

Business Information Systems

Learning Objectives

- ◆ To define key terms such as business processes, information systems as they relate to Business Information System (BIS);
- ◆ To introduce the concept and components of BIS;
- ◆ To understand the relationship between organizations, business processes and the information systems used in their day-to-day activities;
- ◆ To recognize how the organizations and information systems integration facilitate business processes
- ◆ To make out how IT works as a business enabler & driver with the help of various information systems;
- ◆ To discuss all levels of information systems and the various types such as TPS, OAS, KMS, MIS, DSS, ESS etc at each level;
- ◆ To define the specialized systems such as ERP, CRM, SCM, HRMS, Core Banking System and Accounting Information systems and their working and usage;
- ◆ To elaborate the concept of Artificial Intelligence, Expert systems, and Business Intelligence;
- ◆ To have a bird-eye view on Business Reporting tools;
- ◆ To have an overview of Access controls in any organization and different modes of payment mechanism; and
- ◆ To widespread the range of applications of BIS systems in business, industry, government, academia and other burgeoning field.

Task Statements

- ◆ To implement various information systems in perspective of any business organization;
- ◆ To check how the Artificial intelligence and Expert Systems work in different application areas;
- ◆ To check how the Information Systems act as a business enabler and driver;

- ◆ To assess the effectiveness of Information Systems like DSS, MIS, OAS etc. and results in better management of business processes;
- ◆ To know how the right information transported to the right person, in the right fashion, and at the right time is applied through business intelligence for appraising business performance;
- ◆ To assess how ERP has also evolved considerably with computer and technological advances;
- ◆ To understand how ERP software facilitates competent and efficient administration, and mechanized business activities; and
- ◆ To understand how CRM establishes the benefits of generating customer loyalty, raising a market intelligence enterprise.

Knowledge Statements

- ◆ To know how IT optimizes a company's important core business processes;
- ◆ To know modern information technology facilitate the functions of various company divisions and create transparency in the process;
- ◆ To know how Management Information system is an integrated, user- machine system for providing information to support operation, management and decision-making functions in an organization;
- ◆ To know how DSS leads to knowledge, this leads to new demands, and the modification of the system;
- ◆ To know how ERP systems integrate internal and external management information across an entire organization; and
- ◆ To recognize how AIS is a system that brings data together, records, stores, and processes it to fabricate information for decision makers.

4.1 Introduction

Business Information Systems known for its acronym BIS is a burgeoning term in a corporate world and academia too. In the present scenario, when only thing constant in the world is 'change'; BIS is a preferred software engine for the development of Information Technology (IT) in most recent years. This chapter discusses in length about BIS, its application and its impact on organizations. It also throws a light on various 3 letter acronyms which had revamped the IT Integration with management and created a benchmark in a business era. This analysis and framework of BIS gives readers a solid introduction to BIS and provide them a platform to explore the application perspectives

The world of commerce, business and trade as we know is speedily changing and term 'e' is adding as a prefix in order to add a feather in a cap. Globalization has become embedded,

trade and finance are hot-blooded, customers are more demanding and competition has purely augmented greater than before. There was a time when the things were supplier centric; but thanks to paradigm shift which is moving towards an era of customer centric approach where the customer is an ultimate key man in deciding and IT seems to be a driving force rather only an enabler. Organizations have gradually further turned to business linked with technology and more adopting out-of-box approach to aid triumph against the challenges of the 21st Century.

We need to understand how diverse Information systems and specialized systems are essential to augment the performance of any organization.

4.2 Information Technology as a Key Business Enabler & Driver

Information is said to be the currency of the present business environment and rightfully it can be said that we are living in the 'Information Age'. Information is a significant resource to an organization. It represents the organization's tangible and intangible resources and all transactions relating to those resources. Information influences the way an organization operates. The right information, if it is transported to the right person, in the right fashion, and at the right time, can progress and guarantee organizational effectiveness and competence. The BIS is the mechanism used to manage and control the information resource.

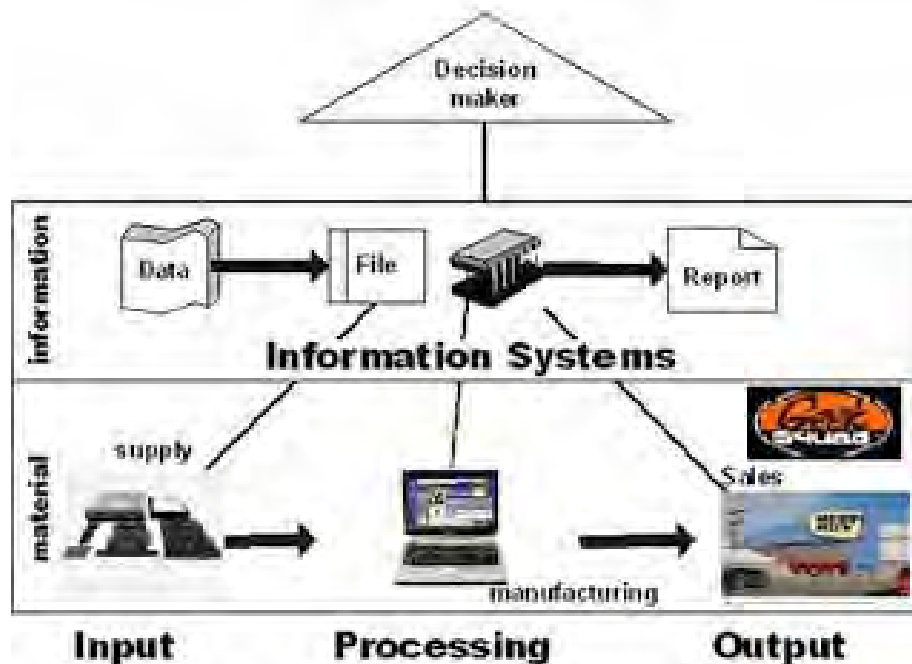


Fig. 4.2.1: IS working as an Enabler to convert Input into Output

Thus it is apparent from the above Fig. 4.2.1 as to how Information System facilitates in converting input into output. An Information System is an integrated process of components for collecting, storing, processing, and communicating information. Any specific Information System aims to support operations, management and decision making.

Information Systems (IS) refers to the interface of people, processes, and technology as shown in the Fig. 4.2.2.

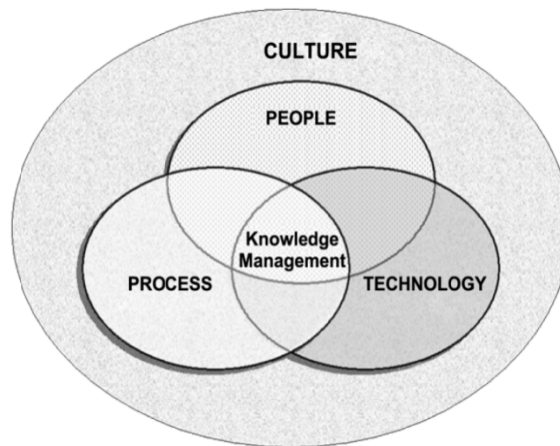


Fig. 4.2.2: Integration of People, Process and Technology a Three Tier Approach

If we see the three terms PPT which is known for its acronym; People, Process and Technology (PPT) is a very important aspect. People need technology to process the information in fast and accurate manner with a motive to get an edge, which is very well depict and self-explanatory in nature. Here People are considered as a Frontline Employees, executives and managers. The role of information systems in the organization is shifting to support business processes rather than individual functions. The focus is outwards to customers, rather than inwards to procedures.

Information Technology or Information System are used inter-changeably in place of each other. However, Information System is a broader term including information technologies as relevant and required. It is noticeable that Information Systems are dissimilar from Information Technology in that an Information System has an Information Technology section that interacts with the people and procedure components.

As already explained, 'IT' is an exceptionally imperative and acquiescent resource offered to organizations. As information systems have facilitated supplementary varied human activities, they have put forth a thoughtful power over civilization. These systems have impacted the pace of growth of day-to-day activities, expanded the scope of service offerings and empowered enterprises to reach out to customers across the world without the limitations of time and space.

People require information for many reasons and in varied ways. For example, we probably seek information for entertainment and enlightenment by viewing television, watching movies, browsing the Internet, listening to the radio, and reading newspapers, magazines, and books. In business, however, people and organizations seek and use information specifically to make sound decisions and to solve problems---two closely related practices that form the foundation of every successful company.

4.3 Information Systems

Let us understand the related terms.

Information: First of all, we should be able to distinguish between Data and Information. Data is a raw fact and can take the form of a number or statement such as a date or a measurement. It is necessary for businesses to put in place procedures to ensure data have been processed so that they are meaningful. This requires a process that is used to produce information which involves collecting data and then subjecting them to a transformation process in order to create information. Some examples of information include aggregating which summarizes data by such means as taking an average value of a group of numbers. Sorting organizes data so that items are placed in a particular order, for example listing orders by delivery date etc.

System: The system can be defined as “a group of mutually related, cooperating elements working on reaching a common goal by taking inputs and producing outputs in organized transformation processes.”

Not every system has a single goal and often a system contains several subsystems with sub goals, all contributing to meeting the overall system goal. For example the finance, operations and marketing areas of an organization should all have goals which together help to achieve overall corporate objectives. In systems, data are used as the input for a process that creates information as an output. In order to monitor the performance of the system, some kind of feedback mechanism is required. In addition, control must be exerted to correct any problems that occur and ensure that the system is fulfilling its purpose. There are thus five components of a generic system in terms of Input, Process, Output, Feedback and Control.

In the extensive sense, the term Information Systems (IS) refers to the interaction between processes and technology.

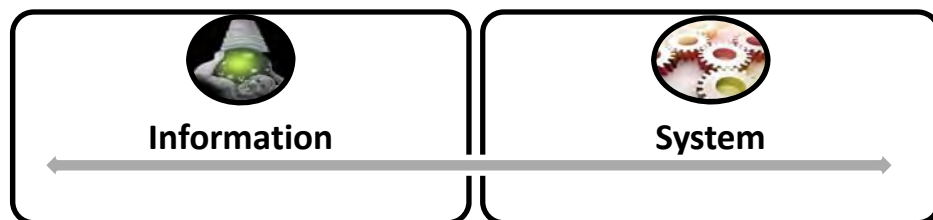


Fig.4.3.1: Bifurcation of a Terminology 'Information' and 'System'

From the Fig. 4.3.1, we can see how Information and System are interlinked with one another.

Information System: Information System (IS) is a combination of people, hardware, software, communication devices, network and data resources that processes (can be storing, retrieving, transforming information) data and information for a specific purpose. The system needs inputs from user (key in instructions and commands, typing, scanning) which will then be processed (calculating, reporting) using technology devices such as computers, and produce output (printing reports, displaying results) that will be sent to another user or other system via a network and a feedback method that controls the operation.

In general, any specific Information System aims to support operations, management and decision-making.

4.3.1 Components of Information System

The main aim and purpose of each information system (definition of information system) is to convert the data into information which is useful and meaningful. This process consists of four basic concepts:

- (i) People, hardware, software, and data are four basic resources of information systems;
- (ii) Human resources consist of end users and IT specialists; hardware involves machines and media; software resources consist of programs and procedures; and data resources includes data, model, and knowledge base;
- (iii) A process is used to convert data into information for end users;
- (iv) Information processes consist of input, processing, output, storage, and control processes.

All components of information systems are mutually connected and cannot exist individually. The relationship between separated components is defined for best process efficiency.

Components of information systems and their relations are presented in the following Fig. 4.3.2.

The output could be in terms of Printing, Reports, Graphics; Input can be data, information and instructions; Processing may involve calculations, programming and storing; Controls could be related to decision-making and the feedback.

Business Information System: Business Information Systems (BIS) may be defined as systems integrating information technology, people and business. BIS bring business functions and information modules together for establishing effective communication channels which are useful for making timely and accurate decisions and in turn contribute to organizational productivity and competitiveness.

In this entire chapter, we will throw light on distinguished type of systems mentioned above in a structure which finally furnishes a shape to a gigantic system known as Business Information System.

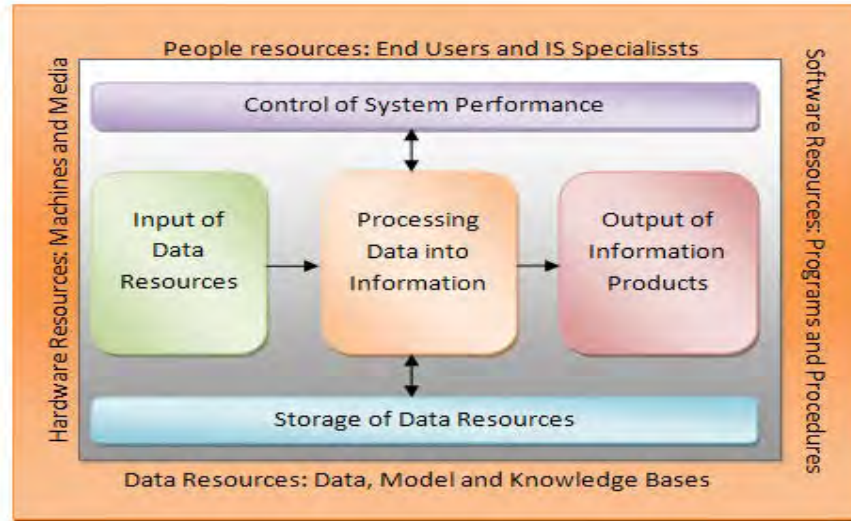


Fig. 4.3.2: Components of Information System

4.4 Organisations, Information Systems and Business Processes

Business Process: A business process is an activity or set of activities that will accomplish a specific organization goal.

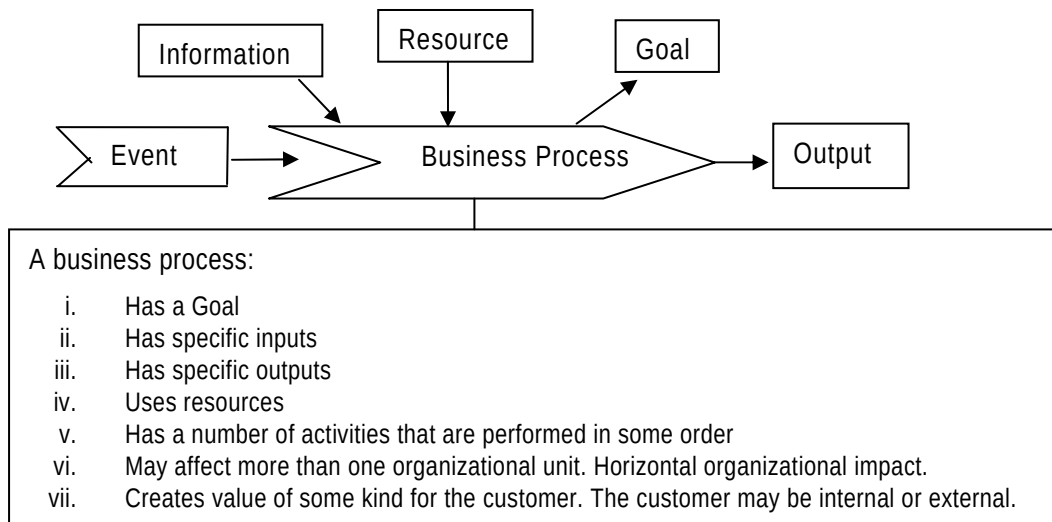


Fig. 4.4.1: Business Process Model

Referring to the Fig. 4.4.1, we can say that a business process is a collection of activities intended to produce an explicit output for a particular customer or market. It implies a strong

prominence on how the work is done within an organization, in contrast to a product's focus on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs: a structure for action.

Information Technology, which was for a long time considered an enabler of an organization's approach, is currently viewed as a vital ingredient of an organization's strategy in using information to take advantage of opportunities and encourage organizational growth. IT has progressed from being a separate function, marginalized from the rest of the organization, to a critical function in an organization. Any endeavor in an organization, now requires considerable information inputs, and this has made it vital for organizations to replace old systems.

To be successful in today's highly ready for action world; one has to be able to visualize the future. The key to managing opportunities lies in one's ability to, in actual fact; manage the large amount of information available. In order to deliver high quality information to the decision makers at the right time and also to computerize the process of data collection, collation and refinement it is essential to bring into play information technology especially BIS to its full potential and in the best possible way.

For the last decade and a half, the business community has seen what appears to be one fashion after another. To a surprising (and to a great extent under-recognized) degree, nonetheless, these enthusiasms are facets and constitutes of one major theme – the significance of information and its competent use to the accomplishment of the modern corporation. If we go into the diverse approaches to Information System keeping into consideration, BIS is a key component of a system in enterprise. The components which earlier used to be standalone are now effectual combined into information systems through IT. With the help of Information System, businesses are able to process and operate its daily works more accurate and easier.

