basis for evaluation of the candidates' answers in the DIRM examinations. The answers are arranged by the Committee on Insurance and Pension with a view to assist the candidates in their education. While due care is taken in preparation of the answers, if any errors or omissions are noticed, the same may be brought to the attention of the Secretary, Committee on Insurance and Pension. The Council and the Committee on Insurance and Pension of the Institute is not responsible in any way for the correctness or otherwise of the answers hosted herein.

P-4 Business Strategic Planning and Information Technology

May 2005 Answers

1a) **Functions of Insurers**

The functions performed by any insurer necessarily depend on the type of business the corporation writes, the degree to which it has outsourced certain functions, the financial resources available, the size and nature of the insurer and a host of other factors. However, a broad range of functions are common to almost all insurers. These functions are usually carried out by dedicated departments:

1. Production (Selling and Marketing)
2. Underwriting
3. Rate Making
4. Claims Management
5. Investing and Financing
6. Record keeping and Accounting
7. Miscellaneous functions

Production/Selling

Insurance is an intangible item and thus does not exist until a policy is sold. In the insurance industry, therefore, the act of selling is production in the truest sense and the function that corresponds to selling or marketing in other businesses is usually referred to as production in the insurance industry.

The production (or sales) management team coordinates and manages the relationships with agents in the field. Where an insurance company has exclusive agents, it has to maintain a high degree of control over the activities of the agent. The function encompasses the recruitment, training and supervision of such agents. In India, the IRDA (Insurance Regulatory and Development Authority) has laid down the qualification and training necessary for such agents. Some insurance companies have designated their agents as "Certified Financial Planner". The main task of these agents is to reach out to customers and sell the policy. They are often the public face of the insurance company. An insurance company needs a sufficient number of applicants (policyholders) for it to be a viable entity.

Underwriting

Underwriting is the process of selection of risks. The insurance companies need to select the risks to insure in accordance with the companies policies. The objective of underwriting is to ensure that the applicant will not suffer a loss that is much greater than what was assumed at the time the premiums are fixed. The insurance company establishes certain standards of selection, when the premium rates are formulated, keeping in mind the physical and moral hazards. For example, the company may decide that it will not insure against theft and burglary, if the nearest police station is more than 16 kilometres away. A life insurance company may

similarly decide not to insure the life of someone who works in a hazardous environment, say, a stuntman in the film industry.

When considering an application for theft and burglary insurance of a piece of property where the nearest police station is 17 kilometres away or while considering an application for life insurance of a film stuntman, the underwriter need to consider whether he can make an exception to the company policy. The underwriter needs to evaluate what would happen if a large number of such policies were written and if a significant number of claims arose. Underwriters have to strike a balance Rate Making Rate Making is an extremely between being too liberal and taking more risk than is warranted and being too strict and losing too many customers.

It may be noted that until recently, the government owned insurance companies issued highly standardized policies with very little leeway to the underwriters. However, with the opening up of the insurance sector to the private sector, it is expected that the function of the underwriter will gain greater prominence. The field agent is also expected to do some preliminary screening of the applicant before forwarding it to the insurance company's underwriter. In many fields of insurance, the agent can make binding decision on behalf of the insurance company, but these decision can be subject to post underwriting by the insurance company and the contract is cancelable on giving due notice to the insured.

There are some functions that are allied to underwriting or provide support to underwriters. In life insurance, for example, a physician may provide medical reports on prospective applicants. The physicians may be appointed or licensed by the insurance company. Similarly in property and marine insurance, the underwriter may be assisted by inspectors who inspect value and assess the risks involved in insuring the property.

Another function of the underwriting department is policy writing. In most cases, the agent issues the policies, but the underwriter has to check whether the rates have been accurately charged, whether or not the agent has taken a prohibited risk and whether the applicant has followed all the terms and conditions.

Rate Making

Rate Making is an extremely technical function which involves selection of classes of insurable units on which statistics is collected regarding probability of loss. In the case of life insurance, it usually involves estimating mortality rates according to age, sex, occupation and other factors including lifestyle habits and choices such as smoking/drinking etc. In other fields, like property and liability insurance rate making is an extremely complicated and a large number of variables needs to be factored in before rates are fixed. Rate making is a specialised field that is usually overseen by actuaries.

Accurate rate making requires huge amounts of information collected over long periods of time in order to predict the potential loss from each class of assets. The premium charged by an insurance company is the

amount of anticipated loss (called pure premium) plus the cost of doing business (called loading). For example, if an insurance company expects to pay Rs.600,000 by way of motor vehicle insurance claims for a particular class of insured (say truck operators) and there are a total of 1000 trucks among the insured, the pure premium works out to Rs.600 per truck. This pure premium has to be increased by the cost of doing business which includes expenses such as agents' commissions, general company expenses, premiums, taxes and fees, and the profit margin. The sum of pure premium and loading is what the customer actually pays the insurance company and this sum is called gross premium. Guidelines for rate making are fixed by the IRDA.

Claims Management

Settling claims under insurance contracts is the function of claims management, which is often performed or supervised by risk managers. This activity usually requires field work, and use of outside expertise in the form of loss assessors and insurance adjusters. A certain amount of legal expertise is also required for this task. In life insurance, the task of claims management is relatively simple when compared with claims management in general insurance. In life insurance the quantum of loss is usually certain, whereas in general insurance the loss is usually partial and quantifying the amount of partial loss is an exacting and fraught with legal risks. The claims department of a general insurance company has to ascertain the validity of written proofs of loss, investigate the scene of the loss, estimate the amount of the loss, interpret and apply the terms of the policy in the loss situation, and finally of approve payment of the claim.

Claims management is crucial to the success of an insurance company. The public image of the company is dependent on the speed and fairness with which it settles claims. Since in many cases, the agent is responsible for selling the policy and collecting premiums, it is often only when a claim is made that the insured come into direct contact with the insurance company. If the insured is dissatisfied with the handling of his case, it may result in loss of business, court action, action by regulatory bodies.

Investing and Financing

Since premiums are paid in advance, the insurance company often has to considerable amount of funds that belong to the policyholder. Apart from such funds the company often has other funds in the form of paid-up capital, accumulated surpluses, and reserves. The investing and financing department is responsible for selecting and supervising the avenues for investment. For many insurance companies, investment income represents a substantial portion of total profits and has serves to offset underwriting losses. In life insurance, if the company does not earn a minimum rate of return on its assets, it becomes insolvent.

Financing refers to the function of ensuring that the insurance company has funds to meet its obligations. Generally an insurance company, once established, rarely has to raise funds from outside. New firms may, however, require considerable capital

infusions in the first few years. For established firms, the reinvested profits of previous years are usually sufficient to meet its obligations.

Accounting

The function of the accounting department is to present fairly and with full disclosure the financial position of a business in conformity with generally accepted accounting principles. Insurance companies, like all other types of businesses, use accounting to record, analyze, and summarize their financial activities and status. Once the information is accumulated, it is the accountant's responsibility to evaluate, interpret, and communicate the results to all interested parties.

Miscellaneous Functions

Apart from the six functions discussed above, there are a host of other allied functions that are performed by an insurance company or outsourced to some external agency. These functions include human resource management, engineering services, legal advice and marketing research.

Human resource management includes the selection, training and dismissal of employees. The maintain employee records, supervise employee induction, orientation and ongoing training, administer employee welfare schemes and other similar functions.

Engineering services play a significant role in general insurance, particularly in the areas of rate making and claims management. For example, if an computer centre is made out of fire resistant materials, the exposure due to fire may be less and hence eligible for a reduction in premium. However, to quantify the reduction or discount available, the underwriter or rate makers have to take the help of engineering services.

Marker research helps to create new products, carrying out of customer satisfaction surveys, advertising and public relations and forecasting of market volumes. Market research is also involves testing of various types of advertisement campaigns, developing effective advertising and brand-building. This is function is particularly significant because most insurers sell very similar products, with virtually identical terms and for similar prices. Hence, insurance compa-nies need to resort to rather heavy advertising in order to differentiate their products from that of competitors.