In order to be able to compete successfully in the modern business environment, information systems must be able to:

- ◆ have large capacity for storage of information and also provide faster access;
- ◆ provide support for decision making;
- ◆ grant a competitive edge;
- ◆ ensure fast and accurate processing of data and make it available as and when required;
- ◆ offer faster communication and exchange of information across the value chain;
- ◆ reduce information redundancy;

4.5 Information Systems and their Role in Businesses

Enhancing the effectiveness of information systems always results in better management of business processes. When companies have skill-full business processes, they can be much more successful and competitive in the marketplace. In today's aggressive business

environment, companies compete on how they can provide to their existing and future customers goods and services more promptly and cheaper than their competitors. This is accomplished by well-organized, integrated information systems. It is superior to appreciate on how Information Systems process data and facilitate decision-making before discussing their different types distinctly.

Many business organizations obtain a competitive advantage by employing new information systems. The history of information systems goes back merely five decades, but from its inception, IS has done more to expand business and industry into global markets than any other technology. The backbone of 'IS' is the World Wide Web, Internet, or within a business a Local Area Network (LAN), along with EDI, EIS, ERP, SCM, eCRM, E-commerce and host of others, which portray new ways in which IS can be employed to cultivate business.

In the beginning stages, utilization of IS was merely on routine job and task centric, later on it become information centric i.e. integration of subsystems, afterwards user centric pedagogy formulated which includes office automation and DSS, then after Customer centric approach such as customer relationship management, strategic application came into force, then after service orientation came into existence which talks about total cost of ownership.

4.6 Types of Information Systems

We will see the detail implementations of all those managerial aspects gradually in the following Fig. 4.6.1. An Information system can support Strategy, Management, Knowledge and Operations.

Thus it is very well depicted from the Fig. 4.6.1 that how IS can support the four level of decisions which revolves around Strategy, Management with knowledge and Operations.

The Figure also throws a light on typical structure of IS in an organization perspectives. If we see the figure from the top there are three hierarchies. The Upper hierarchy is totally focused on Strategic and planning issues whereas Middle hierarchy entirely concentrate on management, control of process, collaboration, knowledge and Office automation under the supervision of human resource. At last the lower level, which exclusively inclined to operations that talks about Transaction Processing System.

- ◆ **Strategic Level Systems:** For strategic managers to track and deal with strategic issues, assisting long-range planning. A principle area is tracking changes in the external conditions (market sector, employment levels, share prices, etc.) and matching these with the internal conditions of the organization.
- ◆ **Management-Level Systems:** Used for the monitoring, controlling, decision-making, and administrative activities of middles management. Some of these systems deal with predictions or "what if..." type questions. e.g. "What would happen to our profits if the completion of the new production plant was delayed by 6 months?" Tracking current progress in accord with plans is another major function of systems at this level.

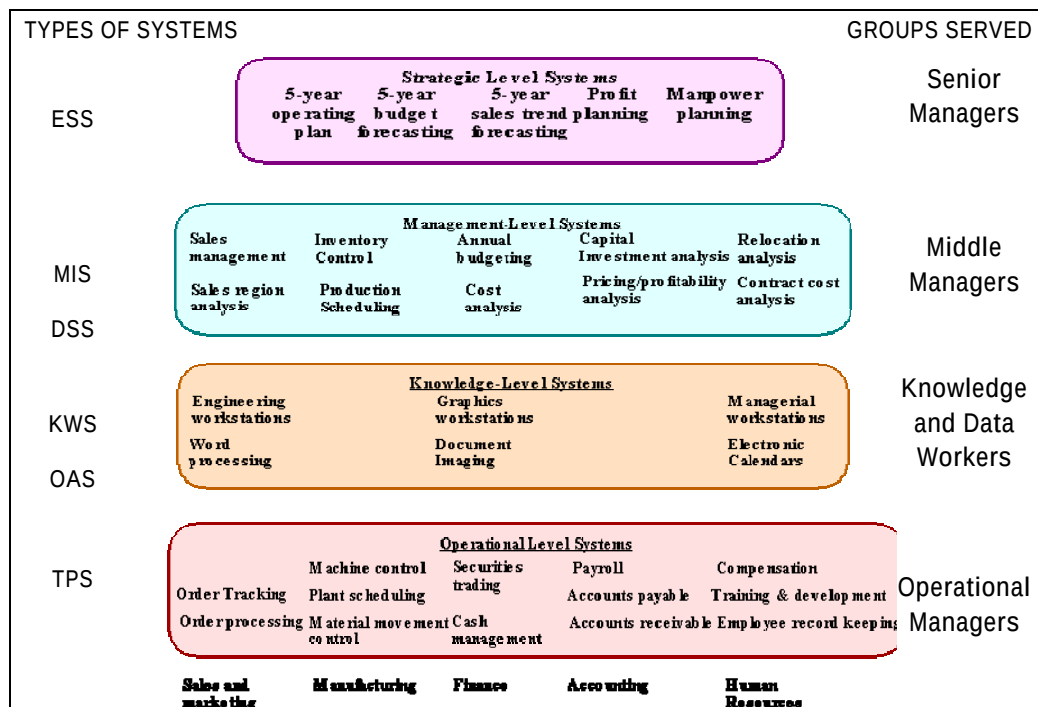


Fig. 4.6.1: Types of Information Systems and the Groups Served

- ◆ **Knowledge-Level Systems:** These systems support discovery, processing and storage of knowledge and data workers. These further control the flow of paper work and enable group working.
- ◆ **Operational-Level Systems:** Support operational managers tracking elementary activities. These can include tracking customer orders, invoice tracking, etc. Operational-level systems ensure that business procedures are followed.

Who uses Information Systems?

As depicted in the Fig. 4.6.1, the groups served at different levels are as follows:

- ◆ **Strategic Level:** These are senior managers or Top-level managers that hold the titles such as Chief Executive Officers, Chief Financial Officers, Chief Operational Officers, Chief Information Officers and Chair Person of the Board, President, Vice President and Corporate Head Managers take decisions that will affect the entirety of the organization. Top Managers do not direct the day-to-day activities of the firm; rather they set goals for the organization and direct the company to achieve them. Top Managers are ultimately responsible for the performance of the organization, and often, these managers have very visible jobs.
- ◆ **Management Level:** These are Middle Managers that are in the levels below top managers and hold the job titles like General Manager, Regional manager etc. Middle-

level Managers are responsible for carrying out the goals set by Top Management. They do so by setting goals for their department and other business units. Middle Managers can motivate and assist First-line Managers achieve business objectives. Middle Managers may also communicate upwards, by offering suggestions and feedback to Top Managers. Because Middle Managers are more involved in the day-to-day workings of a company, they may provide valuable information to Top Managers to help improve the performance of an organization.

- ◆ **Knowledge Level:** These include knowledge and data workers who are selected, recruited and trained in a special manner than the non-knowledge workers. The knowledge resides in the heads of knowledge workers and these are the most precious resource an organization possesses.
- ◆ **Operational Level:** These include Operational Managers or supervisors that are responsible for the daily management of the line workers who actually produce the product or offer the service. There are First-line Managers in every work unit in the organization. Although First-line Managers typically do not set goals for the organization, they have a very strong influence on the company. These are the managers that most employees interact with on a daily basis, and if the managers perform poorly, employees may also perform poorly, may lack motivation, or may leave the company.

4.6.1 Transaction Processing System (TPS)

The detonation of e-business and Web-based commerce which we in general call E-commerce and the long-lasting expansion of the global economy are placing ever-greater demands on transaction processing systems. For example, travel reservation systems that some time ago maintained solitary by travel professionals is at the present in a straight line reachable by anybody with an Internet connection and a Web browser. Transaction Processing Systems were the elite domain of mainframe computers.

A Transaction Processing System (TPS) may be defined as a type of information system that collects, stores, modifies and retrieves the day-to-day data transactions of an enterprise. Fig. 4.6.2 depicts a typical TPS. Archetypal examples of such systems would be used in an Airline Reservation Systems, Railway reservation by IRCT, Banking Systems, or the Accounting System of roughly any outsized company.

TPS systems are designed to process transactions virtually instantly to ensure that customer data is available to the processes that require it. Most of the Transaction Processing Systems include one or additional of the following attributes:

- ◆ **Access Control - TPS:** Most Transaction Processing Systems come with access control to put a ceiling on users to only those allowed to accomplish so. Access Control ensures that people who are not authorized to use the system are not permissible to influence or transform the transaction process.

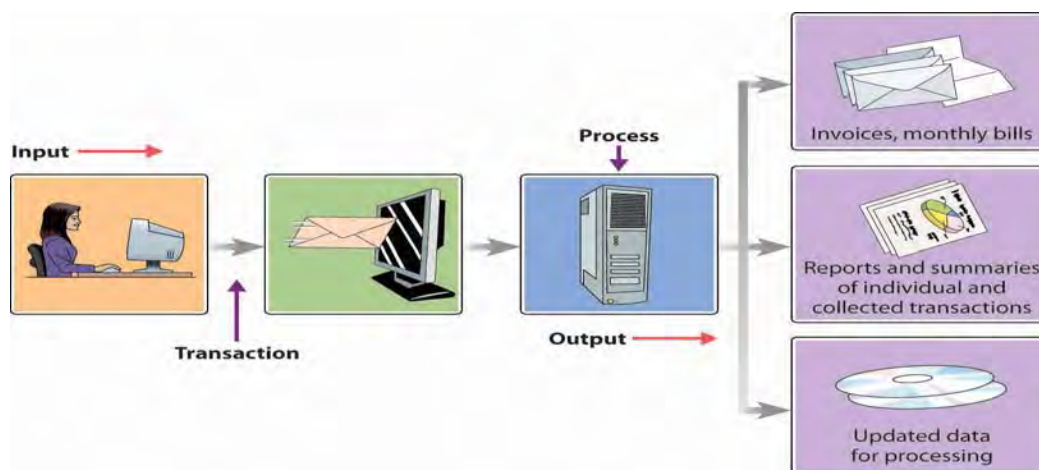


Fig. 4.6.2: Transaction Processing System

- ◆ **Equivalence - TPS:** Transactions are processed in the similar format every time to ensure that full effectiveness is achieved. The TPS Interfaces are designed to get hold of identical data for each transaction, despite the consequences of the source.
- ◆ **High Volume Rapid Processing - TPS:** In most of the transaction processing, the foremost issue is momentum. The instantaneous processing of transactions is noteworthy to the success of certain industry such as banking. TPS is designed to process transactions in an immediate to make confident that the transaction data is available to other users or processes that entail it.
- ◆ **Trustworthiness - TPS:** A TPS system is designed to be robust and trustworthy. The system is capable to process transactions very rapidly yet at the same time conduct several checks to make certain that the data integrity is preserved.

Transactions Processing Qualifiers In order to qualify as a TPS, transactions made by the system must pass the ACID Test. The ACID Test refers to the following four prerequisites as discussed in the Table 4.6.1:

Table 4.6.1: Pre-requisites of ACID TEST for any TPS

Prerequisite	Explanation
Atomicity	This means that a transaction is either completed in full or not at all. TPS systems ensure that transactions take place in their entirety. For example, if funds are transferred from one account to another, this only counts as a bone fide transaction if both the withdrawal and deposit take place. If one account is debited and the other is not credited, it does not qualify as a transaction.

Consistency	TPS systems exist within a set of operating rules (or integrity constraints). If an integrity constraint states that all transactions in a database must have a positive value, any transaction with a negative value would be refused.
Isolation	Transactions must appear to take place in seclusion. For example, when a fund transfer is made between two accounts the debiting of one and the crediting of another must appear to take place simultaneously. The funds cannot be credited to an account before they are debited from another.
Durability	Once transactions are completed they cannot be undone. To ensure that this is the case even if the TPS suffers failure, a log will be created to document all completed transactions.

These four conditions ensure that TPS systems carry out their transactions in a methodical, standardized and reliable manner.

So Transactions must be ongoing. This means that at what time that decisive seat in the movie hall has been booked and we have received proclamation that the chair is ours, it is everlastingly recorded. No matter what problems happen to the system; there are back-ups in place in the transaction processing system to make confident that the witness stays everlasting.

4.6.2 Office Automation Systems (OAS)

Office automation almost always implies a network of computers with a variety of available programs. The expression Office Automation refers to the entire tools and methods that are applied to office activities which formulate it achievable to practice written, visual, and sound data in a computer-aided mode. Office automation is anticipated to make available elements which make it achievable to make straightforward, get better, and mechanize the organization of the activities of a company or a group of people (management of administrative data, synchronization of meetings, etc.).

The Office Automation Systems (OAS) is amalgamation of hardware, software, and other resources used to smooth the progress of communications and augment efficiency. Office automation refers to the use of computer and software to digitally generate, collect, store, manipulate, and relay office information needed for accomplishing basic tasks and goals.

If we set out into the diffusion of the expression, office automation refers to all apparatus and methods that are functional to office activities which construct it promising to progression written, visual, and sound data in a computer-aided approach. Office automation is predictable to formulate available elements which create it probable to construct clear-cut, recuperate, and automate the organization of the activities of a company or an assemblage of people (management of administrative data, synchronization of meetings, etc.). Considering that company organizations demand augmented communication, in the present day, office

automation is no longer limited to essentially capturing handwritten notes. In meticulous, it in addition comprises the following activities:

- ◆ Exchange of information;
- ◆ Management of administrative documents;
- ◆ Handling of numerical data; and
- ◆ Meeting planning and management of work schedules.

Diagrammatical view

An Office Automation Model consists of:

- (a) Information and communication
 - No data
- (b) Computer and non-computer applications
- (c) "Other problem solvers"
 - Internal
 - Environmental

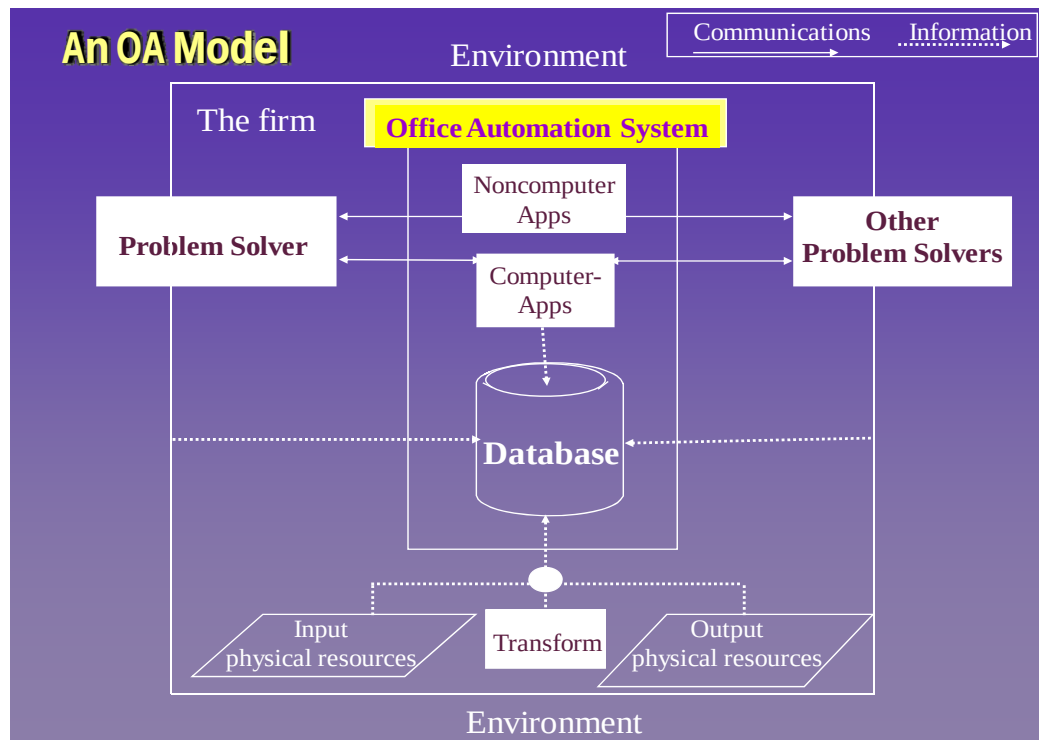


Fig. 4.6.3: An Office Automation Model

From the Fig. 4.6.3, it is well versed that Office Automation system takes into consideration the Computer applications and other problem solving tool along with a database to transform input into output.

Thus OAS is to use new technology to get a better working environment. So Office Automation is a widespread appearance that includes an all-embracing variety of applications of computer, communication and information technologies in office surroundings. Despite the actuality that automation is in dull circumstances of flux, the size of the market is enormous, with twelve-monthly investments calculated in billions of dollars. Mechanization has untouched not any more than our work environment, but our very impression of work.

4.6.3 Knowledge Management System (KMS)

The world is moving swiftly in the direction of a knowledge-based system as enterprises adapt more and more cost-cutting measure. There is a paradigm shift from an economy principally concerned by the management of tangible resources (equipment, machinery, buildings,) to an economy in which renovation and growth are determined by intangible resources and investments (knowledge, technology, competencies, abilities to innovate....). Information and Knowledge are the key elements of this economy. A firm's competitive gain depends on its knowledge processing i.e. what it knows; how it uses & how fast it can know something new. It's much more influential than the harmony of land, labour & capita (i.e. three most important production factors). Even though there is not a lucid and exclusive definition of the so-called knowledge-based or knowledge-driven economy, it seems to be unstated as the 'upshot of a set of structural changes':

Knowledge Management Systems (KMS) refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the KM process. KMS treats the knowledge component of any organization's activities as an explicit concern reflected in strategy, policy, and practice at all levels of the organization.

There are two broad types of knowledge—Explicit and Tacit as shown in the Fig. 4.6.4. KMS makes a direct connection between an organization's intellectual assets — both explicit [recorded] and tacit [personal know-how] — and positive results.

- ◆ **Explicit knowledge:** Explicit knowledge is that which can be formalized easily and as a consequence is easily available across the organization. Explicit knowledge is articulated, and represented as spoken words, written material and compiled data. This type of knowledge is codified, easy to document, transfer and reproduce. For example – Online tutorials, Policy and procedural manuals.
- ◆ **Tacit knowledge:** Tacit knowledge, on the other hand, resides in a few often-in just one person and hasn't been captured by the organization or made available to others. Tacit knowledge is unarticulated and represented as intuition, perspective, beliefs, and values that individuals form based on their experiences. It is personal, experimental and context-specific. It is difficult to document and communicate the tacit knowledge. For example – hand-on skills, special know-how, employee experiences.

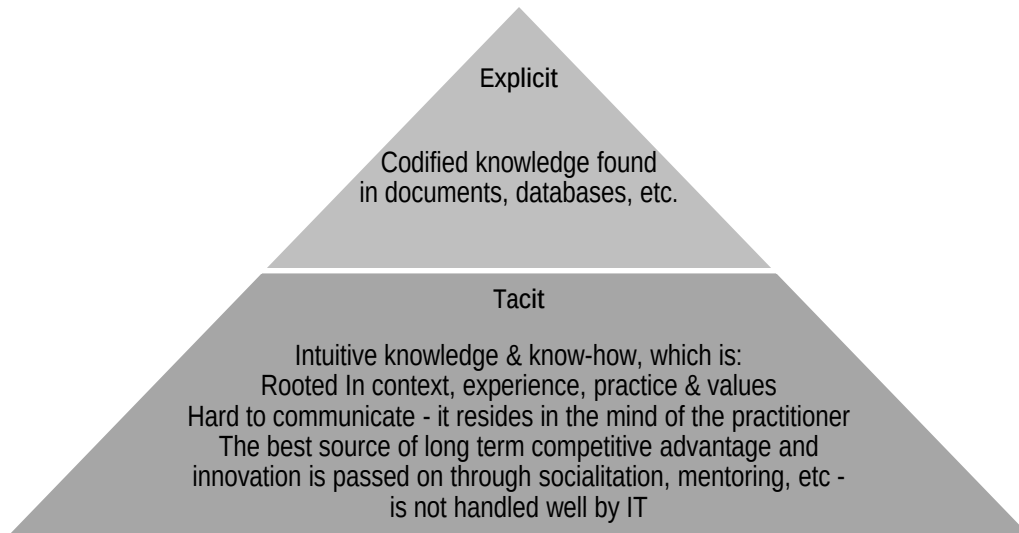


Fig. 4.6.4: Types of Knowledge

It is this tacit knowledge that differentiates between organizations when push comes to shove, and hence provides the strategic edge to any organization. A regular example in the software industry is how to write code to get around a particular limitation, or to include a particularly tricky condition.

Referring to the Fig. 4.6.5, a knowledge base is a special kind of database for knowledge management. It is an information repository that provides a means for information to be collected, organized, shared, searched and utilized. It can be either machine-readable or intended for human use.

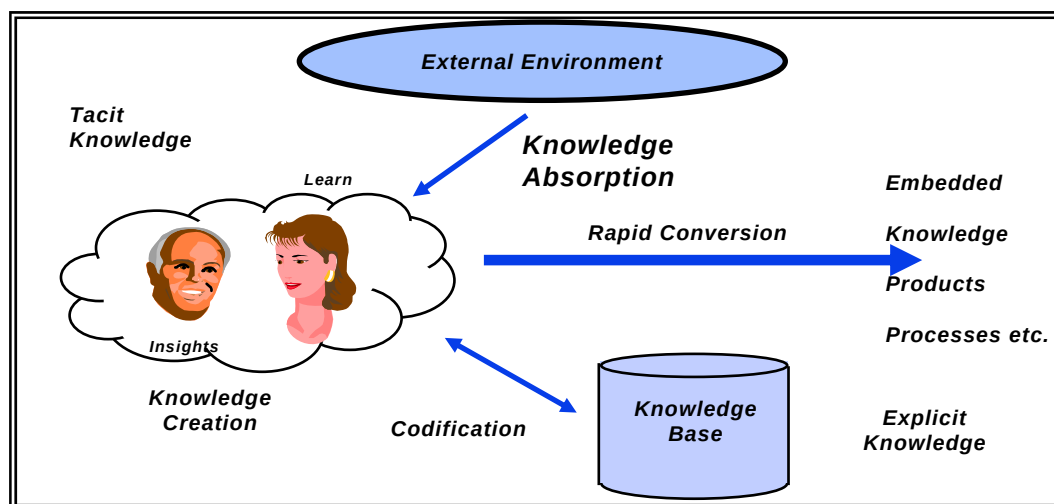


Fig. 4.6.5: Knowledge Environment

A Knowledge Discovery in Databases system is a value-added intranet, with facilities to search and identify captured knowledge, or identify experts who have the knowledge. The system will also help us establish contact with the expert and have a dialogue with them. It will then capture and make available the transcripts of such discussions, whether they be on chat, e-mail or discussion forums.

A. Link between Information and Knowledge

Information touches all human action – it is repeatedly said that we survive in the ‘Information Age’. Information is an important resource to an organization. It represents an organization’s tangible and intangible resources and all transactions relating to those resources. Information influences the way an organization operates. The right information, if it is delivered to the right person, in the right fashion, and at the right time, can improve and ensure organizational effectiveness and efficiency. The information system is the mechanism used to manage and control the information resource.

Knowledge is power. Knowledge is derived from information. Knowledge represents information with a potential use retained for reference in future decision situations. Information is necessarily subjective. Information must always be set in the context of its recipient. The same data may be interpreted differently by different people, depending on their existing knowledge. For example, ₹ 3450/- is data, my bank account has a balance of ₹ 3450/- is information and if my balance falls below ₹ 2500/- I shall have to pay minimum balance charge, is knowledge.

A close and firm link between information and knowledge has always existed.

- ◆ Information is piecemeal, fragmented, particular, whereas knowledge is structured, coherent, and often universal.
- ◆ Information is timely, transitory, perhaps even short-lived, whereas knowledge is of enduring significance.
- ◆ Information is a flow of messages, whereas knowledge is a stock, largely resulting from the flow, in the sense that the “input” of information may affect the stock of knowledge by adding to it, restructuring it, or changing it in any way.
- ◆ Information is acquired by being told, whereas knowledge can be acquired by thinking. Thus, new knowledge can be acquired without new information being received.

To sum up, data refers to the raw figures, information is essentially data in a context and knowledge is interpreted data/information which will also be very well presented with the help of following Fig. 4.6.6.

The Figure illustrates the relationships and dependencies between information and knowledge management. Knowledge Management encompasses both the content and the process of creating the content. It refers both to what is known and how it came to be known. In process terms, knowledge represents the human ability to recognize new patterns in content and to relate these to older patterns, in context.

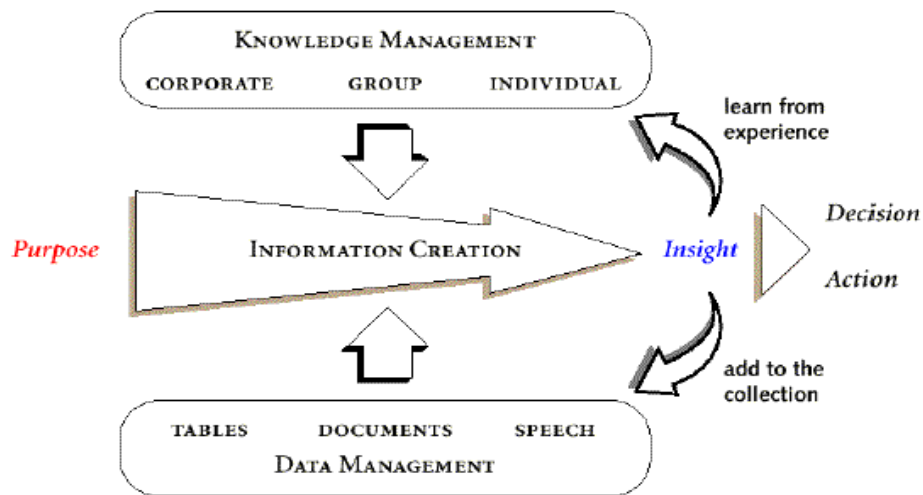


Fig. 4.6.6: Information Creation through Knowledge Management

B. Understanding the Importance of Knowledge Management

The new millennium is seeing the emergence of a knowledge society where the only differentiator between success and failure, for individuals, societies and corporations, is the knowledge they acquire and use. Before probing into the cryptic and still nebulous art and science of knowledge management, let us comprehend the term “knowledge” itself in an organizational context. The difference between the normal and the abnormal handling of any task, process or interaction-between employees, with the customers or with any other stake holder of the firm—has always been the explicit and tacit usage of knowledge by the person guiding the transactions. This knowledge has often been confused with information and sometimes with wisdom because of the somewhat blurred boundaries that exist between the three. It is important to understand that information is nothing but the outcome of the processing of large amounts of data that are created during the regular operations of any organization. This in the form of Management Information Systems to Decision Support Systems to Enterprise Resource Planning.

C. Why Knowledge?

Knowledge is a sum total of “What everybody knows” about the community world. It is a gathering of values, wisdom, education, experience, morals, and dissemination. Before we gamble into how to deal with knowledge, it's indispensable to have a comprehensible understanding of what we indicate by knowledge, so that we be on well-known terms with what it is that we're setting out to administer, and what falls outside the ambit of our Knowledge Discovery in Databases exercise.

Knowledge Discovery and Data Mining (KDD) fundamentally deals with ways and means of capturing and making obtainable knowledge of the experts to others, in electronic form. Knowledge Discovery in Databases systems also assist us establish, contact, and

communicate with experts (knowledgeable people) on various subjects, surrounded by our organization, or perhaps even outside. Knowledge worker (also referred to as an intellectual worker or brain worker) is a key intellect who is employed owing to his or her acquaintance of a subject matter, rather than their ability to perform manual labor. It includes those in the information technology fields, such as computer programmers, systems analysts, technical writers or the people outside of information technology but who are hired for their knowledge of a few subjects, such as lawyers, teachers, and scientists.”

There are confident factors that show “why knowledge has gained so much momentum in recent times”. These are as discussed:

- ◆ **Altering Business surroundings:** Previously the business environment used to be stable one, so the people of any organization naturally became knowledgeable over time. They absorbed and hang out knowledge about company's product & service, its market, customers, competitors and suppliers. But now rapid change means speedy knowledge obsolescence, so need is there to manage it before it disappears without leaving a trace.
- ◆ **Burgeon Connections:** Extremely dispersed operations, global expansion, continual change –none of these would have been possible if it was not possible to deploy knowledge officially and deliberately .Cheap computing has made it probable. IT is now translucent to the user and is more accomplished of capturing knowledge. The authentic, interactive networks can put knowledgeable people in stroke through communication & technologies.
- ◆ **Globalization:** It's putting heaviness on firms for innovation as markets are at the present release for new-fangled players and competition is stiff. The scenery of goods and services has changed. Now companies have started selling knowledge in addition. For a research lab or software firm, not managing knowledge is similar to Wal Mart not managing inventory.
- ◆ **Modification in Organizational composition:** In today's state of affairs, the organizational structures are changing. The new arrangement is that of “Virtual Organization”. This composition is used to integrate far flung operations & Knowledge Discovery in Databases is required.

D. Difference between Information and Knowledge

Information is “know what” despite the fact that knowledge is “know-how.” Information is “what is” at the same time as knowledge is “what works.” Information that helps achieve an action well again is knowledge. To a doctor, most of the contents of a distinctive daily newspaper is basically information – interesting but not helpful for effectual action as a doctor; nevertheless, an piece of writing from a medical periodical in her field of speciality that improves her capability to make a diagnosis or become aware of a recently exposed disease is knowledge. If a knowledge worker answers “yes” to the question, “does this facilitate me do my occupation better?” then it is knowledge.

Thus the knowledge based information technology is that enabler which turns the knowledge into a valuable industrial community. Around these factors the Information age economy is growing, for which the fundamental source of wealth are knowledge and communication rather than natural resources and physical labour.

4.6.4 Management Information System (MIS)

Management Information System is an old management tool, which has been long used by people for superior management and scientific decision making. Management Information System is primarily dependent upon information, which is a vital ingredient of any Management Information System. Information is the most critical resource of Management Information System. We all know that information is a vital factor for our existence. Just as our body needs air, water and clothes, we are as much dependent upon information.

Before going into the details of what is Management Information System, we all ought to know the meaning of three different terms which form Management Information System as discussed through Fig. 4.6.7.

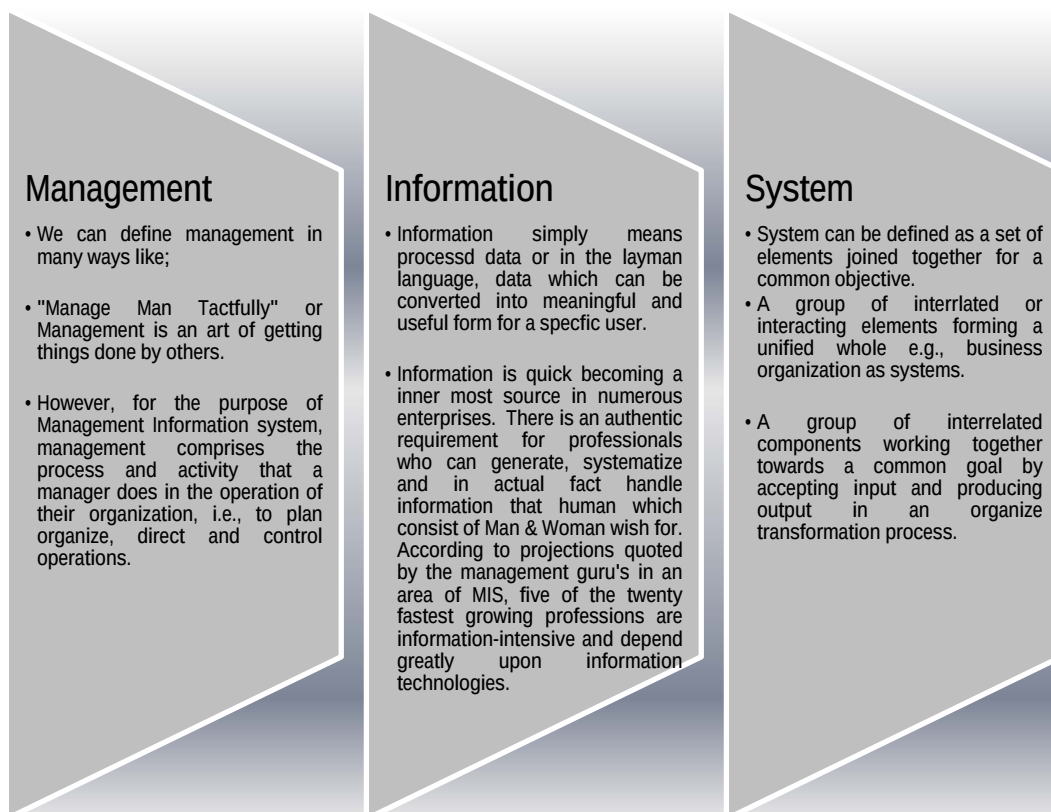


Fig. 4.6.7: Exploratory Thought on MIS

Definitions of MIS

The term 'Management Information System' (MIS) refers to the data, equipment and computer programs that are used to develop information for managerial use.

Like most complex systems, a MIS may be described in a number of different ways:-

- ◆ Management Information System is an integrated, user-machine system for providing information to support operation, management and decision-making functions in an organization.
- ◆ A Management Information System aims at meeting the information needs of managers, particularly with regard to the current and past operations of the enterprise.
- ◆ In the very simple words, MIS is the management of information systems.
- ◆ Management Information System is a system which provides accurate, timely and meaningful data for management planning, analysis and control to optimize the growth of the organization.
- ◆ Management Information System is also defined as a system that aids management in making, carrying out and controlling decisions" Here management information system is a system that aids management in performing its job.