1b) Norms for foreign currency in respect of

(i) Claims in foreign currency:

Registered Insurers and authorised dealers are permitted to settle claims in foreign currency on general insurance policies subject to certain conditions such as the claim has been made for the loss occurred during the policy period, the claim has been settled as per the surveyors report and other sub stantiating documents, claims on account of reinsurance are being lodged with the reinsurers and will be received as per the reinsurance agreement, the remittance is being made to the non-resident beneficiary under the policy etc.

However, in the case of resident beneficiaries, the claim is required to be settled in rupee equivalent of the foreign currency due and under no circumstances can payment be made in foreign currency to a resident beneficiary.

(ii) Policy Issued by an Insurer Outside India

As per the provisions of the Foreign Exchange Management (Insurance) Regulations, 2000, no person resident in India is permitted to take any general or life insurance policy issued by an insurer outside India. However, the RBI may permit, for sufficient reasons, a resident in India to take any life insurance policy issued by an insurer outside India. Further, an exemption has been made for units located in Special Economic Zones (SEZs) for general insurance policies taken by such units. Therefore, remittances towards premium for general insurance policies taken out by units located in SEZs from insurers outside India are permitted provided that the premiums are paid out of the foreign exchange balances.

A person resident in India but not permanently resident therein is permitted to continue holding any insurance policy issued to him by an insurer outside India, if the premium on such policy is paid out of foreign currency resources outside India. “Not permanently resident” means a person resident in India for employment of a specified duration (irrespective of the length thereof) or for a specific job or assignment, the duration of which does not exceed three years.

A person resident in India may take a general insurance policy issued by an insurer outside India, provided that, before taking the policy he has obtained a no objection certificate from the Central Government of India. Further, a person resident in India is also permitted to continue to hold any insurance policy issued by an insurer outside India when such person was resident outside India, subject to fulfilment of certain conditions.

****

2) Rationale of outsourcing business communications and the key process attributes of such outsourcing in regard to insurance companies:

Today, the importance of business communications is unquestioned: transaction based documents are the lifeblood of every business, including insurance providers. Through business documents, insurance companies acquire and retain customers, communicate important information, issue policies and invoices, and generate cash flow. However, if firms are producing and distributing documents in house, the process could be costing substantially more than it should.

Surprisingly, many senior managers are unaware of what it actually costs to run an inhouse document production and distribution operation, and how outsourcing can be used to their benefit. For example, by outsourcing the printing and mailing of insurance documents, it is common for providers to realize overall cost savings of 20 to 25%. The benefits are even more compelling when providers also realize improved document quality and turnaround, and the increased freedom to focus on their core business.

Key Process Attributes

Outsourcing companies that specialize in the production and delivery of business communications provide a broad, sophisticated range of capabilities as part of their output solution. The attributes described below provide insurance companies with greater control over their customer communications process.

(a) Document Personalization

Studies have shown communications that are highly personalized and targeted to the end recipient are more likely to noticed and acted upon. Insurance customers want to be treated as individuals, not account numbers. The latest, flexible communications software used in the production of documents for printmail, CD-ROM, and other media, permits a greater inclusion of personal data and eliminates irrelevant fields of information.

(b) Document customization

Communications that are tailored from a local or highly recognizable source also make documents more important to recipients. Variable messaging on documents and the inclusion of selective inserts in mail pieces make this possible. For example, when customers received communications with the address and phone number of their local agent or dedicated customer service representative, or with a custom message or insert offering a service that is targeted to their needs, they are more inclined to valueand act upon the communication.

(c) Document design

To maximize the effectiveness of communications, and ensure their greatest efficiency and economy in production, proper document design is a must. In a high-volume, printmail environment, that begins with selecting the correct document base stocks. Experienced and skilled designers, who understand the true limits of communications production and distribution, can balance the aesthetics and functionality of documents.

(d) Enhanced document features

Document formatting software allows for the use of variable fonts, graphics (logos, icons, and other art), bar graphs, pie charts, and highlight colour printing on documents. Such enhancements help make documents meaningful and enhance their overall value. Customer communications can be further enhanced by including only relevant information; often this eliminates the need for customers to call with questions.

(e) Process efficiencies

Specialized high-volume business communications companies can provide numerous process efficiencies. These result in faster production turnaround times and cost savings.

(f) Combines multiple mailings

“House holding” the content of multiple documents being distributed to individuals or consenting family members into single communications means reduced material/service costs and more convenience for customers. For example, in the printing and mailing of

healthcare insurance documents, it is common for providers to realize as much as a 30% to 40% reduction in annual postage costs using this approach.

(g) Combines data from multiple sources

Data from different productsand different sources can be combined or “consolidated” onto one document as an added service to customers.

(h) Reduced distribution costs

Large business communications companies can quality mail for the best postal rates and fastest delivery through postal systems. They also can provide economies through other form of distribution (Internet, fax, CDROMs, etc.).

(i) Improved document conten

Because these companies are accustomed to handling vast quantities of information and documents, they are proficient in maximizing document content. For example, mailed documents are qualified by weight; by balancing messages and inserts to the weight scale, providers can optimize mail-piece content.

(j) Improved quality assurance

Sophisticated firms provide absolute datat output quality assurance through advanced process control systems.

(k) Enhanced Communications

Through the use of advanced coding (bar codes, and other unique identifiers and symbologies), additional information can be included on remittance and response vehicles for added value and increased process efficiencies.

(l) Print-on-demand

Along with the advancements of electronic printing technology for mission-critical documents, on demand printing has opened a whole new output strategy for the production of mass customized documents. For provider companies, this technique has revolutionized the production of traditional business documents, as well as communications such as product summaries, enrolment, and marketing kits. Among the benefits are elimination of material waste and reduction of warehousing and inventory functions.

(m) Distributive printing

Speed of delivery is often a factor in the distribution of critical documents going to a national audience. Through distributive printing, communications are printed and mailed from locations offering the fastest delivery through the UDPS mail stream. This process shaves days of delivery time from traditional single site or regional operations. This method is also used to balance production volume over multiple locations.

(3) Organisations regularly experience change in business environment, information technology, regulatory controls etc., How does an insurance company, develop a successful information system, in the context of such aforesaid changes?

Ans) Unlike systems that occur naturally, information systems must be created. Accountants have been creating accounting systems for hundreds of years; the double entry system originated in Italy nearly three hundred years ago. But the relatively recent adoption of computer technology in accounting and other areas has forced accountants and auditors to be more attentive to the methods used in developing information systems.

Implicit in the SDLC process are the following systems development objectives:

1. The system being developed must satisfy an organization's informational and operational needs.
2. The system development process must be efficient and effective.

Achieving Systems Development Objectives

It is a fact that most system development effort does not result in good information systems. One recent study recently revealed that only about 20% of the software was usable, another 40% marginally useful and 40% unusable.

The Qualities of a Successful System

No information system is completely successful or totally unsuccessful. In this context, success is a relative quality: A system is successful if it achieves most of the goals set out for it. In general, an information system is successful if it achieves four goals or qualities. *First*, it should produce correct and timely information. *Second*, it should be developed within a reasonable amount of time. *Third*, the system should meet the organization's needs for information. And *finally*, users should be satisfied with it. These qualities, and some methods of achieving them, are discussed below.

Correct and Timely Information

In an information system, errors and fraud are the two sources of incorrect information. For example, the double entry system prevents or detects many of the errors that humans can make in manually processing accounting data. Because of this, double entry systems are implemented on computers even though computers are less likely to make these kinds of errors. The use of computers, however, creates the possibility of other errors and makes it easier for a dishonest person to use the information system to conceal fraud.

A successful system has internal control that prevent and detect errors and fraud. Accountants and auditors frequently participate in system development processes because they, more than most other professionals who work with computers, are knowledgeable about internal control. Adequate internal control is necessary for implementing a successful information system.

Information is considered timely if it is available to its user when needed for decision making. For example, suppose inventory issues and additions are posted only on Fridays. A customer asks a salesperson about the availability of a particular product on Wednesday. The salesperson can tell the customer that goods were in stock on the previous Friday but cannot say that the goods are available when the customer wants

them. Such a system provides information that is untimely. More modern processing methods avoid this shortcoming. Timely information is provided by adopting a transaction processing method that meets the needs of the system user.

Time Required for System Development

Another quality of a successful system is that its development should be completed in a reason able period of time. Many large or critical information systems require three or more years to complete. Companies that have used computers for many years can tell horror stories of systems that were never completed. Excessive time for development results in excessive costs that may cause the system's costs to exceed its benefits.