A. MIS is an Integrated Application

MIS is an integrated information system that serves all departments within an enterprise. Evolving out of the manufacturing industry, MIS implies the use of packaged software rather than proprietary software in black and white by or for one customer. As the internet has developed, all of the foremost MIS solutions have now been written to be accessed via web browsers. While developing an integrated MIS system one should follow certain steps as shown in the Fig. 4.6.8.

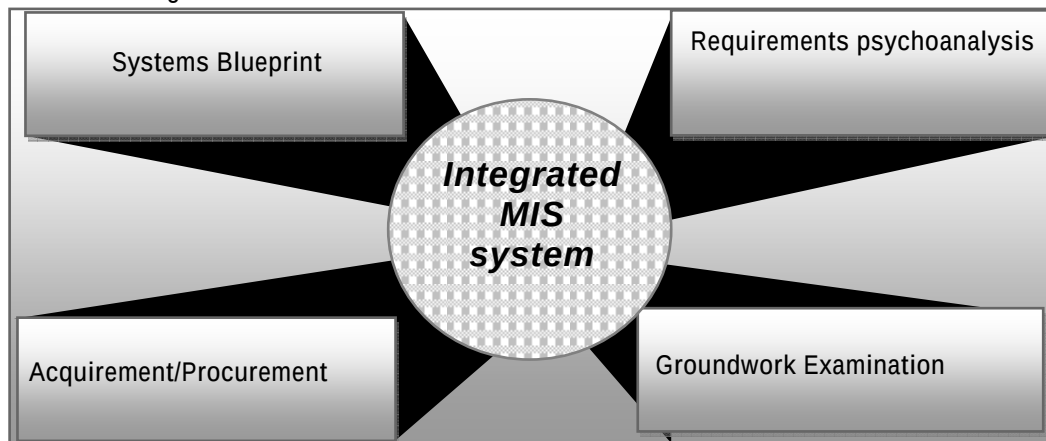


Fig. 4.6.8: Integrated MIS System

Groundwork examination ⇒ The problem ⇒ Magnitude and scope ⇒ Alternatives ⇒ Viability and cost effectiveness	Requirements psychoanalysis ⇒ Knowing the primary and secondary users ⇒ Ascertaining user needs ⇒ Primary and secondary sources of information ⇒ Design, development and implementation needs
Systems blueprint ⇒ Inputs ⇒ Processing ⇒ Outputs ⇒ Storage ⇒ Procedures ⇒ Human resources	Acquirement /procurement ⇒ Compatibility ⇒ Cost effectiveness ⇒ Performance standards ⇒ After sales service ⇒ Configuration ⇒ Portability

B. Developing MIS – Dos And Don'ts

Once we are in the process of developing MIS or rather makeup our mind to implement MIS, the best way is to accomplish some homework which can facilitate in finding out what is right and what is wrong. Refer Table 4.6.2.

Table 4.6.2: Developing MIS – Dos and Don'ts

S No.	Particular	Do's	Don't
1	Layman	Have simpler and manageable system	Be ambitious
2	Bridging	Develop common understanding between consultant and the organization	Be unrealistic in developing action plan
3	Contribution in Totality	Involve programmer in needs assessment	Delay decisions on hiring application developer/s
4	Tailor-made	Customize off-the-shelf software	Depend heavily on the Consultant
5	Interpretation	Have simple software for users to handle	Invest heavily in in-house application development
6	Synchronization	Extensively involve users in MIS development	Let vendors determine hardware needs for LAN
7	Application	Adopt modular approach for s/w development	Go for large applications

C. Some Examples of MIS

- ◆ Airline reservations (seat, booking, payment, schedules, boarding list, special needs, etc.)
- ◆ Bank operations (deposit, transfer, withdrawal) electronically with a distinguish payment gateways
- ◆ Integration of department with the help of contemporary software's like ERP
- ◆ Logistics management application to streamline the transportation system
- ◆ Train reservation with the help of IRCTC

So Management information systems provide decision-makers with preselected types of information. MIS is generally in the form of computer-generated reports and usually generated from data obtained from transaction processing systems.

4.6.5 Decision Support Systems (DSS)

DSS were introduced in the 1970s and expanded mainstream attention in the 1980s. In the beginning run principally on mainframes, they were witness as an evolutionary step from management information systems, which at the time were reasonably rigid storehouses of corporate data. In that environment, DSS were high-end applications reserved for occasional, non-recurring strategic decisions by senior management. The speedy advances in personal computers ushered in a new variety of straightforward and comprehensively used DSS. Positively, some experts think about the built-in.

A. Meaning and Definition

Decision Support Systems (DSS) are a contradictory compilation of interactive computer tools—first and foremost customizable software—designed to lend a hand in decision-making. They thrust into a broader class acknowledged as Management Support Systems (MSSs). The concept of a Decision Support System (DSS) is extremely broad and its definition varies depending on the author's point of view. Some of the definitions of DSS from various sources that provide a much elaborative view of it are as follows:

- ◆ A Decision Support System (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization (usually mid and higher management) and help to make decisions, which may be rapidly changing and not easily specified in advance. DSS can be either fully computerized, human or a combination of both.
- ◆ A properly designed DSS may be defined as an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.
- ◆ DSS can be extremely beneficial to any organization's overall performance. However, DSS can also be the cause of great confusion, misperception and even inaccurate

analysis – these systems are not designed to eliminate “bad” decisions. DSS are there to facilitate a manager in making operational decisions, but the ultimate burden of responsibility lies with the manager. Managers can sometimes be over-optimistic in their expectations of a DSS and develop a unrealistic reliance on the system.

- ◆ Decision support system (DSS) covers a wide variety of systems, tools and technologies. Some people think the term DSS is dated and that it has been replaced by a “new type” of system called on-line analytical processing or OLAP. Others seem to emphasize creating knowledge-based DSS as the “state-of-the-art” in decision support systems. Operations researchers primarily focus on optimization and simulation models as the “real” DSS .

DSS has four basic components:

- (a) **The user:** The user is usually a manager with an unstructured or semi-structured problem to solve and may be at management - level of an organization.
- (b) **One or more databases:** Databases contain both routine and non-routine data from both internal and external sources.
- (c) **Planning languages:** Planning languages can either be general-purpose or special-purpose allowing users to perform routine tasks and specific tasks respectively.
- (d) **Model Base:** Model base is the brain of the DSS as it performs data manipulations and computations with the data provided to it by the user and the database. The planning language in DSS allows the user to maintain a dialogue with the model base.

The ambition of a DSS is to construct management more resourceful and victorious, mainly with extemporized and flexible decisions (versus regular or programmatic ones that entail little judgment). Interactivity is key; unlike related expert systems and numerous artificial intelligence tools, DSS usually do not endeavour to make the decision themselves, but to a certain extent present information in a mode that is favourable to making an informed and well-organized decision.

From the Fig. 4.6.9, Decision Support Systems are not entirely different from other systems and require a structured approach. Such a framework includes people, technology, and the development approach. The early Framework of Decision Support System consists of four phases:

◆ Intelligence - Searching for conditions that call for decision.
◆ Design - Inventing, developing and analyzing possible alternative actions of the solution.
◆ Choice - Selecting a course of action among those.
◆ Implementation - Adopting the selected course of action in decision situations.

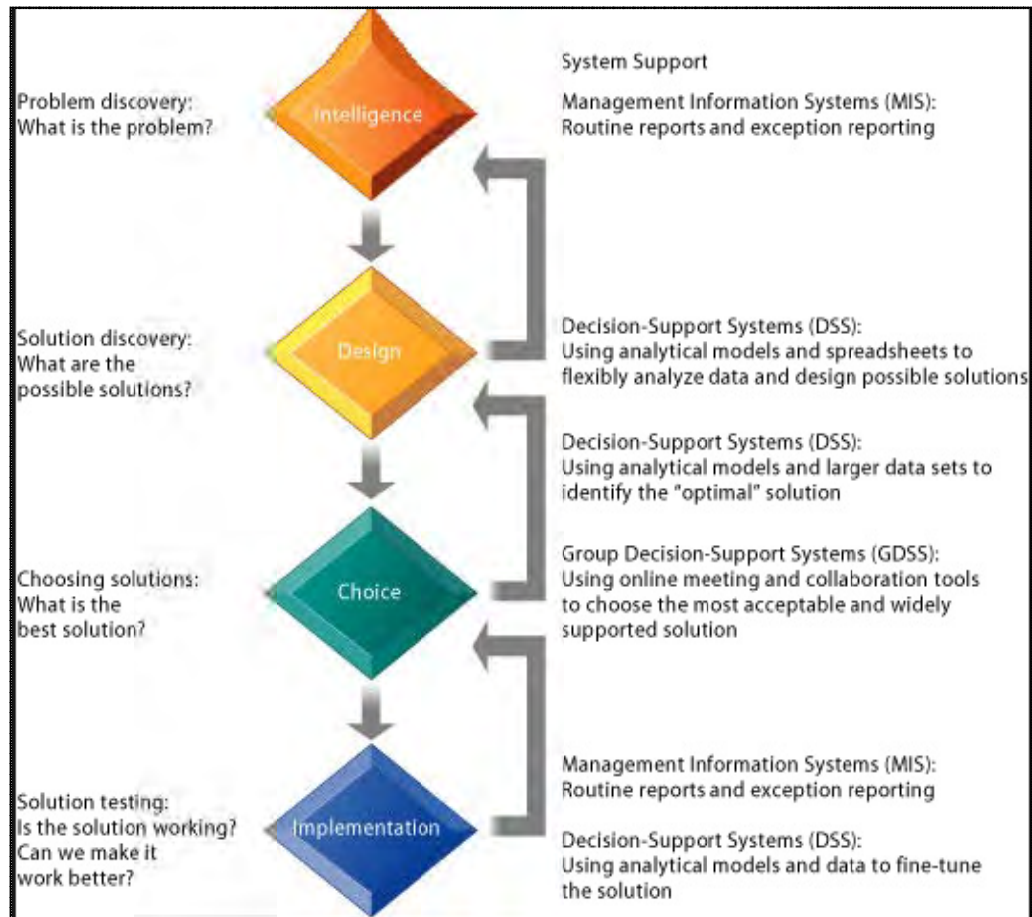


Fig. 4.6.9: DSS structured approach

In the real world, the stages of decision making described here do not necessarily follow a linear path. One can be in the process of implementing a decision, only to discover that his/her solution is not working. In such cases, one will be forced to repeat the design, choice, or perhaps even the intelligence stage. For instance, in the face of declining sales, a sales management team may strongly support a new sales incentive system to spur the sales force on to greater effort. If paying the sales force a higher commission for making more sales does not produce sales increases, managers would need to investigate whether the problem stems from poor product design, inadequate customer support, or a host of other causes, none of which would be "solved" by a new incentive system.

Thus a DSS helps users to:

- ◆ engender data models and "what if" scenarios
- ◆ manipulate data directly

- ◆ premeditated to make non-routine decisions
- ◆ slot in data from external sources

4.6.6 Executive Information Systems (EIS)

An Executive Information System (EIS) is the nature of IS used by executives to access and administer the data they entail to make informed business decisions. Even though there are tools for managing an executive information system, the EIS in itself is not an instrument, but rather, an infrastructure within a company. In the hierarchical structure of information systems, the EIS is at the pinnacle and is designed to renovate all significant data (from project to process to budget) into aggregated information that makes sense and brings value to the by and large business strategy.

As per the Business Dictionary "EIS is not a piece of hardware or software, but an infrastructure that supplies to a firm's executives the up-to-the-minute operational data, gathered and sifted from various databases. The typical information mix presented to the executive may include financial information, work in process, inventory figures, sales figures, market trends, industry statistics, and market price of the firm's shares. It may even suggest what needs to be done, but differs from a Decision Support System (DSS) in that it is targeted at executives and not managers."

Alternative names of EIS are Enterprise Information Systems or Executive Support Systems (ESS).

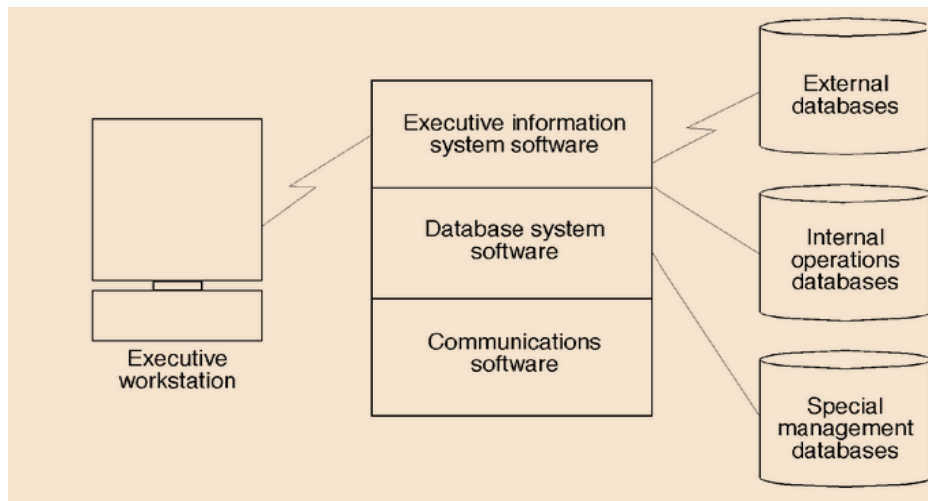


Fig. 4.6.10: Components of Executive Information System

It is clear from the Fig. 4.6.10 that EIS and special software is one of the important components of Executive workstation and facilitates external databases, internal operations databases management database.

EIS is able to link data from various sources both internal and external to provide the amount and kind of information executives find useful. These systems are designed for top management; Easy to use; present Information in condensed view; Access organization's databases and data external to the organization.

The components of an EIS can typically be classified as shown in the Table 4.6.3:

Table 4.6.3: Components of an EIS

Component	Description
Hardware	Includes Input data-entry devices, CPU, Data Storage files and Output Devices.
Software	Includes Text base software, Database, and Graphic types such as time series charts, scatter diagrams, maps, motion graphics, sequence charts, and comparison-oriented graphs (i.e., bar charts) Model base.
User Interface	Includes hardware (physical) and software (logical) components by which people (users) interact with a machine. Several types of interfaces can be available to the EIS structure, such as scheduled reports, questions/answers, menu driven, command language, natural language, and input/output.
Telecommunication	Involves transmitting data from one place to another in a reliable networked system.

Thus Executive Information Systems (EIS) are high-risk/high-return systems; principally because the clientele these systems serve are not merely important in the unyielding, but encompass information needs that are extremely easier said than done to provide through computer-based information systems. As a consequence, it is significant to appreciate the explanation to victorious EIS development and constant operation.

4.7 Specialised Systems

Specialized Systems provide comprehensive end to end IT solutions and services (including systems integration, implementation, engineering services, software application customization and maintenance) to various corporations in India and other part of a world. Specialized Systems also offer comprehensive solutions to various sectors to confront challenges, and convert every challenge into an opportunity. There are various specialized systems which can be used in a following way:

4.7.1 Enterprise Resource Planning (ERP)

The perception of an integrated information system starts on the factory floor. Manufacturing software developed during the 1960s and 1970s, evolved from trouble-free inventory tracking systems to materials' requirements planning software. Companies realized that the

management and flow of information were just as important as materials and inventory management. It is defined by some renowned researchers that ERP system is rooted in Materials Requirement Planning (MRP-I) and Manufacturing Resource Planning (MRP-II) System.

Enterprise Resource Planning (ERP) systems integrate internal and external management information across an entire organization—taking on finance/accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. The rationale of ERP is to make easy the flow of information between all business functions in the interior boundaries of the organization and control the connections to exterior stakeholders.

ERP has also evolved considerably with computer and technological advances. Enterprise Resource Planning popularly known as 'ERP' is a description of systems that employ innovative information technology to manage all sorts of areas in companies. Major corporations, in particular, could hardly function without tailor-made ERP software.

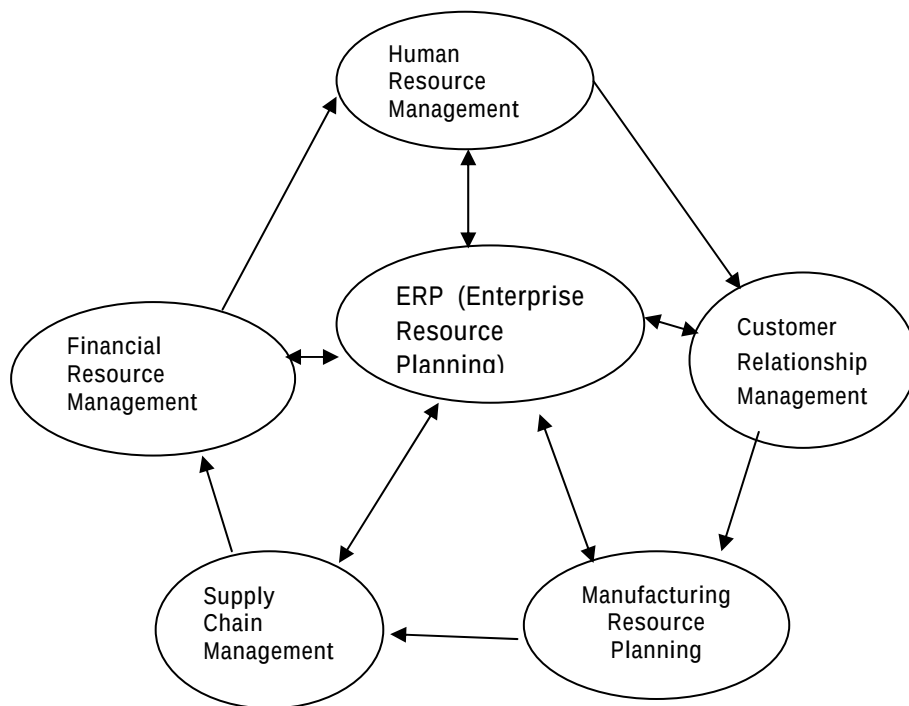


Fig. 4.7.1: ERP linkages with various Modules

Thus the above Fig. 4.7.1 shows how the various systems which we would explain in a forthcoming heads are linked with one another and facilitate each other as and when required.

Thus successful management of emerging technologies has been most noteworthy in supporting the new and emerging management philosophies, where the emphasis is on allocation of information, facilitated by simpler and easier data access. ERP software facilitates competent and efficient administration, and mechanized business activities. It is a complete software solution package for enhancing the performance in large organizations and meeting their requirements with ease and efficacy.

There are diverse stages to ERP, which are explained in Fig. 4.7.2.



Fig. 4.7.2: Diverse Stages of ERP

Brief overview of the each of the above stages is provided here in the Table 4.7.1 for understanding the diverse stages of implementing an ERP solution in an enterprise.

Table 4.7.1: ERP Stages

Stage -1 Inventory Control	It is the supervision of supply, storage and accessibility of items in order to make certain a sufficient supply without excessive oversupply. It can also be referred as internal control - an accounting procedure or system designed to encourage competence or give surety the implementation of a strategy or maintain assets or avoids fraud and error etc.
Stage – 2 ABC Analysis	ABC analysis is that technique of material control in which we divide our material into three categories and investment is done according to the value and nature of that category's materials. After this, we control of material according to their level of investment. We need not to control all the categories but we have to control those materials which are in a category. The ABC approach states that, when reviewing inventory, a company should rate items from A to C, basing its ratings on the following rules: • A-items are goods which annual consumption value is the highest. The top 70-80% of the annual consumption value of the company typically accounts for only 10-20% of total inventory items. • C-items are, on the contrary, items with the lowest consumption value. The lower 5% of the annual consumption value typically accounts for 50% of total inventory items. • B-items are the interclass items, with a medium consumption value. That 15-25% of annual consumption value typically accounts for 30% of total inventory items. Thus it is very well said "The Pareto principle states that 80% of the overall consumption value is based on only 20% of total items." In other words, demand is not evenly distributed between items: top sellers vastly outperform the rest.
Stage – 3 Economic order Quantity (EoQ)	EoQ is used as part of a uninterrupted review inventory system in which the level of inventory is scrutinize at all times and a fixed magnitude is ordered each time the inventory level reaches a particular reorder point. The EOQ provides a model for calculating the suitable reorder point and the optimal reorder quantity to make sure the immediate replenishment of inventory with no shortages. It can be an important tool for small business owners who need to make decisions about how much inventory to keep on hand, how many items to order each time, and how often to reorder to incur the lowest possible costs.
Stage – 4	JIT is a philosophy of continuous improvement in which non-value-

Just-In-Time (JIT)	adding activities (or wastes) are identified and removed for the purposes of:		
	• Reducing Cost	• Improving Quality	• Improving Performance
	• Improving Delivery	• Adding Flexibility	• Increase innovativeness
	When the JIT principles are implemented successfully, significant competitive advantages are realized. JIT principles can be applied to all parts of an organization: order taking, purchasing, operations, distribution, sales, accounting, design, etc.		
Stage – 5 Material Requirement Planning (MRP – I)	MRP which was nothing but a historical background of ERP, the motive was only to tap inventory i.e. raw materials planning etc. Material requirements planning (MRP) is a production planning and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, while it is possible to conduct MRP by hand as well. An MRP system is intended to simultaneously meet three objectives: • Ensure materials are available for production and products are available for delivery to customers. • Maintain the lowest possible material and product levels in store Plan manufacturing activities, delivery schedules and purchasing activities.		
Stage-6 Manufacturing Resource Planning - II (MRP – II)	It is defined as a method for the valuable planning of all resources of a manufacturing company, preferably, it addresses operational planning in units, financial planning, and has a simulation ability to respond "what-if" questions and extension of closed-loop MRP which looks after production related activities. The concept of MRP II evolved was to look after shop floor and distribution management activities.		
Stage – 7 Distribution Resource Planning (DRP)	DRP is a method used in business administration for planning orders within a supply chain. DRP enables the user to set certain inventory control parameters (like a safety stock) and calculate the time-phased inventory requirements. This process is also commonly referred to as distribution requirements planning. The objectives of Distribution Resource Planning (DRP) in the SAP R/3 System are: • To improve customer service levels by anticipating customer demand at distribution centres and providing finished products at the correct location when customer needs arise. • To provide an accurate requirements plan for manufacturing. To optimize the distribution of available stock in the distribution network using the deployment function.		

Stage – 8 Enterprise Resource Planning	This has a broader role and is not confined to one department but has an elaborate purview. ERP takes a customer order and provides a software road map for automating the dissimilar stages along the path to fulfilling it.
Stage – 9 Money Resource Planning (MRP-III) or ERP-II	This has more emphasis on planning of capital or managing the situation when surplus money arises. MRP-III is said to have been stretch, including the management of the enterprise administrator the Sales and Marketing (Sales & Marketing), Logistics (Logistics), that have the aptitude to look with Financial Accounting (Financial Accounting).
Stage - 10 EIS-Web Enabled	Web-based technologies are causing a revisit to existing IT implementation models, including EIS. Web browser software is the cheapest and simplest client software for an EIS. Web enabled EIS is a final step in this direction.

For example, an ERP allows a company to track sales orders from the order desk, to production planning, purchasing, production, warehousing, shipping and accounts receivable (referred to as "Order to Payment" process). An ERP will also prevent duplication of an order between departments, for example, purchasing and production.

Many manufacturing organizations, mainly those in the private sector, have messaging and groupware in place for intra-organizational communication. Network-centric applications continue to be developed. Some examples are given below.

One elementary factor in optimizing a company's important core business processes is the fast and precise retrieval, integration and collection of information. ERP is a system that uses modern information technology to manage the functions of various company divisions and to create transparency in the process. Through the use of ERP - and, as a result, a single data model for all company-relevant information - significant amounts of internal integration can be achieved. There are various vendors who had given a new shape to ERP business and provide it a great height. SAP, Oracle and Microsoft are few of them. Some of the "popular" ERP packages are SAP, JD Edwards, Baan, Oracle 9 i.

4.7.2 Customer Relationship Management (CRM)

Customer Relationship Management (CRM) emerged in the information technology community in mid-1990s. The Management Guru's had quoted in their thought provoking statements that "Customer is the sovereign and decisive in a modern day businesses". Acquiring new clients is far more costly than retaining the old profitable customers. This is the common believe with which firms operate in today's global and competitive fierce battlefield of so called marketing. The main objective is to retain as much loyal customers as one can and this has led to the emergence of Customer Relationship Management.

Organizations now have to comprehend the value of CRM i.e., the parameter of identifying, magnetizing and preserving the most valuable customers to prolong profitable growth in a regulated environment, where the endeavours were universal access and the propensity to dish up all customers equally well. “The Customer Is Always Right -So Always Be Right about Your Customers”. Creating cost-effective approach is an ultimate goal of CRM customers who will prolong to pay money even then when there is a competitive alternative exists. To get that faithfulness and trustworthiness, there is a tremendous need of CRM at every juncture of the organization or rather at every customer touch point.

A. CRM may be defined as a business process in which client relationships; customer loyalty and brand value are built through marketing strategies and activities. CRM allows businesses to develop long-term relationships with established and new customers while helping modernize corporate performance. CRM incorporates commercial and client-specific strategies via employee training, marketing planning, relationship building and advertising.

As we know that competition for market share is fierce due to globalization, accessibility of products through the internet and electronic selling too add to the increasing demands of customers. This increased competition is driving organizations to implement CRM as a business strategy to lend a hand to the business challenges like, declining revenue, cut-off in the profit margin, costs occurred due to lost customers etc. If we go into a depth of using CRM there is a bifurcation of using CRM application.

To accomplish with CRM, companies need to match products and campaigns to prospects elegantly the customer life cycle. CRM encompasses the function and responsibilities of those employees who directly work with customers.

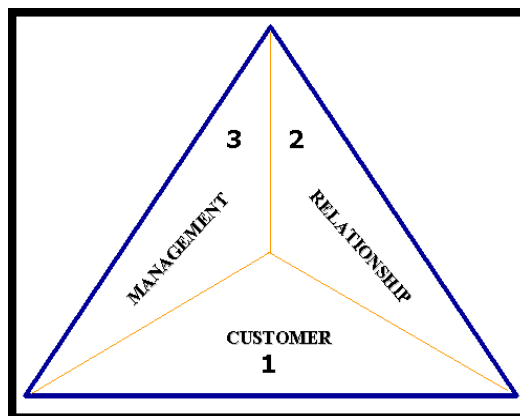


Fig. 4.7.3: CRM Interpretation

By seeing the Fig. 4.7.3, these three words have been interpreted as:

- ⇒ Customer is a 'Human Being',
- ⇒ Relationship is the 'Feeling' and
- ⇒ Management is 'Management Tact' respectively.

So CRM is a combined activity of these three aspects, which perform well only when it will be used in totality.

Table 4.7.2: CRM Mechanisms

Customer: The customer is the source of the company's profit and future growth. Sometimes it is intricate to find out who is the real customer because the buying decision is a collaborative activity among participants of the decision-making process. CRM provides the abilities to distinguish and manage the customers.

Relationship: The relationship between a company and its customers involves continuous bi-directional communication and interaction. CRM involves managing this relationship so it is mutually beneficial. Managing the key customers' relationships competently is a critical factor to the success of the company. The relationship can be short-term/long-term, continuous/discrete, attitudinal/behavioural etc.

Management: CRM is not only an activity of marketing department; rather it involves continuous corporate change in the culture and process. The customer information collected and analyzed continuously is transformed into corporate knowledge that leads to activities that take advantage of the information and of market opportunities. CRM software enables us to make a required comprehensive change in the organization and its people.

A. Some Common Definitions of CRM

I. Analytical CRM Definition

Table 4.7.3: Analytical CRM Definition

CRM Equation:	Customer Relationship Management = Customer Understanding + Relationship Management
Customer Understanding:	Analysis of customer data to gain deep understanding down to the level of individual customer
Relationship Management:	Interaction with the customer through various channels for various purposes
Analytical CRM:	Use customer understanding to perform effective relationship management

II. Greenberg's definition of CRM

This states that CRM must establish with a business strategy, which drives transformation in the business, and influences work processes. These processes are enabled by information technology (IT) and are illustrated with the help of CRM Pyramid. Refer Fig. 4.7.4.



Fig. 4.7.4: Process of CRM

B. Benefits of CRM

CRM establishes the benefits of generating customer loyalty, raising a market intelligence enterprise, and an integrated relationship. Preserving existing customers and providing enhanced services to accomplish the loyalty is expressed as CRM. The underlying standard that business exists is their customers. Developing connection and affiliation with customer and supervising it professionally and effectively so that it is advantageous to both the customer and the business is a noteworthy objective. This unit will talk about how the effectual deployment of CRM as a software and how it will facilitate an organization in a big way.

CRM applications smoothen the progress to capture, consolidate, analysis, and enterprise-wide dissemination of data from existing and potential customers. CRM can be considered as an amalgamation of people, process and systems rather than just IT application.

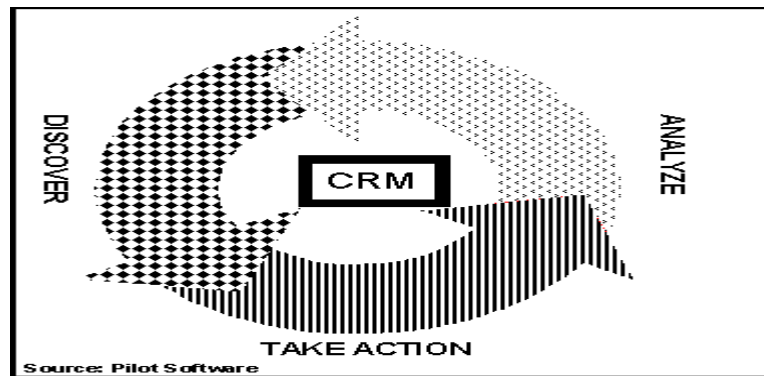


Fig. 4.7.5: Three ways to CRM

Where (Refer Fig. 4.7.5)

- ⇒ Take Action: Talks about Policies & Procedures, Marketing policies, Support procedures
- ⇒ Analyze: Talks about Customer base Profitability Buying pattern Support pattern Productivity
- ⇒ Discover: Talks about the trends in market selling opportunities for expansion

C. Why CRM?

The business now-a-days suffer with a dilemma of customer's disconcert, and contemporary marketing efforts from the closing business rivals, which accomplish in attracting new customers. The up-to-date businesses have learned the inflexible mode that it is well-organized to maintain hold of customers than to merely attract new customers. Additionally, loyalty is desired first and foremost in a precise category of the client base. If we go into the depth of the research and studies that shows another expression of the old Pareto Rule "80/20 rule" which emphasize that most organizations find that approximately 20% of their customer base generates 80% of the profits. It is merely based on the philosophy that indicates that old trustworthy customers are most lucrative and helps in generating profits. It is at the present imperative that businesses make out the noteworthy characteristics of this assemblage, keep hold of these exceedingly desirable customers, and discover ways to augment the size.

The thought behind CRM is to have a single integrated enterprise view of the customer for the rationale of cultivating these high-quality relationships that lead to enhanced loyalty and profits. This means being proficient to recognize all the services/products the customer had fetched from the organization and thus being able to recognize the buying behaviour/pattern of the customer. This would result in the company being able to give to the customer the identical kind of approved experience where customer had been delighted with the service/product. The distinguishing feature of contemporary CRM is the prominence on an enterprise view of the customer, not simply a departmental sight.

4.7.3 Supply Chain Management (SCM)

If we go to a BIGBAZAAR or visit a nearby retail store which is in our vicinity and pick up a few items of the shelf from electronics and white goods or even clothes or gadgets and look at the labels, chances are that we will come across them having been manufactured in China or Mexico. The coffee pods we buy to use for our day-to-day use comes from Africa. Computers have been shipped out of South American Factories and Soft furnishings on the shelves are from India and Hong Kong.

Supply Chain Management (SCM) is based on two central ideas. The first is that practically every product that reaches an end user represents the cumulative effort of multiple organizations. These organizations are referred to collectively as the Supply Chain. The second thought is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their "four walls." Few businesses understood, much less managed, the entire chain of activities that ultimately delivered products to the final customer.

In simple terms, SCM is a chain that starts with customers and ends with customers. Supply Chain Management may be defined as the process of planning, implementing and controlling the operations of the supply chain with the purpose of satisfying the customer's requirement as efficiently as possible. Supply Chain spans all movement and storage of raw materials,

Work-in-process, inventory and finished goods from the point of origin to the point of consumption. Refer to Fig. 4.7.6.



Fig. 4.7.6: Supply Chain Linkages

A. Components of SCM

Referring to the Fig. 4.7.7, the main elements of a supply chain include.

- (a) **Procurement/Purchasing**—begins with the purchasing of parts, components, or services. Procurement must ensure that the right items are delivered in the exact quantities at the correct location on the specified time schedule at minimal cost. This means that procurement must concern itself with the determination of who should supply the parts, the components, or the services. It must address the question of assurance that these suppliers will deliver as promised. The key issue in procurement is how one goes about selecting and maintaining a supplier, which can be approached from two directions. The first concentrates on how a firm might evaluate a potential supplier whereas the second is how a firm evaluates those businesses that are already suppliers to an operation.
- (b) **Operations** - The second major element of supply chain management system is operations. Having received raw materials, parts, components, assemblies, or services from suppliers, the firm must transform them and produce the products or the services that meet the needs of its consumers. It must conduct this transformation in an efficient and effective manner for the benefit of the supply chain management system.



Fig. 4.7.7: Core Elements of a Supply Chain Management

- (c) **Distribution** - The third element of the supply chain management system is distribution. Distribution involves several activities—transportation (logistics), warehousing, and customer relationship management (CRM). The first and most obvious is logistics—the transportation of goods across the entire supply chain.
- (d) **Integration** - The last element of supply chain management is the need for integration. It is critical that all participants in the service chain recognize the entirety of the service chain. The impact of the failure to adopt a system-wide perspective—that is, examining the totality of the chain can significantly increase costs and destroy value.