What can be done to avoid this kind of system failure? First, system designers learn to limit the scope of any new system to size that can be developed within a reasonable time. In the terminology of systems theory, they define the boundaries of the system and limit their efforts to those components within the boundaries. Even though procedures outside the boundaries may need changing, these needs are addressed at a later date. For example, accountants seldom attempt to change an entire transaction cycle. Instead, they identify the application system within the cycle that most needs to be improved. Then they complete a new version of that application system before proceeding to another system within the cycle.

Second, system design teams learn to use project management techniques such as budgets, Gantt charts, and PERT (Program Evaluation and Review Technique) or CPM (Critical Path Method) diagrams. These methods require that the designers identify in advance all activities required by the development effort and the estimated times and costs for each activity. Designers can monitor actual elapsed time and costs, comparing them to those expected. Then they can change either the scope of the system or the resources assigned to the effort before an excessive amount of time elapses.

Satisfy the Organization's Needs

A third quality of a successful system is that it meets the needs of the organization implementing it. The system should provide information that is both meaningful and relevant to its users. Because developing information systems can be expensive and time consuming, they should be useful for many years. Thus, any new system should satisfy not only the current needs of the company but also anticipated future needs. An appropriate system design satisfies the organization's current needs; adequate system planning helps to identify future needs.

Most organizations have management committees that provide short and medium range planning for new information systems. Frequently called the Information System Steering Committee (ISSC), this group considers and approves new systems on a project by project basis. When approving the final design for a new system, they try to ensure that current information needs will be met.

To produce successful systems, organizations should also engage in long range systems planning. This type of planning examines information requirements at a broader level than a project by project analysis allows. It may be accomplished by members of a corporate long range planning staff or by a strategic planning group within an IS

(Information Systems) department. This long range systems planning group identifies long range information resource requirements and develops a system master plan (often called "the strategic information technology plan") for new systems. The master plan is based on overall corporate goals, on proposed new products, on new markets the firm will enter, and on future critical tasks within the firm's operations.

Whether a system is intended for a transaction processing application or for aiding in management decisions at a less structured level, adequate system planning is necessary if it is to be considered a success.

User Satisfaction with the System

A system is usually considered to be successful if its users are satisfied. In fact, many systems professionals consider user satisfaction as the strongest indicator of success. The user may be a clerk inputting data into a component of a transaction processing system. He or she may be an operating manager reviewing reports from a responsibility accounting or budgeting system. In either case, user satisfaction indicates that the system provides information that is correct and timely enough to satisfy the user's needs.

Frequently, designers of a new system conduct an evaluation of it months after it starts operation. Major objectives of this post implementation review are to determine if intended users are relying on the system and to find out whether they are happy with its operations and out-puts. By using surveys and interviews, they can determine if users are satisfied with the system.

Gaining User Acceptance

Often organizations allocate time and money to develop a new system only to find that users are unwilling to use it. In other situations, employees or managers use the new system grudgingly because no other is available. In some cases, users deliberately sabotage a new system, making it inoperable. A system can be technically sound, designed to be consistent with the organization's needs, and produce correct and timely information. Yet employees may prefer to use an older system, a manual system or an informal one.

Users may resist a new system for several reasons. Sometimes personnel may feel an economic threat due to the fear of losing a job. In other cases, the threat is simply to the user's ego or status. For example, in the past many managers were unwilling to use computer terminals. Using the keyboard requires typing, which, they believed, was a secretarial task. Sometimes a new system changes an employee's job in an undesirable way. The job may have added complexity or become more rigid due to a time schedule established for the new system. Occasionally a person may feel more insecure because of the formality introduced by using computer generated reports rather than those humans produce. Many people simply oppose any change in their work routines.

System designers have learned to anticipate these problems and to take steps during system development to gain users' acceptance of the new system. The

right kind of users involvement in the development process encourages user acceptance.

User Input in Setting Policies

The information systems steering committee should involve users. The steering committee should have representatives from top management and from all the major information systems user departments: accounting, marketing, production, engineering, internal audit, and others. Each representative should be a high ranking manager within a department and may be the head of the department. The manager in charge of the IS (Information Systems) function (nowadays called the chief information officer or CIO) should also serve on this committee. Large corporations may have several such committees one at the top management level composed of divisional vice presidents, others within the company's operating divisions or subsidiaries.

The steering committee provides users input into the selection of new systems for development. Just as important, the committee establishes priorities for those system projects that are approved. Every manager thinks that his or her pet project is the most important one! On the steering committee, a manager has to convince other managers of the importance of the project.

User Support for Projects

System designers must enlist user support for development projects in progress. All managers and supervisors should be sold on the project's value to their departments. If the superiors openly support a new system, subordinates will have difficulty resisting it after implementation. In developing a successful information system, sales ability and good interpersonal skills are as important as technical skills.

Active User Participation in Projects

Users not only should be sold on the value of a new system project but should also be active participants in the design process.

A multidisciplinary project team handles most projects. Members of the team come from varied backgrounds, and each contributes unique skills to the design process. Accountants usually participate in the design of an accounting system, and so do personnel from the affected operating departments. For example, the design of an order entry system requires someone from sales or marketing. The design of a cost accounting system requires input from production. Frequently these personnel are temporarily relieved of their normal duties and assigned full time to the project. Any project team also has people from the IS department who are experienced in the design and development process. These include systems analysts, programmers, documentation specialists, and technical consultants.

***

4) **Rapid Application Development**

Large system development projects may require years and cost millions to complete. When an organization's needs for information change rapidly, such a system may become obsolete before it is completed. To avoid this problem, some organizations have adopted newer approaches that produce working systems much more rapidly.

Called rapid application development (RAD) methods, these approaches attempt to deliver high quality systems quickly and at low cost. Small project teams implement RAD projects, and they minimize costs by using CASE tools and whenever possible by reusing existing computer code and other system components. They shorten development time by omitting the decision checkpoints and management approval processes of formal SDLC methodologies.

A RAD Project

A RAD project typically consists of four stages. In the first, requirements planning, the team conducts a review of the business functions and data closely affected by the proposed system. This review yields an outline of the system's functions and its costs and benefits. In the second stage, user design, key users define the detail of the business functions and the data associated with the new system. They determine inputs and outputs of the system and program critical procedures in it. They also prepare a plan for implementing the system. During construction, the third stage, the project team completes the system, demonstrates the system to users, and modifies its design as necessary. Cutover, the final stage, turns the operational system over to its final users and provides training to them.

RAD Techniques

The structure of a RAD project sounds similar to a project using a traditional SDLC approach. However, the project team uses several techniques to make the RAD project proceed faster. These are user workshops, prototyping, timeboxes, reusable components, and developmental tools.

User Workshops

Traditional projects rely heavily on interviews with users affected by a new system. Although an effective way to gather information, conducting many interviews is time consuming. As an alternative, RAD methods employ user workshops.

The workshop is a meeting of all key people involved in a project, both users and information systems professionals. The facilitator conducts the meeting and promotes an open discussion and free flow of ideas. The facilitator helps the group to achieve its objectives and agree on its results. A user workshop may produce in one meeting ideas that would require days or weeks of interviews and analysis.

Prototyping

Prototyping is an iterative process that avoids the structure and the periodic formal approval process of the traditional approaches. It relies on the development of a prototype, or working model, of the new system.

The project team quickly creates a high level, non detailed working model of the system. Users are then allowed to repeatedly revise the system, its outputs, or its inputs, until they are satisfied with it. Once users are satisfied with the system, the design team creates an actual production system patterned after the prototype.

Another approach minimizes the involvement of systems analysts by having the ultimate users of the system learn the tools and create the design.

Prototyping may be used successfully with RAD methods because these are relatively small transaction processing systems implemented with state of the art technology. These systems have a limited number of users who become closely involved in the design effort. Prototyping can be advantageous whenever it is difficult to specify in advance the precise data processing needs of a system. It is extensively used for developing decision support systems because the prototype can be customized to a decision maker's preferences and decision style.

Timeboxes

A timebox is a fixed time period at the end of which the project team must deliver a working system. If necessary, the team must narrow the scope or reduce the functions performed by the system in order to complete it on time. This avoids the common mistake when prototyping of overspecifying the system prior to developing code. Advocates of timeboxes assert that it is better to produce a working system early and then progressively to improve it than to wait months to complete a comprehensively specified project.

Teams complete RAD projects typically within timeboxes of two to four months. If using RAD with a large project of, say, a year's duration, they must break it up into a succession of several timeboxes. A typical large system development project consists of three or four small RAD projects.

Reusable Components

Components of a system include computer programs, forms, display screens, documentation, and paper reports. RAD works best when there is an existing library of such components that were developed for use in earlier systems. The project team is able to draw from this library to obtain components similar to, or in some cases identical to, those required for the current system under development.

Creating a new system from pre-existing designs in this way is much faster than recreating each component for each new system. Because reusable components are used many times, they are likely to have been tested thoroughly and less likely to contain errors. Furthermore, they present a consistent interface to users, making the new system easier to learn and use.

Developmental Tools

Rapid application development requires the use of appropriate high level developmental soft ware tools, such as CASE tools.

***

5) Feasibility study & Criterion of a feasibility study:

Ans) During the feasibility study the system study team examines alternatives that are potential changes to existing systems. In the feasibility study, the study team specifies the objectives and scope of the new system under consideration. Then they examine each alternative in detail and eliminate from consideration those clearly infeasible.

Objectives of the System

Before examining the feasibility of a system change, the study team identifies the objective or objectives of the system. This is necessary if they are to apply the systems approach. The information system steering committee initiates systems analysis because an existing system is not meeting its objectives, or because new objectives have been identified for it. During the preliminary survey, the study team may find that the objectives of an existing system are not clearly defined. During the feasibility study, these are specified. Then in determining the feasibility of an alternative, the study team considers whether a proposed change achieves these objectives.

Scope of the system

During the preliminary survey, the system study team examined a problem. They gathered and analysed data relevant to the problem from throughout the organization.

During the feasibility study, the problem is known, objectives are defined, and the study team evaluate possible solutions. In doing this, the study team must restrict their analysis to factors relating to the problem. They define the scope of the system to include only those components relevant to achieving the objectives of the system. In the terminology of systems theory, they establish the boundaries of the system that is to be changed. Then they restrict their efforts only to those components within these boundaries.

Defining the scope of the system is frequently a difficult task. During the preliminary survey, a study team may find many problems that need correction or many opportunities for technological improvement. They may wish to correct all the problems or make all the improvements immediately. Such a major system development effort is unlikely to be completed within a reasonable time period and will probably be unsuccessful. An experienced systems analyst recognises the need to select the most critical needs and implement solutions to them first. Another study team can address less critical needs later.

Determining Feasibility

During the preliminary survey, the study team identifies a problem and possible solutions to it. These solutions may include minor changes, major changes, or completely new systems. After establishing limits to the scope of its efforts, the study team evaluates the feasibility of solution alternatives. For an alternative to progress beyond the system analysis phase, it must be feasible in four ways; technical, operational, time and economic.

Technical Feasibility

A problem has a technically feasible solution if it can be solved using available (already possessed or obtainable) hardware and software technology. This feasibility criterion

concerns the state of technology in the computer industry and the technological capabilities of the organization. In evaluating technical feasibility, the study team determines whether computer soft ware and equipment that allow implementation are available from manufacturers or already available.

This is the easiest feasibility criterion to evaluate. IS representatives on study team usually are knowledgeable about the capabilities of available equipment. Their knowledge can be supplemented by advice from outside consultants. Technical and trade journals keep team members up to date regarding the state of technology.

Predicting the success of a technology in an organization is more difficult. This requires evaluation of a second feasibility criterion, the operating feasibility.

Operating Feasibility

A problem has an operationally feasible solution if it can be solved given the organization's available (already possessed or obtainable) personnel and procedures. In considering the operating feasibility of an alternative, the study team determines if a proposed system change could enable the system to meet its operating objectives. An alternative that fails to do so is discarded.

Technological change often occurs faster than employees feel threatened by the new technology, or if they feel that it makes their jobs less important or enjoyable. In other cases, a new technology may require capabilities that existing personnel lack. For example, using a computer keyboard requires typing skills that some factory workers may be unwilling to learn.

A significant factor in determining operating feasibility is user satisfaction. If users are dissatisfied with a system, it does not meet its objectives. When users are dissatisfied with a system, they fail to use it. Or, even worse, they may sabotage, it making it ineffective or inoperable. Thus, when a study team performs the feasibility study, they must consider any behavioural or social implications of a system change on the people who work with it.

Another issue examined by the study team is the expected performance of the system alternative. Many system studies are initiated to overcome problems with processing backlogs or to implement a new technology that improves performance. For example, a new system may complete the processing cycle more quickly than an old one and thus eliminate the backlog. It may allow more data entry operators to use it simultaneously. The study team compares the performance of a system alternative to that desired. A system that does not meet performance expectations is eliminated from further consideration.

Time Feasibility

In evaluating this feasibility criterion, the study team determines if the alternative can be implemented within a reasonable length of item. They compare the time needed to implement it with the company's needs for the system. If the company started a system study to implement a new technology, it may be willing to go through a lengthy development process, may be two or three years, to gain the technology. If the study

resulted from a critical problem with an existing system or an immediate need for information, the company wants an alternative that can be implemented quickly.

In determining time feasibility, the study team predicts the time needed to design and imple ment the new system. This time frame is affected by four factors: (1) the team estimates the equipment delivery time. Sometimes purchasers wait from several months to a year for the delivery of equipment. (2) The team must project the software delivery time. If computer programs are available for purchase, the system can be implemented much more quickly than if programs must be written. The team also estimates (3) the training time for users and (4) the time for conversion to the new system. These will be longer if the system requires a major technological change than if it requires only a minor change to an existing system. The study team considers these factors and compares implementation time to the time allowed by the company.

Economic Feasibility

In analysing this criterion, the study team determines whether the proposed change will benefit the organization financially. Their objective in evaluating economic feasibility is to find out whether the change is worth making. Many system development projects last from two to three years and cost millions of rupees to implement. During the feasibility study, the team makes preliminary calculations to determine whether the benefits received are worth the costs.

Before a study team recommends initiation of system easing, the proposed system or system change must satisfy all four feasibility criteria. If an alternative is infeasible on any of these grounds, then the alternative is not considered further.

*****

6) **Evaluation of Equipment Vendors**

Two common approaches exist for evaluating vendors. Under one approach, the design team establishes a minimum configuration for the hardware required by the system. They identify the quantity and specifications of all the computers and peripheral equipment needed. They summarize this in a request for quotation (RFQ) mailed to potential vendors. In the RFQ, the design team asks the vendor to quote a price for this configuration. This approach relies on the expertise of the design team.

Using the second approach, the design team establishes performance specifications for the proposed system. They describes these in a request for proposal (RFP) that goes to vendors. Each vendor then proposes a configuration for the hardware that meets these specifications and quotes a price for it. This approach is useful when the design team lacks the experience or time to develop its own configuration. However, because a vendor sometimes overstates the capabilities of its equipment, the second approach may result in inadequate configurations.

Criteria for Equipment Evaluation

The design team uses five criteria to evaluate equipment sources and examine proposals from vendors: equipment performance, adaptability, vendor support, availability, and cost.

EQUIPMENT PERFORMANCE

The design team wants to acquire equipment that performs adequately. During system specification, they may compare performance of equipment from alternative vendors. Unfortunately, making meaningful predictions of equipment performance in a particular application is difficult. Manufacturers publish performance specifications for each model they manufacture. For example, computers are described by a MIPS (Million Instructions per Second) number, the number of millions of instructions per second that they can process. For magnetic disk drives, manufacturers specify the mean access time to retrieve data stored on them. In determining these numbers, manufacturers assume operating conditions for the equipment that may be unrepresentative of typical applications. Manufacturer's performance specifications are useful in comparing equipment, but they do not reflect expected performance in practice.

Sometimes a benchmark is used as a measure of performance. A benchmark is a computer program written to represent a typical application, such as computing payroll. The design team runs a benchmark program on two or more different computers and compares execution time. The system that requires the least time is the better performer. Data provided by benchmarking are useful whenever the benchmark program is similar to programs in the proposed system.