Relationship between ERP, CRM and SCM

CRM and SCM are two categories of enterprise software that are widely implemented in corporations and non-profit organizations. While the primary goal of ERP is to improve and streamline internal business processes, CRM attempts to enhance the relationship with customers and SCM aims to facilitate the collaboration between the organization, its suppliers, the manufacturers, the distributors and the partners.

SCM software chugs along, ensuring that materials and information flow through the supply chain with the highest possible efficiency and the lowest possible cost. Meanwhile, CRM software focuses on the identification, targeting, acquisition and retention of customers, and on the building of strong relationships between the business and its customers as shown in the Fig. 4.7.8.

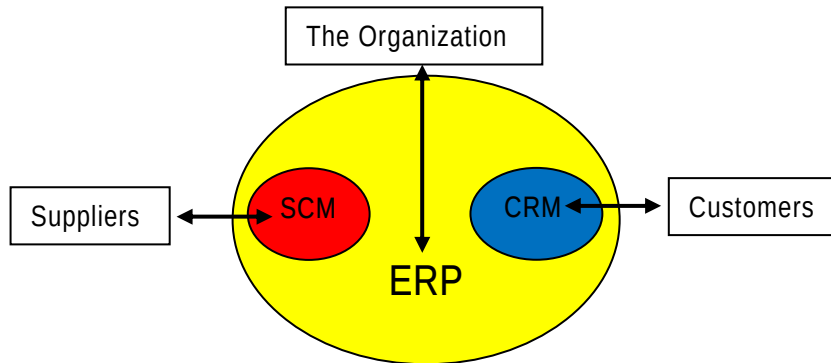


Fig. 4.7.8: Relationship between ERP, CRM and SCM

Thus, the two tools tend to sit at opposite ends of the enterprise and deal with different sets of data albeit with the same end goal.

4.7.4 Human Resource Management Systems (HRMS)

People are the most valuable asset of an enterprise and substantial time and endeavour has to be spent in managing the human resources. From recruitment and talent acquisition to talent retention and expansion, one invests energies in carefully planning and executing a variety of functions to generate well-organized personnel.



Fig. 4.7.9: HRMS endeavour in managing the human resources

A Human Resources Management System (HRMS) is a software application that coalesce many human resources functions, together with benefits administration, payroll, recruiting and training, and performance analysis and assessment into one parcel.

Key Integration Points:

HRMS uniquely provides indigenous integrations from HR Management to other core talent management processes in order to support a holistic, end-to-end cloud talent management strategy.

- ◆ **Compensation Management:** It is very well that “Historical compensation data can be used to guide future compensation and reward decisions”. It can be said that compensation is the “glue” that binds the employee and the employer together and in the organized sector, this is further codified in the form of a contract or a mutually binding legal document that spells out exactly how much should be paid to the employee and the components of the compensation package.
- ◆ **Recruiting & Hiring:** New hire information, including resume/CV data, can be automatically populated into the employee system-of-record. Refer to the Fig. 4.7.10.

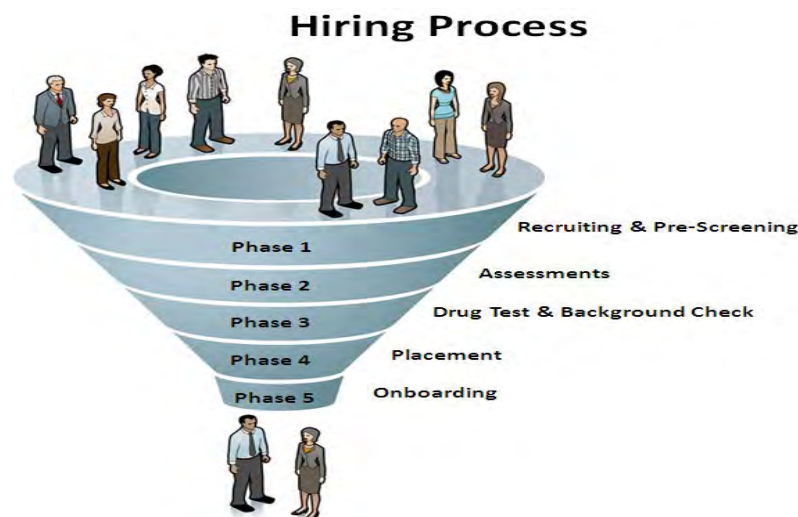


Fig. 4.7.10: Hiring Process

- ◆ **Succession Planning:** Historical information regarding past positions and career progression can be used to guide future succession decisions.
- ◆ **Workforce Management:** Integrated across the strategic Human Capital Management (HCM) solution, Workforce Management provides powerful tools to effectively manage labour rules, ensure compliance, and control labour costs and expenses.
- ◆ **Payroll & Benefits:** As an integrated service into the strategic cloud HCM solution, Payroll and Benefits Management provides efficient, flexible and easy-to-use service well suited for complex environments

Human Resource Management Systems (HRMS) or Human Resource Information systems (HRIS) or HR Technology shape an intersection between Human Resource Management (HRM) and Information Technology. It merges HRM as a discipline and in particular it's basic HR activities and processes with information technology.

There are certain benefits

- ◆ Bringing industry best practices to the HR functions
- ◆ HRMS lets you assess and utilize the human resource potential completely.
- ◆ The solution increases the operational efficiency and productivity of the HR department;
- ◆ Reduces HR administrative costs
- ◆ Increases employee engagement and satisfaction
- ◆ Ensures seamless flow of information between employees, supervisors, managers and administrators;
- ◆ Improves leadership development and succession;
- ◆ Enhances data integrity within the enterprise;
- ◆ Enables to meet compliance and audit requirements.

Thus it is clear from the above points that an able workforce is an asset. Managing human resources well and retaining them, is therefore crucial in order to meet the business goals and objectives. While an automated and technologically-sound solution greatly supports in this endeavour, it brings with it challenges of maintenance costs and integration with other software and systems.

4.7.5 Core Banking System (CBS)

Banks can no longer continue to use legacy applications. Growth, and perhaps even endurance, depends upon an agile, cost-effective core banking solution that delivers a distinguish service know-how. Nowadays, most banks use core banking applications to sustain their operations where CORE stands for "Centralized Online Real-time Environment".

Core banking systems are the heart of a bank. The absolute bank's branches access applications from centralized data centres. All transactions budge through core systems, which, at an absolute minimum, must remain running and responsive during business hours. Increasingly, these systems are running 24x7 to support Internet banking, global operations, and real time transactions via ATM, Internet, phone, and debit card. The various elements of core banking include:

- ◆ Making and servicing loans;
- ◆ Opening new accounts;
- ◆ Processing cash deposits and withdrawals;
- ◆ Processing payments and cheques;

- ◆ Calculating interest;
- ◆ Customer relationship management (CRM) activities;
- ◆ Managing customer accounts;
- ◆ Establishing criteria for minimum balances, interest rates, number of withdrawals allowed and so on;
- ◆ Establishing interest rates; and
- ◆ Maintaining records for all the bank's transactions.

Core Banking System may be defined as the set of basic software components that manage the services provided by a bank to its customers through its branches (branch network). In other words, the platform where communication technology and information technology are merged to suit core needs of banking is known as **Core Banking Solutions (CBS)**. These technologies have cut down time, working at the same time as on dissimilar issues and escalating usefulness. Here, computer software is developed to perform core operations of banking like recording of transactions, passbook maintenance, and interest calculations on loans and deposits, customer records, balance of payments and withdrawal.

Normal core banking functions will include deposit accounts, loans, mortgages and payments. Banks make these services available across multiple channels like ATMs, Internet banking, and branches.

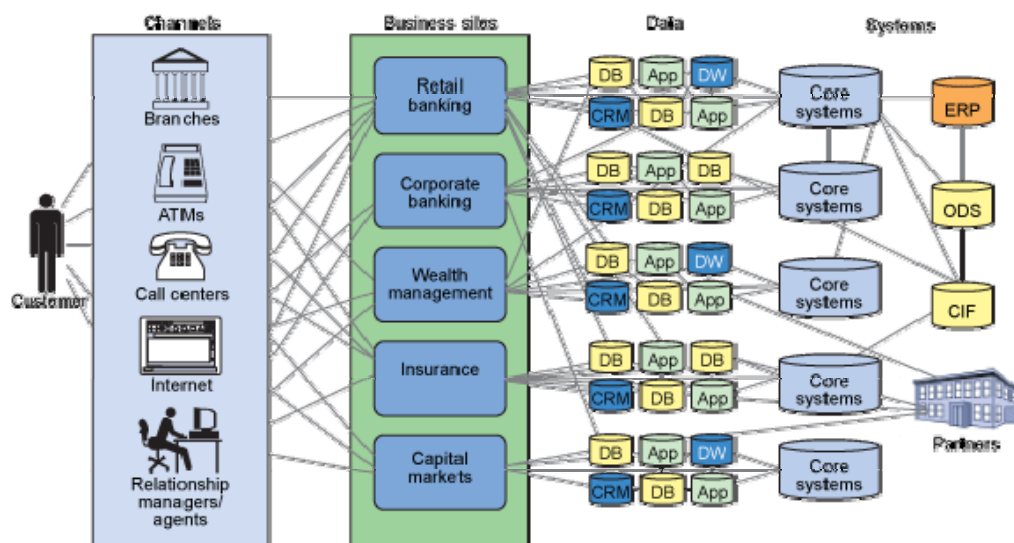


Fig. 4.7.11: Normal Core Banking Functions

Thus a core banking solution must be technologically stylish and provide future business objectives. From the above Fig. 4.7.11, it is clear that customer is at the initial point and Partner is at the end point. With the help of CORE Banking every services and utilities are linked with one another.

Examples of major core banking products include Infosys' Finacle, Nucleus FinnOne and Oracle's Flexcube application (from their acquisition of Indian IT vendor i-flex).

(A) Infosys' Finacle

Finacle core banking solution is a comprehensive, agile, componentized yet integrated business solution, addressing all the core needs of banks, in easy-to-configure modules. Finacle provides all the building blocks of business functionality enabling users to configure products and processes flexibly in order to adapt to a dynamic environment. With a 360 degree single source view into customer accounts, banks can empower customers with relevant information and delight them with the right offerings, presented at the right time through the right channel.

The key modules of Finacle as shown in the Fig. 4.7.12 are as follows:

- (a) **Enterprise customer information:** This module enables banks to create and maintain a single source of customer truth enterprise customer information files, across multiple host systems that access comprehensive segmentation information all through a unified view.
- (b) **Consumer banking:** Offerings such as savings and checking accounts, and provision for personal and auto finance are easily supported. Multilayered products—structured deposits, multi-currency accounts, top-up deposits, master term deposits, top-up loans, revolving loans and securitization are added as needed.
- (c) **Corporate banking:** This includes commercial lending essentials such as multicurrency disbursements and repayments, flexible and varied interest rate setup, commitment fee setup, crystallization, amortization, and debt consolidation. Finacle maintains the corporate customer information files, corporate deposits, commercial lending, corporate origination and corporate payments with comprehensive liquidity management, sweeps and pool facilities.
- (d) **Trade finance:** This module presents an end-to-end solution for the trade finance needs of a bank and is fully integrated with the payment system and exchange rate setup, and supports multicurrency processing of trade products such as: documentary credit, forward contract, import and export financing, letter of guarantee, factoring and buyer's credit etc.
- (e) **Customer analytics:** This module supports operations with comprehensive intelligence, ranging from data acquisition to reporting and analysis, leveraging quantitative modelling techniques and multi-dimensional reporting. There is also the flexibility to pick and choose specific customer analytics functions, relevant to the business, across the customer life-cycle stages of acquisition, development, and retention.
- (f) **Wealth management:** This creates new revenue streams by offering high net worth individuals and the mass affluent, products and services powered by the Finacle wealth management solution.
- (g) **Islamic banking:** This module offers a flexible and varied feature repertoire for banks to design and deploy products for varying market segments, based on different Islamic concepts.

This further provides unified, comprehensive, real time view of the client across the enterprise –covering both Islamic & non Islamic Product.

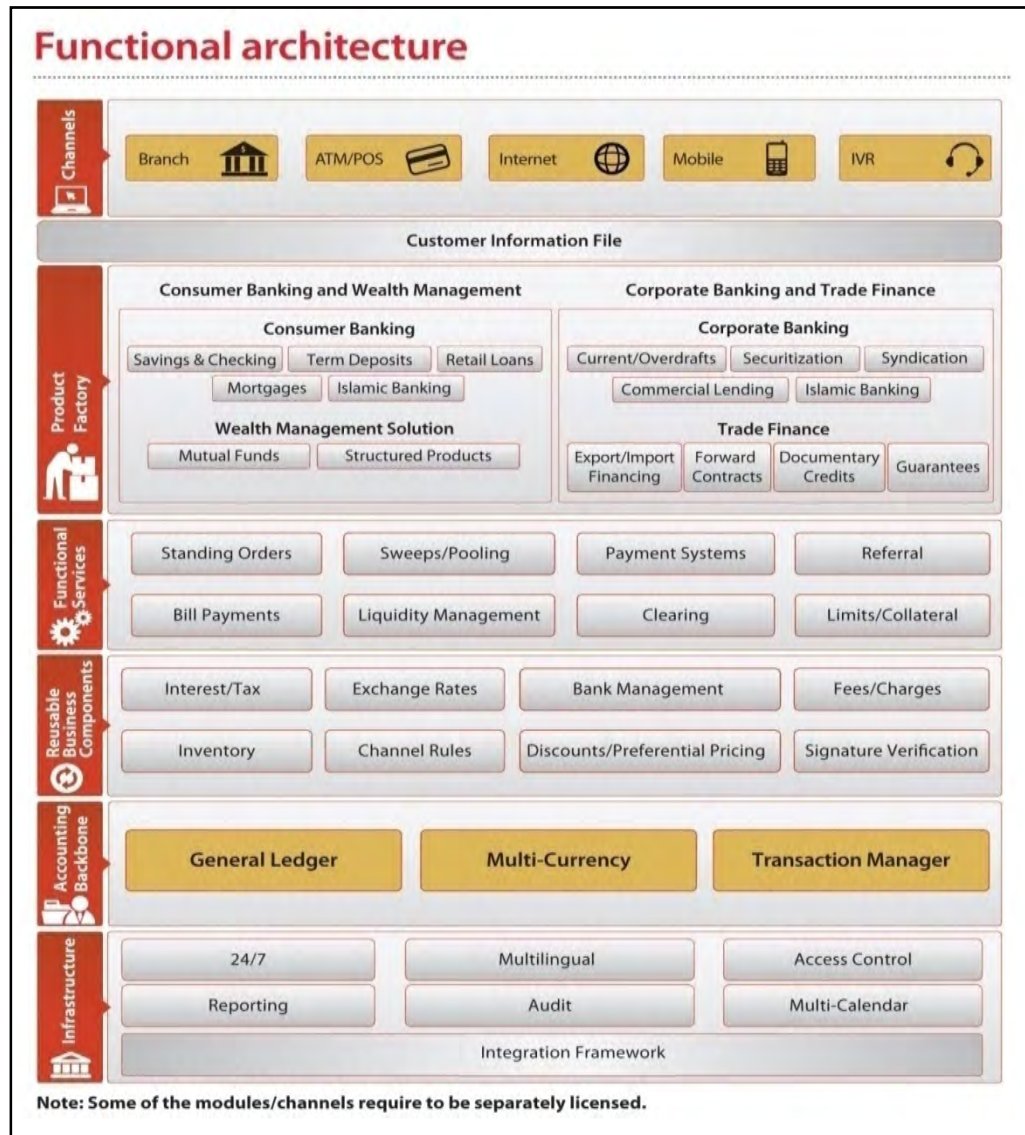


Fig. 4.7.12: Finacle Core Banking Solutions

(h) **Payments:** The solution manages end-to-end payments lifecycle and processes payments regardless of payment instruments, originating channels, hosting modules and payment networks.

(i) **Origination:** This module simplifies and strengthens the complete credit lifecycle, across retail and commercial loans with Finacle's enterprise loan origination solution.

(j) **Dashboards:** This provides advance operational efficiencies and user experience by enabling availability of frequently used functions on a single console.

(B) **Nucleus FinnOne:** The Nucleus FinnOne banking suite, made and marketed by India-based Company Nucleus software, comes with a wide variety of integrated applications that cover different aspects of global web banking. These applications include a loan origination system that automates and manages the processing of many types of loans, a credit card application system with strong credit and fraud detection tools and a multilingual web-based collection service that organizes legal payouts.

FinnOne is a web-based global banking product designed to support banks and financial solution companies in dealing with assets, liabilities, core financial accounting and customer service. The solution is wholly focused on banking and financial services spanning across solutions in the areas of Retail & Corporate Banking, Cash Management, Relationship Banking, Financial CRM, Credit Risk & Appraisal, EAI, Internet Banking, FX, Basel II, Data warehousing and Analytics.