ADAPTABILITY

Organizations investing thousands or millions of rupees in systems want them to be useful for many years and adaptable to changing needs. As the organisation grows, the system must be able to grow; thus, adaptability of the system requires expandability for the equipment. The system should also be compatible with other equipment and software that may becomes available later.

Many computers are not expandable into faster, more powerful systems. Some purchasers have found that although their performance is adequate at the time of acquisition, these computers cannot add memory or peripherals or upgrade processors when needed. Similarly, purchasers of less popular brands of computers have few sources for software or peripheral equipment. As a result, costs are higher and the selection is smaller. A wise design team purchases a brand compatible with a variety of other brands.

VENDOR SUPPORT

Most organizations that acquire new computer equipment require technical help from the seller. A design team should select a vendor that has the ability and desire to provide this help. Adequate vendor support facilitates the activities performed during the implementation phase of the SDLC.

Vendor support reflects both the capabilities and the desires of the seller. A vendor with technicians in the local area can provide more help than one who must bring in technicians from some other region. Some vendors make backup computers available or service equipment at the data centre, while others do not. A supplier who wants to maintain good customer relations can be relied on to keep promises and to aid customers in resolving implementation problems.

Evaluating vendor support is a subjective task. A design team does it by talking to each vendor's current customers and relying on their experience.

AVAILABILITY

The design team must choose a supplier that can provide the equipment at the time it is needed. Some new or popular models of computers are difficult to get and may be unavailable for several months. This can delay many activities of the implementation phase and be costly to the organization.

Sometimes a purchaser inserts a penalty clause in the purchase contract. This entitles the purchaser to a discount if equipment is not delivered on time. If a vendor refuses to accept such a clause, the purchase should interpret this unwillingness as an admission of uncertainty
regarding the delivery date.

COST

A final factor in the selection of computer equipment is its cost, not only the initial cost of purchase and installation but also the ongoing costs of operation. Equipment that requires special air conditioning or cabling is more expensive than equipment that is simply plugged into a source of electricity. Although the design team always considers these tangible costs, they are seldom the only criterion for equipment selection.

The other four criteria for equipment evaluation have implied costs that are difficult to estimate. There are costs for slow performance, for lack of adaptability, for poor vendor support, and for waiting on equipment that is unavailable. Usually a design team makes no attempt to estimate these costs. Instead, they identify equipment sources that are adequate in each of these areas; then they select equipment from these sources that is available at the lowest cost.

***

7) Developing and operating computerized information systems in a responsibility accounting system:

Ans) Developing and operating computerized information systems are costly activities, many organizations use responsibility accounting system or a budgetary control system to control these costs. They trace the costs to a responsibility centre and hold the manager of the centre responsible for them. Accountants participate in deciding how this is done. The two kinds of systems costs are the initial costs of developing and implementing the

system, and the ongoing costs of operating it. A responsibility accounting system charges each to responsibility centres.

Development Costs

Development costs include expenditure for supplies, equipment, and salaries of personnel working in a system development project. These costs may vary from a few thousand to a few crore rupees, depending on the size of the project. In accounting for these costs, the organization must choose between two alternative; allocating them to specific user departments or including them in general overhead. Each approach may be appropriate in certain circumstances.

ALLOCATION OF DEVELOPMENT COSTS

A fair method of accounting for development costs recognizes that the departments benefiting from a system should bear its costs. Thus, many organizations choose to assign development costs to specific user departments. The most common approach is to allocate these costs to the responsibility centre of the manager who subjects the project proposal. This gives the manager a personal interest in the success of the project and motivates the manager to cooperate with the project completed on schedule. Furthermore, the manager cannot propose a project unless it produces enough benefits for the responsibility centre to recover its costs.

This is a reasonable approach for those systems that clearly benefit a single department; however, in many cases this department may not be able to afford the system. Even though a proposed system is beneficial for the organization, a manager may reject it rather than absorb its costs in the department's budget. For this reason, some organizations simply include development costs as general overhead.

DEVELOPMENT COSTS AS GENERAL OVERHEAD

Advocates of this approach recognize that an improved system in any department or division benefits the entire organization. They argue that the costs of a new system should be included in general overhead.

With this approach, the costs of a new system are traced to a high level responsibility centre, such as at the organization or plant level. They are then allocated to all lower lever responsibility centres. In this way the costs are borne by all departments. This approach avoids the possibility that a manager might reject a beneficial system because of its effect on a departmental budget.

The disadvantage of including developmental costs in general overhead is that, this approach offers individual manager no incentive to control development costs. Because the user department is not charged for these costs, its manager may propose projects that are unnecessary or unprofitable. Furthermore, the manager may not actively support the project because cost overruns do not adversely impact his or her performance reports.

Many organizations adopt a combination of these two methods of accounting for selecting a method for each individual project. Before selecting an accounting method, the committee evaluates the user managers' support for

the project, the department's ability to pay for it, and its benefits to the entire organization. Other organizations establish a consistent policy in which all systems analysis costs are included in general overhead, and design and implementation costs are allocated to the proposing manager's responsibility centre. This compromise approach provides the manager with incentives for cost control while not burdening the user department with all of the costs of development. It decreases, but does not eliminate, the disadvantages of each method.

Operational Costs

Operational costs are the ongoing costs of using the system during the operations phase. These include expenditures for utilities, supplies, equipment repairs, software maintenance, and operations personnel.

Most organizations consider these costs in form of overhead and allocate them to user departments based on consumption of services. A computerized application system called a charge out system measures the services provided to different departments. It multiplies these quantities of services with predetermined rates to assess the total charges. The organization adopts a charging algorithm for this purpose. The predetermined rates may be calculated as cost based, market, or standard rates.

COST BASED RATES

When using cost based rates, the charge out system determines the actual expenditures for operation of the IS department. These actual costs are then allocated to user departments using the charging algorithm. User departments absorb these costs as part of their departmental overhead.

This method is an obvious one to most accountants, who are accustomed to recording and allocating other overhead costs. It requires the recovery of all IS operating costs by revenue producing departments. Each department absorbs its share of IS expenditure based on its consumption of IS services.

However, the use of cost based rates may produce undesirable effects in user departments. The magnitude of the expenditures for IS operations affects the costs allocated to each department. The level of these expenditures may vary significantly from month to month or year to year. Because user managers have no control over these expenditures, they may react unfavourably to a responsibility accounting system that includes uncontrollable costs on their performance reports. They sometimes blame excessive overhead not on their department's consumption of IS services but rather on the level of expenditures in the IS department.

Adverse effects occur in the IS department as well. Because all of its costs are recovered, the CIO has little incentive to minimize them. The use of market rates overcomes these shortcomings.

***

8)

(a) Teleprocessing Networks: Computer networks use communications software to control the flow of data over the network. The functions of the software depend on the kind of network. Networks called teleprocessing networks consist of a single computer with many attached external devices. These networks use communication control programs to communicate with these devices. Often such networks have terminals attached to the computer. If so, the system uses software called terminal control programs or telecommunications monitors. The network may use a small processor, called a communications processor, to execute these programs.

(b) EDI: One way in which many companies use computer networks is through electronic data interchange (EDI). EDI is the computer to computer transmission of the data contained on standard business documents such as invoices, or purchase orders. For example, when a company purchases materials from a supplier, the company normally sends the supplier a written request for materials on a document called a purchase order. The supplier responds by sending the customer a document called an order acknowledgement. If both companies use computers to process this transaction, they can transmit the purchasing and acknowledgement data over a computer network rather than printing it on paper and mailing it.

(c) Value Added Network: A value added network (VAN) is a computer network operated by a third company. Two companies implementing EDI each have an electronic "mailbox" on a computer owned by the VAN company. The VAN computer exchanges data between company electronic mailboxes in much the same way that a postal employee exchanges mail at a post office. People call these "value added" networks because the VAN company usually provides other services as well.

Translation software changes the format of the data from that used by the sending company's computer to that used by the VAN. The receiving company has similar software that translates from the VAN's format into that used in its system.

VANs are used by small companies or by companies with several EDI trading partners. It is a relatively expensive alternative because the VAN company charges for its services. For this reason, a company with only one EDI trading partner may implement EDI by private network.