(C) **Oracle's FLEXCUBE:** Oracle FLEXCUBE helps banks transform their business model from disparate operations towards centralization of key functions, such as accounting, customer information, and management information. The centralization of operations is further augmented by role based dashboards that guide business users to take action on critical tasks, track their pending activities, and get insights into customer information and interaction. The application also provides comprehensive product processing capabilities to cater to various lines of business.

Banks using Oracle FLEXCUBE can take advantage of the high fidelity reports provided by the system for better management and operational controls. Oracle FLEXCUBE Development Workbench for Universal Banking provides the ability to create or modify products rapidly, helping banks respond quickly to market needs.

Oracle FLEXCUBE empowers universal banks with:

- ◆ Superior Web experience through self-service and assisted channels
- ◆ Improved bank staff productivity with intuitive, role-based dashboards
- ◆ Comprehensive transaction banking capabilities and straight-through-processing (STP)
- ◆ Improved risk management and reporting

4.7.6 Accounting Information System (AIS)

The theme of Accounting Information System (AIS) combines a general business background with a spotlight on Business information systems and accounting to prepare learners for specialized careers in accounting, auditing, consulting, business analysis and management. Today's accounting professionals are predictable to lend a hand organizations recognize enterprise risks and make available declaration for information systems. The principle of the majority organizations is to formulate accessible value to their customers. While "adding value" is a regularly used buzzword, in its justifiable sense, it means making the value of the finished

component better than the sum of its parts. It may also connote making it prior, making it additional trustworthy, providing enhanced service or guidance, providing a bit in limited supply.

As already explained, an **Accounting Information System** is defined as a system of collection, storage and processing of financial and accounting data that is used by decision makers. An accounting information system is generally a computer-based method for tracking accounting activity in conjunction with information technology resources. The resulting statistical reports can be used internally by management or externally by other interested parties including investors, creditors and tax authorities.

Six key elements that compose the typical Accounting Information System are shown in the Table 4.7.5.

Table 4.7.5: Key components of Accounting Information System

1	People	AIS helps various system users that include accountants, consultants, business analysts, managers, chief financial officers and auditors etc. from different departments within a company to work together. With well-designed AIS, everyone within an organization who is authorized to do so can access the same system and get the same information. AIS also simplify getting information to people outside of the organization when necessary.
2	Procedure and Instructions	These include both manual and automated methods for collecting, storing, retrieving and processing data.
3	Data	Refers to the information pertinent to the organization's business practices that may include sales orders, customer billing statements, sales analysis reports, purchase requisitions, vendor invoices, check registers, general ledger, inventory data, payroll information, timekeeping, tax information etc. This data can then be used to prepare accounting statements and reports such as accounts receivable aging, depreciation/amortization schedules, trial balance, profit and loss, and so on.
4	Software	These are the computer programs that provide quality, reliability and security to the company's financial data that may be stored, retrieved, processed and analyzed. Managers rely on the information it outputs to make decisions for the company, and they need high-quality information to make sound decisions.
5	Information Technology Infrastructure	This include hardware such as personal computers, servers, printers, surge protectors, routers, storage media, and possibly a backup power supply used to operate the system. The hardware selected for AIS must be compatible with the intended software.
6	Internal Controls	These are the security measures such as passwords or as complex as biometric identification to protect sensitive data against

	unauthorized computer access and to limit access to authorized users. Internal controls also protect against computer viruses, hackers and other internal and external threats to network security.
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Thus it is clear that:

- ◆ AIS are a system that brings together, records, stores, and processes data to fabricate information for decision makers.
- ◆ AIS can use extremely developed technology, be a trouble-free paper-and-pencil system, or be something in amid. Technology is just a tool to engender, uphold, or get enhanced a system.
- ◆ AIS mandate is to accumulate additionally store data about events, resources, and agents.
- ◆ Make available sufficient controls to make certain that the entity's resources (including data) are obtainable when needed, as well as truthful and dependable.
- ◆ Transform that data into information with the intention that management can exercise to make verdict about events, resources, and agents.



Fig. 4.7.13: Sub systems of an Accounting Information System

Accounting information system takes into consideration different aspects, which are composed of smaller subsystems, which help an organization in achieving its goal. It uses advanced technology with which a company is able to enhance value in the value chain system.

Referring to the Fig. 4.7.13, the different sub components in AIS include Budgeting and Planning, Expenses Management, Revenue Management, Cash and Treasury Management, Accounting software, Electronic Banking, Activity-based Management, Payroll etc.

The accounting information system focuses strongly on different accounting transactions and other important aspects such as payroll, sales, purchases, invoicing, taxation, budgeting, inventory management and control, inventory valuation and budgeting. The accounting information system helps in analyzing certain perspectives. It also helps in enhancing the performance of a company by allowing it to conduct systematic operations across the market. With the adoption and implementation of information system, an organization can focus harder on increasing its own efficiency. The accounting information system focuses strongly on different accounting transactions and other important aspects such as payroll, sales, purchases, invoicing, taxation, budgeting, inventory management and control, inventory valuation and budgeting. The accounting information system helps in analyzing certain perspectives. It also helps in enhancing the performance of a company by allowing it to conduct systematic operations across the market. With the adoption and implementation of information system, an organization can focus harder on increasing its own efficiency as well as that of its managers and accountants.

4.8 Artificial Intelligence

Artificial Intelligence (AI) is the vicinity of computer science focusing on creating machines that can fit into place on behaviours that humans regard as intelligent. A significant driver for any application of artificial intelligence is fresh and innovative code. Of particular interest are ideas for powerful algorithms (or heuristics) which might be generally applicable to many applications. But we want to go a step further; to break out of the "customized program for a specific application" mindset and begin finding new ways to recycle code for new applications.

Artificial intelligence (AI) is a research field that studies how to comprehend the intelligent human behaviours on a computer. The decisive objective of AI is to make a computer that can discover, sketch, and crack problems in parallel. Although AI has been studied for more than half a century, we still cannot make a computer that is as intelligent as a human in all aspects. On the other hand, we do have many successful applications. In some cases, the computer outfitted with AI technology can be even more intelligent than us. The Deep Blue system which defeated the world chess champion is a well-know example.

The subject of artificial intelligence spans a wide horizon dealing with various kinds of knowledge representation schemes, different techniques of intelligent search, various methods for resolving uncertainty of data and knowledge, different schemes for automated machine learning and many others. Expert systems, Pattern Recognition, Natural language processing, and many others are some of the various purposes on which AI may be applied as shown in the Fig. 4.8.1.

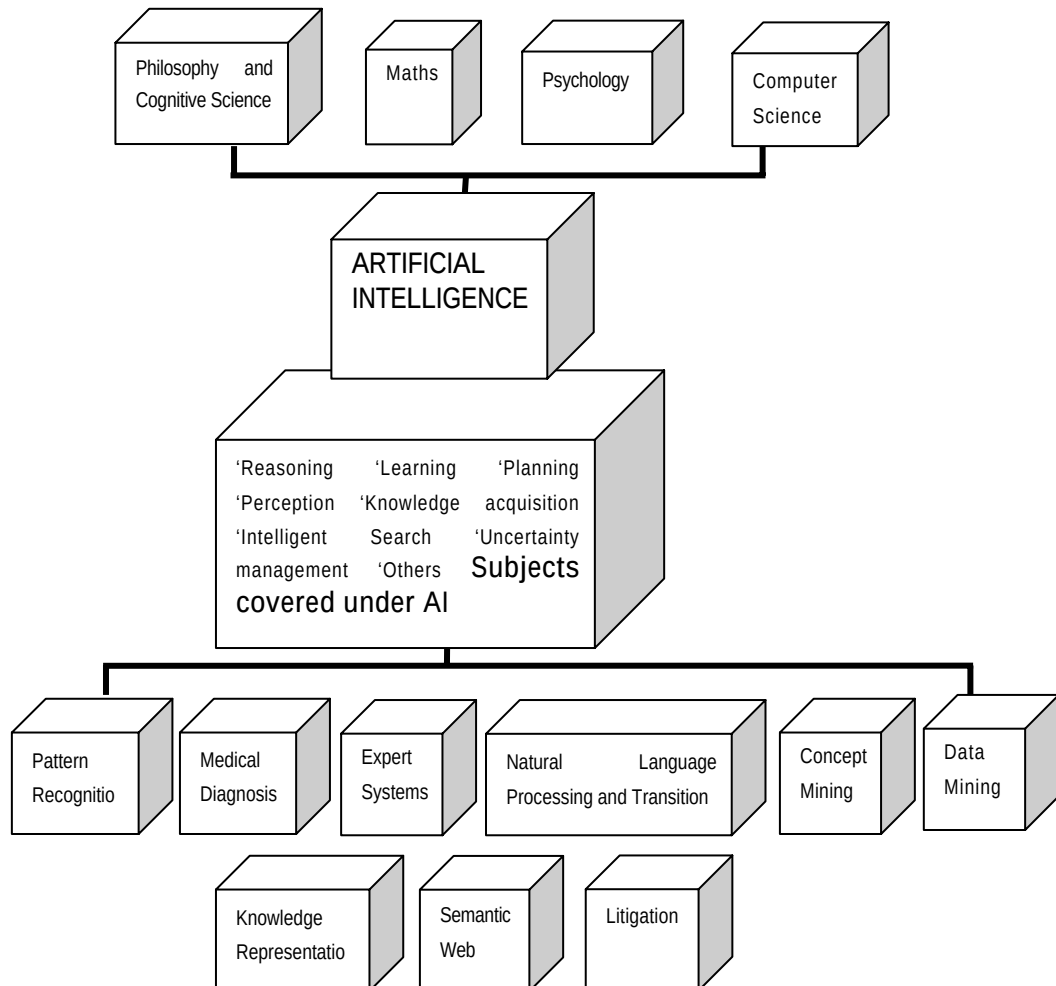


Fig. 4.8.1: Discipline and Application areas of AI

Even our toaster is about to fasten together the AI revolution. We will put a bagel in it, take a photograph with the help of a smart phone, and the phone will send the toaster all the information it needs to brown it completely. In a sagacity, AI has become almost mundane ubiquitous, from the intelligent sensors that set the opening and shutter speed in digital cameras, to the heat and humidity probes in dryers, to the automatic parking feature in cars. And more applications are tumbling out of labs and laptops by the hour. Refer to the Fig. 4.8.2.

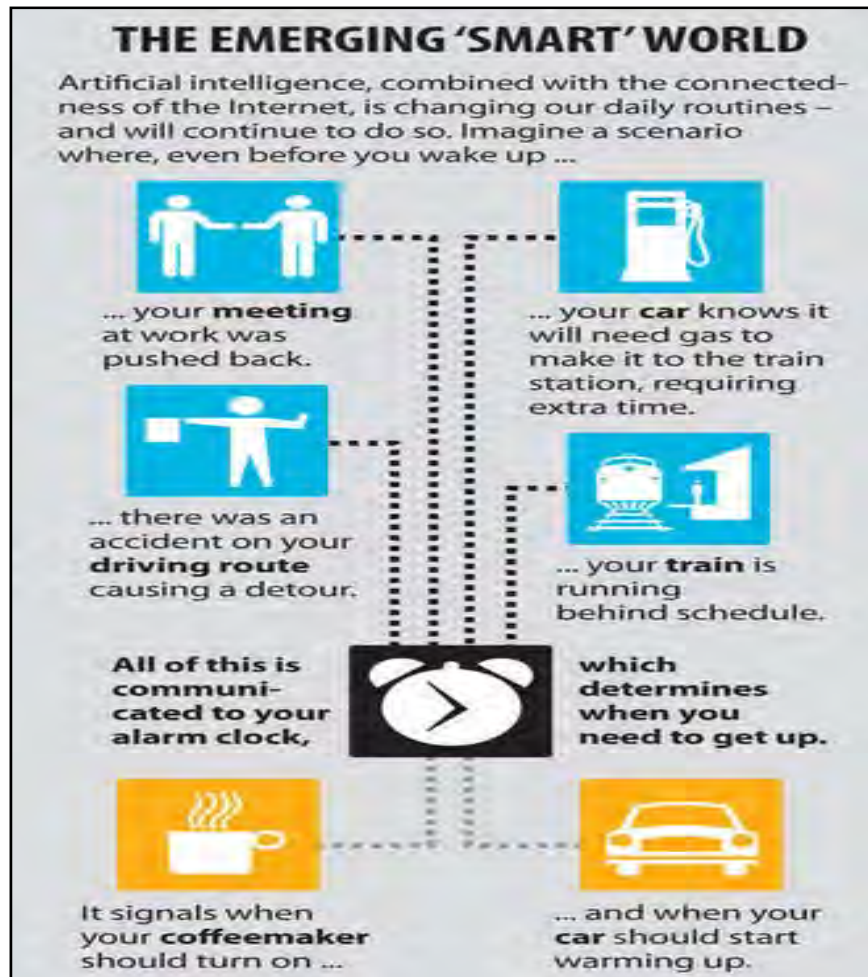


Fig. 4.8.2: AI Impact in our Day-To-Day Activity

4.9 Expert System

An Expert System (ES) is a computerized information system that allows non-experts to make decisions comparable to those of an expert. Expert Systems are used for complex or ill-structured tasks that require experience and specialized knowledge in narrow, specific subject areas. The aim of the expert system is to have a team of seasoned specialists holding industry-wide experience who further spread across implementations. Expert system has leveraged its strengths to plan and execute a miscellaneous variety of projects for Defence, Government, Finance, Telecom, and Engineering sectors. In recent years expert system facilitate in making available consulting services, displaying the self-assurance clients have in one's capability to acquire the job done right. The key components of an ES are well depicted

in the Fig. 4.9.1. It is well versed that expert system takes into consideration knowledge, facts and user interface with the help of knowledge engineer to accomplish the task.

(a) **Knowledge Base:** This includes the data, knowledge, relationships, rules of thumb (heuristics), and decision trees used by experts to solve a particular problem. A knowledge base is the computer equivalent of all the knowledge and insight that an expert or group of experts develop through years of experience in their field. The knowledge base of expert systems encloses both realistic and heuristic knowledge. Realistic knowledge is that knowledge of the job domain that is extensively shared, characteristically found in textbooks or journals, and frequently agreed upon by those knowledgeable in the meticulous field whereas Heuristic knowledge is the fewer rigorous, extra empirical, supplementary judgmental knowledge of performance. In contrast to factual knowledge, heuristic knowledge is not often discussed, and is principally individualistic. It is the knowledge of high-quality put into practice, good decision, and reasonable reasoning in the field. It is the knowledge that underlies the "art of good guessing."

(b) **Inference Engine:** This program contains the logic and reasoning mechanisms that simulate the expert logic process and deliver advice. It uses data obtained from both the knowledge base and the user to make associations and inferences, form its conclusions, and recommend a course of action.

(c) **User Interface:** This program allows the user to design, create, update, use and communicate with the expert system.

(d) **Explanation facility:** This facility provides the user with an explanation of the logic the ES used to arrive at its conclusion.

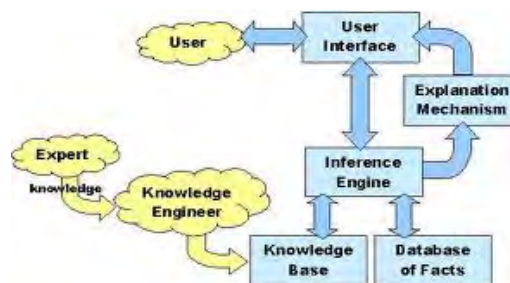


Fig. 4.9.1: Expert System Shell

(e) **Database of Facts:** This holds the user's input about the current problem. The user may begin by entering as much as they know about the problem or the inference engine may prompt for details or ask whether certain conditions exist. Gradually a database of facts is built up which the inference engine will use to come to a decision. The quality and quantity of data gained from the user will influence the reliability of the decision.

Types of Expert System problem domains

- ◆ Expert systems are designed to deal with imprecise data or problems that have more than one solution.

- ◆ Using a technique called **fuzzy logic**; an expert system can deal with imprecise data by asking for a level of confidence.
- ◆ A **neural network** uses computer circuitry to simulate the way in which a brain might process information.

Expert Systems can be Example-based, Rule-based or Frame-based.

- ◆ In Example-based system, developers enter the case facts and results. Through induction the ES converts the examples to a decision tree that is used to match the case at hand with those previously entered in the knowledge base.
- ◆ Rule-based systems are created by storing data and decision rules as if-then rules. The system asks the user questions and applied the if-then rules to the answers to draw conclusions and make recommendations. Rule-based systems are appropriate when a history of cases is unavailable or when a body of knowledge can be structured within a set of general rules.
- ◆ Frame based systems organize all the information (data, description, rules etc.) about a topic into logical units called frames, which are similar to linked records in data files. Rules are then established about how to assemble or inter-relate the frames to meet the user's needs.