(d) Commerce on Internet: Commerce on the Internet takes many forms. Most large companies have home pages on the World Wide Web. Many use them to sell products to the public. Small companies that cannot afford the expense of EDI systems conduct business on the Internet. By establishing a Web server and a home page on the WWW, they can communicate with customers, potential customers, suppliers and employees worldwide.

Internet Storefronts

To the public, the most visible commerce on the Internet occurs through Internet storefronts. An Internet storefront is a retailer that uses a Web page rather than a store to

sell its products. Many retailing companies open Internet storefronts in addition to stores. Some have been very successful selling only over the Internet. Because they do not display merchandise, Internet storefronts sell a wider variety of merchandise and incur lower operating costs than stores. This allows them often to provide better customer service at lower prices. Most Internet storefronts allow payment with credit cards, but some use other forms of cash payment over the Internet.

***

9) DBMS:

Database management system (DBMS), is a set of computer programs that maintain centralised control of the database. Whenever an application program or a user wants data from the database, it requests the data from the DBMS. The DBMS locates the data on a secondary storage device and transfers it into main storage in a form that can be used by the application. A DBMS uses online secondary storage devices.

By eliminating redundancy, a DBMS overcomes the deficiencies of traditional data file organ-isation. The DBMS stores data for use by all applications, so they are not required to maintain their own data files.

Characteristics

Computer systems using database management systems store data in ways unknown to user of the computer. When application programs request data from DBMS software, system software determines data locations on secondary storage and makes this data accessing to the applica-tions. This illustrates one of the major advantages of the database management approach - data independence.

DATA INDEPENDENCE

With a DBMS, the method of storing and organising the data is independent of the computer programs that use it. Application program requesting data neither specify its location nor describe its structure. Rather they identify it to the command in a data manipulation language (DML). A DML consists of a small set of commands included in the procedural language of the application program. The actual structure of the database, the location of the data, or how the fields combine to form records in the database are irrelevant to the application program.

When changes to a system occur that require altering the format of a data item, these changes affect only application programs using this data item. A traditional file system would require changes to all programs using the entire data record. This entails many more changes.

A simple example illustrates this characteristic. With a DBMS, if management decides to add another field to a record because of a new application, no previously existing programs require changes. Naturally, the data records in the database change, but only the DBMS software is concerned with this.

How does the DBMS achieve this data independence? It provides a different view of the data to each application program. Each view is called a subschema.

THE DATABASE ADMINISTRATOR

Organisations using a database management system employ a database administrator (DBA). The DBA then specifies to the database software a label for each set of data items. The application programs use these labels when requesting the data.

The DBA specifies to the project team developing the application a subschema for the data. This is a restricted view of the data that describes how it looks when the DBMS provides it to the application program. In this way, the application program knows the sizes and type of the data fields it will process. The subschema is usually different for each application. A billing system, for example, uses a different subschema from that used by an inventory system.

The database administrator also determines a scheme for the database. This is a logical view of data records as they are stored by the DBMS software. The DBA communicates this to the database software using the software's data definition languages (DDL). Each subschema defines a subset of the data fields continued in the schema.

Using subschema, the DBMS separates the way application programs use the database from the way it is actually structured. This greatly eases the way application programmers use the data. Most database management systems also provide easy access to data for nonprogrammer users of the computer system. They obtain this access using a query language.

QUERY LANGUAGES

A data query language (DQL) is a nonprocedural language similar to a fourth-generation language. It is composed of high-level commands that the DBMS software interprets and executes. Managers enter commands into a terminal identifying the data they wish to see. In response, the DBMS retrieves the data from the database and displays it at the terminal.

Query languages allow managers to access information in the database independently of application programs. Managers see ad hoc reports showing only the data they want to see, at the time they want to see it. This kind of easy access to data is difficult to obtain with traditional data file organisation.

A database management system provides a single source for all the data of a company. This eliminates the problems of data duplication and conflicting data in traditional file systems. To do this, DBMSs use a data dictionary.

DATA DICTIONARY

A data dictionary is a computer file containing standardized names and formats for all data items included in the database. It ensures that applications programmers and managers use the correct name to identify any data item required by a program or a query language inquiry. The database administrator uses data dictionary software to keep this file up-to-date.

For example, CUSTOMER - NAME is a 25 character alphanumeric data field containing the name of a customer. Two programs, ORDER-ENTRY and SALES-ANALYSIS, use this data field. Because the data dictionary identifies all programs using each data item,

the database administrator known immediately which programs must be changed if the format of the data field changes. This simplifies making changes to systems when the schema of the database changes.

Because database management software always requires the use of a data dictionary, it includes the software to maintain the dictionary. However, use of a data dictionary eliminates conflicting data names and formats in a traditional file system as well. For this reason, many companies implement a data dictionary in that environment also.

Logical Data Structures

Database management systems separate the way users view the data from the way the data is actually stored on the device. In addition, they distinguish between its physical arrangement and its logical arrangement.

The physical arrangement of data, which describes how data are recorded on the device, is determined by data management software. The logical arrangement, called the logical data structure, describes how the DBMS searches through the database to identify and retrieve a desired record. Different DBMS packages use different data structures; the choice is important because each has its strengths and weaknesses. Three data structures common among information systems are tree (or hierarchical), network, and relational.

***

10)

(a) Data validation procedures in batch processing:

In batch processing systems, and in batch systems with on-line inquiry, a separate computer program performs data validation. This program, an input edit program, examines data fields in each transaction record and identifies those transactions that have fields containing obvious errors. The program prints a listing of transactions containing errors and removes these transactions form the transaction file. In this way, the application system does not post these erroneous transactions to a master file.

Many application systems add erroneous transactions to a computer file called a suspense file. The system suspends further processing of each of these transactions until someone reviews the error listing, corrects the error in the transaction, removes it from the suspense file, and reenters it in the system. The project team determines these error correction procedures during design of the application.

The project team also determines the actions of the edit program during system design. They select the fields in a transaction record for examination and decide which kinds of errors should be detected. An input edit program would not find all possible errors in transactions, but a well-designed program could find most of the common ones. Some common data validation procedures (sometimes called edit checks) performed by edit programs are as follows:

> **Field check.** Verify that fields that should contain only numeric data contain no non-numeric characters. Also verify that fields that should contain only alphabetic data contain no nonalphabetic characters.

Validity check. Determine that a field that should contain only characters from a limited set contains no improper characters. For example, assume a transaction contains a RECORD TYPE field and there are only two record types, Record Type 1 and Record Type 2. A transaction with a Record Type of 3 is invalid.

Sign check. Determine if a field contains data of the proper sign, either positive or negative.

Limit check. Determine that a field does not contain an excessive amount. For example, an HOURS WORKED field in a weekly payroll program should not contain numbers greater than 168.

Sequence check. The key field of the current transaction should be greater than that of the transaction previously processed.

Self-checking account number. Use routines to verify that a check digit is correct. Such number like the Permanent Account Number (PAN) which incorporate check digits are also called self-checking numbers.

Completeness check. Determine that a critical field in a record has not been left blank. If the field is blank, the record is not processed.

Default values. Determine if a field in a record is blank, the program assumes a value; this is the default value.

10 (b) Data validation in Online real time systems:

On-line real-time applications apply all processes to a transaction before beginning to process the next transaction. Usually a single program converts data into computer-readable form, performs validation checks on certain fields in the transaction, copies it to the transaction log, and then posts the transaction to a master file. The program may also add the transaction to a file. The system later prints the contents of this file in the form of a journal.

Many on-line real-time systems use data entry clerks to enter transactions at terminals. Data entry programs apply validation procedures, to data fields as the clerk enters them. If the validation procedure identifies a field as erroneous, the program does not accept the transaction until the clerk corrects it. In this way these systems avoid suspense files, error listing, and delayed reentry of many transactions.

Validation procedures enable the computer to prevent or detect erroneous data before it affects a master file. Another source of errors for a master file is lost or added data. Control totals are useful in detecting errors from this source.

***

11) (a) Various sources of security risk in an information system:

Weaknesses in data security allow risks from three sources: internal, external and collusive.

Internal Sources

Internal sources of risk are employees who might exploit weaknesses in data security. They include managers and operations level employees.

OPERATIONS-LEVEL EMPLOYEES

Operations-level employees include data entry clerks, computer operators, and factory workers. Because these employees have routine access to the assets of the organization, they have opportunities to steal these assets. They have, however, only limited access to computerized records concerning assets.

When the organization implements good segregation of duties, no one has both custody of an asset and access to the records concerning that asset. This separation restricts the ability of operations - level employees to both steal the asset and conceal the theft by altering computerized records.

MANAGERS

Managerial and supervisory employees have greater access to records but fewer opportunities to steal assets. Although they can more easily falsify records to cover a theft, it is difficult for managers to steal an asset without the knowledge of others in the organization. They may, however, bypass restrictions by threatening to dismiss operations-level employees who know of their thefts.

External Sources

External sources of risk include business contacts and potential criminals who have opportunities to steal the organization's assets.

BUSINESS CONTACTS

Several kinds of business contacts have the opportunity to commit a computer-related crime. The major sources of risk are customers and vendors. Because they process transactions with the organization, the employees of customers and vendors have indirect access to assets and to records. The greatest risk occurs when their employees act in conjunction with one of the organization's employees. Acting together, they may commit a theft and conceal it by entering fraudulent transactions in the computer-based system.

Former employees also constitute a risk to an information system. Frequently they have intimate knowledge of the system and its control weaknesses. If they hold a grudge against their former employer, they may attempt to exploit weaknesses to commit computer-related crimes.

Another source of risk is business competitors who may seek competitive advantage by gaining access to confidential data stored in computer files.

UNKNOWN CRIMINALS

Other criminals may also become sources of risk to computerized records. Hackers attempt to bypass system security features using access by telephone. Other unknown criminals write

programs (called viruses) that maliciously destroy data, erase programs, or use up system resources. Usually the challenge, rather than theft, is the motive for these criminals. Nevertheless, they can do extensive damage to an organization's database. Organized crime may also exploit weaknesses in data security to defraud an organization of its assets.

Collusive Sources

Collusive sources of risk exist two or more individuals conspire to defraud an organization and to conceal the theft by altering computerized records. All organizations, even those with adequate segregation of duties, are subject to frauds from this source. For this reason, auditors must be aware of these sources and adopt procedures to prevent or detect them. Collusive sources exist in two forms: internal collusion and external collusion.

INTERNAL COLLUSION

Internal collusion occurs when two or more employees of the organization cooperate to bypass its control policies, practices, or procedures. For example, internal collusion occurs when an operations employee steals an asset and a manager or another employee conceals the theft by falsifying records. Effective segregation of duties may not prevent frauds of this kind.

EXTERNAL COLLUSION

External collusion exists when an employee acts with a non-employed to defraud the organization. The non-employed may simply be an acquaintance or an employee of one of the organization's business contacts. For example, a vendor's employee mails a fraudulent invoice to the organization. A clerk in the accounts payable department uses it to support issuing a check to the vendor. The vendor's employee intercepts the check, cashes it, and shares the proceeds with the accounts payable clerk. Good cash disbursements procedures prevent this form of external collusion; however, other forms are more difficult to prevent or detect.

In organizations with sound control policies, practices, and procedures, managers and collusive sources are the primary sources of risk. Without good internal control, risks exist from all sources.

11) (b) **Risks associated with data security:**

Just as one must know the sources of risk due to weaknesses in data security, one must also understand the four risks: destruction, espionage, invasion of privacy, and fraud.

Destruction of Data or Programs

All information and data are important, but certain data and program files are vital to the operation of any organization. These represent information that is difficult to reconstruct accurately if destroyed.

Destruction of data or programs may be accidental or it may be intentional. The data centre minimizes the risk of accidental destruction by employing trained computer operators, by having a computer operations manual that describes procedures for

safeguarding data, and by following standard data backup policies. They prevent intentional destruction by having security procedures that eliminate the possibility of unauthorized access to data files. Computer viruses enter the system on data obtained from outside the organization. Companies minimize the risk of damage from viruses by obtaining data only from the safe, reliable sources. They routinely use virus detection software to ensure that viruses have not infected personal computers.

Espionage

Managers are continually concerned about the action and plans of competing companies. They can acquire much useful information about competitors by granting access to computerized data. For example, lists of customers are useful to a competitor's sales force. Competitors can learn proprietary manufacturing processes by accessing certain production data. They may learn pricing strategies by accessing sales or cost accounting records. Budget data disclose plans for future operations and capital expenditures. Payroll data reveal information on pay rates a competitor may use to lure away key employees.

Espionage is primarily an external threat. However, a competitor may also gain access to sensitive data by collusion with an employee.

Invasion of Privacy

Computerized data files contain much personal information about individuals. Disclosure of this information is an invasion of privacy. For example, many employees object to release of data concerning their pay rates, ages, pension records, or home addresses. Customers expect confidentiality concerning current balances, credit ratings, and payment histories. In many countries, laws protect individuals from release of personal information contained in data files. These laws require organizations to maintain adequate security for personal data.

Threats to privacy come from hackers and from employees. Hackers enjoy examining the contents of computer files simply to learn about other people or to demonstrate their ability to bypass security. Employees may gain unauthorized access to pay rates, for example, when dissatisfied with their own pay.

Employee Fraud

Fraud is the risk that affects the accuracy of the financial records and results in loss of assets. Frauds result in misstatements of assets and expenses in the financial statements. Major frauds also endanger the ability of an organization to continue its operations. Many control policies and procedures protect against fraud by lower-level employees. Employees at a managerial level, however, may be in a position to override these controls. And when employees collude with other people, either internal or external to the organization, controls may fail to prevent or detect fraud.

***

12)

(a) Essentials of rate making: Accurate rate making requires huge amounts of information collected over long periods of time in order to predict the potential loss from each class of assets. The premium charged by an insurance company is the amount of anticipated loss (called pure premium) plus the cost of doing business (called loading). For example, if an insurance company expects to pay Rs.600,000 by way of motor vehicle insurance claims for a particular class of insured (say truck operators) and there are a total of 1000 trucks among the insured, the pure premium works out to Rs.600 per truck. This pure premium has to be increased by the cost of doing business which includes expenses such as agents' commissions, general company expenses, premiums, taxes and fees, and the profit margin. The sum of pure premium and loading is what the customer actually pays the insurance company and this sum is called gross premium. Guidelines for rate making are fixed by the IRDA.

Usually the loading is expressed as a percentage of the expected gross premium; in property-liability insurance, for example, a typical loading might be 25 percent.The Relationship between premium and loading may be expressed by the following equation:

GP=PP+LP (GP)

Where GP = Gross Premium

PP = Pure Premium

LP = Loading Percentage

It is common to rearrange the terms of the above formula as follows:

GP-LP (GP)=PP

GP(1-LP) =PP

GP= PP/ (1-LP)= 600/(1-0.25)=800

Thus in this case the premium works out to Rs.800 per truck.

Modifying the example above so that the pure premium is again assumed to be Rs.600 per car but the loading is 30 percent means that the gross premium would be calculated as follows:

GP=600/(1-.30)

GP=Rs.857

The pure premium is the estimate of loss cost, and the ratio of the loss cost to the gross premium is called the loss ratio, which is represented by the term (I-LP) in the formula above. As can be seen, the loss ratio in the first example is 75 percent.

Another way to explain rate making in insurance is by analogy with retail store pricing. If a grocer buys a loaf of bread for Rs.10 and sells it at retail for Rs. 15, the grocer's gross margin (or markup) is Rs.5. The grocer's cost of bread corresponds to the pure premium in insurance (Rs10 in the preceding case) the expected cost of loss. The grocer's gross margin, or markup, corresponds to the loading in insurance, that is, 33.33%(the margin divided by the selling price or 5/15) percent for the case in question.

A basic difference between pricing bread and pricing insurance is that in the case of bread, the grocer knows the cost of merchandise in advance, whereas in insurance the

expected cost of loss, or pure premium, must be estimated. The loss, if it occurs, happens at some future time after the policy is in force. Two factors must be estimated and are subject to errors in forecasting frequency of occurrence and severity of loss. The insurer does not know in advance exactly how often a loss will occur or what its size will be. The expected cost of loss is a function of both frequency and severity of loss. For example, the insurer cannot know who an insured will hit in an auto accident. It could be an 80-year-old retired person or a successful 45-year-old brain surgeon.

Insurers handle forecasting errors in rate making by calculating estimates of both objective and subjective risk. For example, the underwriters may use a probability distribution of loss frequency and severity. They may also add extra margins of safety in the estimate to compensate for a large perceived subjective risk.

Interest Earnings

The basic rate-making method used in property-liability insurance does not make a direct allowance for interest to be earned on policyholders' funds held by the insurer until they must be paid out as losses. In life insurance, an allowance is made for a minimum assumed rate of return on policyholders' funds. Today, insurers do not rely entirely on making a profit in underwriting, because they rely on investment income for part of their profit. (Underwriting + investment revenue–expenses = profit.)

Rate-making Guidelines

Broad guidelines adopted by a rate-maker are:

1. That rate should be adequate to meet loss burdens, yet not be excessive.
2. The rate should allocate cost burden among insureds on a fair basis.
3. The rate should encourage loss control efforts among insureds, if possible.

Although these criteria look simple enough on casual review, applying them raises many difficult problems. Some of these problem, many of which will probably never be completely solved either by insurerrs or by regulatory authorities, are described in the following paragraphs.

Adequacy of the Rate

If a rate is to be adequate but not excessive, how wide a margin should these limits impose? From one standpoint, an underwriter may reason that to have an adequate premium, it is necessary to collect an amount sufficient for all possible contingencies, whereas another underwriter may have a much different view of the size of these possible contingencies. This problem arises from the fact noted above that the insurance rate must be set before all the costs are known. In many lines of business, the entrepreneur may ascertain all or nearly all cost before setting a price. If costs cannot be determined, the entrepreneur will usually insist that the contract of sale be subject to later adjustment to reflect the actual costs or will insist on a cost plus type of contract. In insurance, however, a definite estimate must often be made in advance, with no possibility of later negotiation if the estimation of loss was incorrect. Frequently, these estimates are inaccurate because they are derived from past experience; the insurance contract may involve a substantial future period during which conditions change drastically. It is easy to see that opinions as to the future of insurance costs can vary widely.

The problem of preventing rates from becoming excessive has been the subject of much legislation, yet unrestricted competition sometimes leads to rates that are too low for the long-term solvency of insurance companies. Having rates that are too low is just as bad as, if not worse than, having ones that are too high. Above all, the insured is seeking assurance that personal losses will be paid if and when they occur.

Fair Allocation of Cost Burden

Just how far should the underwriter go in developing a rate that completely reflects the true quality of the individual hazard, thus making the rate fair? The issue is of particular concern to risk managers of businesses as they select appropriate risk management tools for various situations. Theoretically, for life insurance purposes there should be an attempt to set individual premiums on the basis of occupation, income, marital status, drug or alcohol consumption, smoking record, and longevity of parents. In practice, none of these factors affects the premium individually because age, sex are almost the sole discriminants. If the criterion of fairness is carried to an extreme, it might be said that each person should receive a slightly different rate to reflect that person's particular situation. This, of course, would be impossible to administer and would make the rate-making task hopelessly complex. However, a decision must be made concerning where to draw the line and what criteria of fairness to use.

(b) **Rate-Making Methods**

One of the most difficult problems in insurance is that of developing rate-making method that meet the criteria discussed above. The methods employed can seldom meet these criteria, and underwriting judgment, unsupported by statistical evidence, often plays a major role in rate making. The calculation of an insurance rate is in no sense absolute or completely scientific in nature. As in most areas of the social sciences, the scientific method in insurance makes its greatest contribution in narrowing the area within which executive judgment must operate. The basic approaches to rate making follow.

MANUAL OR CLASS RATING (PURE) METHOD

The Manual, or class rating, method sets rates that apply uniformly to each exposure unit falling within some predetermined class or group. These groups are usually set up so that loss data may be collected and organized in some logical fashion. Everyone falling within a given class is charged the same rate. Any differences in hazard attributable to individual risks are considered immeasurable or relatively small.

The major areas of insurance that emphasize use of the manual rate-making method are life, workers' compensation, liability, automobile, health, homeowners', and surety. For example, in life insurance, the central classifications are by age and sex. In automobile insurance, the loss data are broken down territorially by type of automobile, age of driver, gender of driver, and major use of automobile. In each case, it is necessary only to find the appropriate page in a manual to determine the insurance rate - hence the term manual rate making. The central technique in manual rate making is the pure premium method, as illustrated above. Today, such manuals are on the computer.

LOSS RATIO METHOD

It may be impractical to employ the manual rating method in developing a rate because of too many classifications and sub-classifications in the manual. In other words, there may be so many categories involved that losses on only a small number of exposures occur in a given time period. This small number of losses may be deemed insufficient exposure on which to base decisions from a statistical point of view. As a consequence, the new rate is developed by comparing the actual loss ratio, A, of combined groups with the expected loss ratio, E, and using the formula:

A/E = percent change indicated

For example, suppose that the actual loss ratio is 0.80, but only 0.70 was expected when the old rate was promulgated. In this example, A=0.80, E=0.70, and the formula yields 0.80/0.70. The new rate would be 8/7 times the old rate, or nearly 14 percent higher. The loss ratio method is actually a rate-revision method rather than a rate-making method.

INDIVIDUAL OR MERIT RATING METHOD

The individual or merit rating method recognizes the individual feature of a specifics risk and gives a rate that reflects the particular hazard. A variety or merit rating plans are used to give recognition to the fact that some groups of insureds, and some individual insureds, have loss records that are sufficiently credible to warrant reductions (or increase) in their rates from that of the class to which they belong.

One generally used device is for the underwriter to set up special rating classes for which discounts from the manual rates are made, either beforehand in the form of a direct deviation, as it is called, or as dividend payable at the end of the period. Presumably only those insureds meeting certain requirements are eligible for the special rate. For example, some direct writing companies, severely restrict the classes of risk they underwrite and, if warranted, pay substantial dividends as a reward for loss control efforts.

In the field of life insurance, insurers pay dividends that differ in amount according to the type of policy. Life insurers also grant rate deviations for special classes of insured groups, known preferred risks, and charge extra premiums on other groups, called non-standard risk. Automobile insurers may use this method by distinguishing among applicants on the basis of their type of automobile and their traffic violation records. In workers' compensation, certain groups are entitled to a premium discount that various according to the size of the annual premium.

SCHEDULE RATING

Another widely used plan of individual rating is schedule rating. The best example of this is in the field of commercial fire insurance, where each individual building is considered separately and a rate is established for it. The physical features of the structure are analysed for factors (such as the presence of sprinklers, distance from a fire station, and type of construction) that presumably affect the probability of loss, and rate credits are given for good features in the form of a listing, or schedule. In effect, the insured is rewarded in advance for features in the form of a listing, or schedule. It is hoped to yield a lower loss cost for all similar structures as a group. Schedule rating is also used in burglary insurance, with the insured being given rate credits for loss control devices such as burglar alarms and burglar proof safes.

EXPERIENCE RATING

A third way in which an individual risk may receive special consideration by the rate make is through experience rating. Experience rating is permitted in cases where the hazards affecting the insured's operation are sufficiently within the insured's control so that it is reasonable to expect a reduction of losses through special efforts. If such special efforts are made, the insured is permitted a lower insurance rate for the coming period. Unlike schedule rating, which grants a discount for safe feature, experience rating requires that the insured proves the ability to keep loss ratios down before being qualified for a loss reduction. Most experience rating formulas also impose a rate increase in case the loss ratios become higher than expected. Experience rating plans are using in workers' compensation, general liability, group health, commercial auto liability, and other lines of insurance.

RETROSPECTIVE RATING

A final way of recognizing individual differences in risk is through retrospective rating. In contrast to experience rating, under which rate adjustments apply only to the future period, retrospective rating permits an adjustment in rates for the period just ended. The premium is determined, in whole or in part, by the actual record of losses suffered by the insured during the policy year. The final premium is determined after all the facts have been determined. Employers become partial self-insurers, but they use the commercial insurer to limit their losses.

COMBINATION METHOD

In many lines of insurance, a combination of manual and merit rating is used in different degrees. The rate maker may develop a manual rate and then proceed to set up a system whereby individual members of a group may qualify for reductions from the manual rate if certain requirements are met or may be subjected to increased rates under certain other conditions.