4.10 Business Intelligence

In today's IT-driven society, the success of an enterprise is heavily influenced by business intelligence. Corporate giants are becoming more dependent on business intelligence software to increase the amount of knowledge they can apply in real time and reduce the cost of managing their business processes. As globalization and ICT become more intertwined, the volume of data transfers among enterprises is exponentially growing.

There are many definitions of Business Intelligence (BI).

- (a) BI is essentially timely, accurate, high-value, and actionable business insights, and the work processes and technologies used to obtain them.
- (b) Business Intelligence (BI) is the delivery of accurate, useful information to the appropriate decision makers within the necessary time frame to support effective decision making for business processes. BI is comprised of information that contains patterns, relationships, and trends about customers, suppliers, business partners and employees. Business intelligence systems process, store and provide useful information to the user who need it, when they need it. BI can handle large amounts of information to help identify and develop new opportunities. Making use of new opportunities and implementing an effective strategy can provide a competitive market advantage and long-term stability.
- (c) BI enables enterprises to harness the power of information. BI in simple words refers to the process of collecting and refining information from many sources, analyzing and presenting the information in useful ways so that users can make better business decisions.

BI has been made possible because of advances in a number of technologies, such as computing power, data storage, computational analytics, reporting and networking. BI provides an approach for solving business problems with a framework for managing tactical and strategic operations performance. From the perspective of decision-making, BI uses data about yesterday and today to facilitate making better decisions about tomorrow. This is done through various means such as selecting the right criteria to judge success, locating and transforming the appropriate data to draw conclusions, or arranging information in a manner that best provides insights into the future thus making enterprise to work smarter. BI enables managers to see things with more clarity, and empowers them to peek into the possible future.

4.10.1 Business Intelligence Tools

Business Intelligence tools are a type of software that is designed to retrieve, analyze and report data. BI is basically just getting important business information to decision makers when they need it – in a way that they can actually use it. BI tools are standalone tools or suites of tools that are targeted to a specific industry that implement a particular BI technique.

Business Intelligence tools are software programs and features that are used to complete detailed data analysis. There are different types of business intelligence tools which a business may need in order to achieve business objectives. Some of the key Business Intelligence tools are given as follows:

- ◆ **Simple Reporting and Querying:** This involves using the data warehouse to get response to the query: “Tell me what happened.” The objective of a BI implementation is to turn operational data into meaningful knowledge. This requires that BI must be connected with the enterprise data and all the necessary data is available in one place, in one common format. Data warehousing (DW) provides the perfect architecture to combine all the data dispersed throughout the enterprise in different applications in a variety of formats, on a range of hardware, which could be anywhere to be cleaned up, summarized, converted and integrated into one common format and available centrally for further processing. There are reporting tools used to arrange information into a readable format and distribute it to the people who need it.
- ◆ **Business Analysis:** This involves using the data to get response to the query: “Tell me what happened and why.” Business analysis refers to presenting visualizing data in a multidimensional manner. Query and report data is presented in row after row of two-dimensional data. Typically, the first dimension is the headings for the data columns and the second dimension is the actual data listed below those column headings. Business analysis allows the user to plot data in row and column coordinates to further understand the intersecting points. ETL (Extract, Transform, Load) tools bring in data from outside sources, transform it to meet business specified operational needs, and then load the results into the company database. Metadata tools gather and analyze metadata, helping to increase data quality.
- ◆ **Dashboards:** This involves using the information gathered from the data warehouse and making it available to users as snapshots of many different things with the objective of

getting response to the query: "Tell me a lot of things, but without too much effort". Dashboards are flexible tools that can be bent into as many different shapes as per user requirements. It includes a collection of graphs, reports, and KPIs that can help monitor such business activities as progress on a specific initiative.

- ◆ **Scorecards:** This involves providing a visual representation of the enterprise strategy by taking critical metrics and mapping them to strategic goals throughout the enterprise. Scorecards offer a rich, visual gauge to display the performance of specific initiatives, business units, or the enterprise as a whole and the individual goals in the context of larger enterprise strategy. Scorecards distil information into a small number of metrics and targets and provide users with an at-a-glance perspective of information. A scorecard has a graphical list of specific, attainable strategic milestones, combined with metrics that serve as benchmarks. Specific measures on how well the company has actually performed specified activities are linked in the scorecard with graphical display highlighting the status of each goal.
- ◆ **Data Mining or Statistical Analysis:** This involves using statistical, artificial intelligence, and related techniques to mine through large volumes of data and providing knowledge without users even having to ask specific questions. The objective is to provide interesting and useful information to users by design even without their querying. Data Mining involves data analysis for discovering useful patterns that are "hidden" in large volume of diverse data. For Example: Market segmentation - identify common characteristics of customers who buy same products. OLAP (Online Analytical Processing) is a multi-dimensional analytical tool typically used in data mining, that gathers and process vast amounts of information into useful packets.

4.10.2 Business Reporting through MIS and IT

Prior to talking about business reporting in an MIS and IT perspectives it would be justified if we throw a light on the term business reports. Business reports are a type task which facilitates in scrutinizing a situation (either a real life scenario or a case study) and pertain to business theories to fabricate a variety of suggestions for development.

Reporting has been of significance to businesses by providing a platform for users to get immediate access to business information by using simple analysis. However, Business Intelligence (BI) caters to strategic, tactical and operational needs; providing a platform for complete, comprehensive performance management for today's global, competitive businesses. Business reports are routinely assigned to facilitate us to:

- ◆ Accomplish conclusions about a trouble or issue.
- ◆ Demonstrate short and apparent communication skills.
- ◆ Endow with recommendations for upcoming accomplishing.
- ◆ Exhibit our analytical, reasoning, and evaluation skills in identifying and weighing-up potential solutions and outcomes.

- ◆ Pertain business and management theory to a practical situation.
- ◆ Scrutinize obtainable and potential solutions to a problem, situation, or question.

Business reporting or enterprise reporting is a primary division of the bigger movement towards enhanced business intelligence and knowledge management. Business reporting or enterprise reporting is a primary division of the bigger movement towards enhanced business intelligence and knowledge management. Over and over again, realization involves any of aforementioned tools in coordination with a data warehouse and then using one or more reporting tools. While reports can be distributed in print form or via email, they are characteristically accessed via a corporate intranet.

While analyzing the business reports, classically, there is no thumb rule to reach a conclusion but numerous solutions, each associated with their own costs and benefits to an organization. It is these costs and benefits which one needs to recognize and compare in any report. However, Business Reports streamline any business's concerns and helps in taking smarter decisions and increase the productivity.

Benefits for micro-businesses and small to medium enterprises

- ◆ Paperless lodgement - eliminates the hassle of paper work and associated costs;
- ◆ Electronic record keeping – stores the reports securely in the accounting or bookkeeping system;
- ◆ Pre-filled forms - reports are automatically pre-filled with information existing in the accounting or bookkeeping system, as well as from information held by government, saving valuable time;
- ◆ Ease of sharing - between client, accountant, tax agent or bookkeeper for checking;
- ◆ Secure AUSkey authentication - AUSkey is a common authentication solution for business-to-government online services.
- ◆ Same-time validation - receive a fast response that any lodgement has been received.

Benefits for large business

- ◆ A single reporting language to report to government: eXtensible Business Reporting Language(XBRL) - an international standards-based business reporting language developed by accountants for financial reporting;
- ◆ Reduce costs - reduction in the cost of assembling, analysing, and providing data to government;
- ◆ Streamline the process of aggregating data - Opportunities exist for streamlining the process of aggregating data across different internal departments, or business units of a company;

- ◆ Increased access to comparable performance information – Standard Business Report (SBR) uses the same standard (XBRL) that simplifies and adds integrity to the performance of capital market comparisons by analysts and investors;
- ◆ Secure AUSKey authentication - lodge online securely to a range of government agencies; and
- ◆ Same-time validation - rapid response that any lodgement has been received.

4.11 Importance of Access and Privilege Controls

In order to safeguard software systems, procedures are developed and implemented for protecting them from unauthorized modification, disclosure or destruction to ensure that information remains accurate, confidential, and is available when required. The administration of users' access to the software applies the principles of least privilege and "need to know" basis. Logical access level to software and information are restricted to users authorized by the respective Security Administrator. Access controls help us to restrict whom and what accesses our information resources, and they possess four general functions: identity verification, authentication, authorization, and accountability. These functions work together to grant access to resources and constrain what a subject can do with them. These are discussed as follows:

- ◆ **Identity Management:** Identity management consists of one or more processes to verify the identity of a subject attempting to access an object. However, it does not provide 100 percent assurance of the subject's identity. Rather, it provides a level of probability of assurance. The level of probability depends on the identity verification processes in place and their general trustworthiness. Identity management has become a separate consideration for access control. However, the three pillars that support authorized access still define the tools and techniques necessary to manage who gets access to what and what they can do when they get there: authentication, authorization, and accountability.
- ◆ **Authentication:** Identity management and authentication are inseparable. Identity management includes assigning and managing a subject's identity. Authentication is the process of verifying a subject's identity at the point of object access.
- ◆ **Authorization:** Once a resource or network verifies a subject's identity, the process of determining what objects that subject can access begins. Authorization identifies what systems, network resources, etc. a subject can access. Related processes also enforce least privilege, need-to-know, and separation of duties. Authorization is further divided into coarse and fine dimensions.
- ◆ **Accountability:** Each step from identity presentation through authentication and authorization is logged. Further, the object or some external resource logs all activity between the subject and object. The logs are stored for audits, sent to a log management

solution, etc. They provide insight into how well the access control process is working: whether or not subjects abuse their access.

4.11.1 Approaches to Access Control

There are two major approaches to establish access controls, which are given as under:

- ◆ **Role-based Access Control (RBAC):** RBAC largely eliminates discretion when providing access to objects. Instead, administrators or automated systems place subjects into roles. Subjects receive only the rights and permissions assigned to those roles. When an employee changes jobs, all previous access is removed, and the rights and permissions of the new role are assigned.
- ◆ **Rules-based Access Control (RAC):** RAC differs from RBAC methods because it is largely context-based. RBAC, for example, enforces static constraints based on a user's role. RAC, however, also takes into account the data affected, the identity attempting to perform a task, and other triggers governed by business rules. A manager, for example, has the ability to approve his/her employees' hours worked. However, when s/he attempts to approve his/her own hours, a rule built into the application compares the employee record and the user, sees they are the same, and temporarily removes approval privilege. Note that this is dynamic and occurs at the time a transaction is attempted. This also sometimes called dynamic RBAC.

4.11.2 Principle of Least Privilege

This is a fundamental principle of information security, which refers to give only those privileges to a user account, which are essential to that user's work. For example, a backup user does not need to install software; hence, the backup user has rights only to run backup and backup-related applications. Any other privileges, such as installing new software, should be blocked. The principle applies also to a personal computer user, who usually does work in a normal user account, and opens a privileged, password protected account (that is, a super user) only when the situation absolutely demands it.

When applied to users, the terms Least User Access or Least-privileged User Account (LUA) are also used, referring to the concept that all user accounts at all times should run with as few privileges as possible, and also launch applications with as few privileges as possible. Software bugs may be exposed when applications do not work correctly without elevated privileges. The principle of least privilege is widely recognized as an important design consideration in enhancing the protection of data and functionality from any kind of compromises towards security.

4.12 Payment Mechanisms

e-Commerce will have a direct bearing on the validity of the information to individuals, corporations or the country's economic interests and reputation. The validity of the transaction price, period, and the number of hours as part of the agreement is particularly vital.

The use of a credit card as a payment mechanism augments the tendency to spend as compared to cash in otherwise identical purchase situations. Consumers nowadays have the prospect to pay for transactions with a progressively more growing array of payment mechanisms. In addition to conventional mode of payments like cash and cheques, the past few years have seen the speedy creation of plastic payment mechanisms - credit cards, charge cards and debit cards. In addition, consumers are also identifiable with payment mechanisms like traveller's checks, credit checks and money orders. Over the coming years, a total new generation of payment mechanisms like smart cards, memory cards and electronic payments is expected to cultivate and in due course symbolize a remarkable proportion of all consumer transactions.

With the increase in online shopping and e-commerce industry, it has now become a requirement that the web stores are integrated with a payment gateway. Payment gateway is fundamentally a service used to process credit card transactions when orders are accepted online from clients. In a way, it represents a physical POS (Point-of-sale) terminal, which is set in every retail outlet these days. Payment gateways use a special code for acquiring sensitive information like credit card numbers, so that information passes securely.



Fig. 4.12.1: Payment Gateways

Thus the above Fig. 4.12.1 shows once the order is placed, the bank is used to transfer fund using net banking. Online electronic payments are not corresponding to electronic payments. In the emergence of e-commerce, credit cards have long been represented by electronic means of payment, credit cards in shopping malls. Many hotels and other places and items could swipe of the card, POS terminals Regulations, ATM cash forms of payment.



Fig. 4.12.2: Swipe Cards through POS and ATM

Major types of Electronic Payments

In general, the integration of the payments process appears to be important ingredient for both businesses and regulators. Since we are here to discuss the chapter which revolves around BIS; thus the payment mechanism will be considered in terms of online. Here on-line e-commerce transaction involves more than just a financial transaction; it is also called 'Whole Transaction Processes'. Electronic payments are possible by way of the following (Refer Fig. 4.12.2):

- A. **Credit Cards:** In a credit card transaction, the consumer presents preliminary proof of his ability to pay by presenting his credit card number to the merchant. The merchant can verify this with the bank, and create a purchase slip for the consumer to endorse. The merchant then uses this purchase slip to collect funds from the bank, and, on the next billing cycle, the consumer receives a statement from the bank with a record of the transaction.

How a credit card is processed?

Step 1: Authorization – This is the first step in processing a credit card. After a merchant swipes the card, the data is submitted to merchant's bank, called an acquirer, to request authorization for the sale. The acquirer then routes the request to the card-issuing bank, where it is authorized or denied, and the merchant is allowed to process the sale.

Step 2: Batching – This is the second step in processing a credit card. At the end of a day, the merchant reviews all the day's sales to ensure they were authorized and signed by the cardholder. It then transmits all the sales at once, called a batch, to the acquirer to receive payment.

Step 3: Clearing – This is the third step in processing a credit card. After the acquirer receives the batch, it sends it through the card network, where each sale is routed to the appropriate issuing bank. The issuing bank then subtracts its interchange fees, which are shared with the card network, and transfers the remaining amount through the network back to the acquirer.

Step 4: Funding –This is the fourth and final step in processing a credit card. After receiving payment from the issuer, minus interchange fees, the acquirer subtracts its discount fee and sends the remainder to the merchant. The merchant is now paid for the transaction, and the cardholder is billed.

Using a credit card to make a purchase over the Internet follows the same scenario. But on the Internet, added steps must be taken to provide for secure transactions and authentication of both buyer and seller. To address these growing security concerns and pave the way for uninhibited growth of electronic commerce on the net, the two leading credit card brands, Visa and MasterCard, teamed up some years ago to develop a common standard to process card transactions on the Internet, called the Secure Electronic Transaction (SET) standard.

B. Electronic Cheques

Credit card payments will undoubtedly be popular for commerce on the Internet. However, following two systems have been developed to let consumers use electronic cheques to pay Web merchants directly.

- (a) **By the Financial Services Technology Corporation (FSTC):** The FSTC is a consortium of banks and clearing houses that has designed an electronic cheque. Modeled on the traditional paper cheque, this new cheque is initiated electronically, and uses a digital signature for signing and endorsing. To add to the flexibility of their payment system, the FSTC wants to offer users a choice of payment instruments that allow them to designate an electronic cheque as a certified cheque or an electronic charge card slip. This means that the user can use a single mechanism, the electronic cheque, to complete payments that vary according to payee's requirements.
- (b) **By CyberCash:** An electronic cheque has all the same features as a paper cheque. It functions as a message to the sender's bank to transfer funds, and, like a paper cheque, the message is given initially to the receiver who, in turn, endorses the cheque and presents it to the bank to obtain funds. The electronic cheque can prove to be superior to the paper cheque in one significant aspect. As sender, we can protect ourselves against fraud by encoding our account number with the bank's public key, thereby not revealing our account number to the merchant. As with the SET protocol, digital certificates can be used to authenticate the payer, the payer's bank, and bank account.

C. Smart Cards

Smart cards have an embedded microchip instead of magnetic strip. The chip contains all the information a magnetic strip contains but offers the possibility of manipulating the data and executing applications on the card. Three types of smart cards are as follows:

- ◆ **Contact Cards** – Smart cards that need to insert into a reader in order to work, such as a smart card reader or automatic teller machines.
- ◆ **Contactless Cards** – Contactless smart cards don't need to be inserted into a reader. Just waving them near a reader is just sufficient for the card to exchange data. This type of cards is used for opening doors.
- ◆ **Combi/Hybrid Cards** – Combi cards contain both technologies and allow a wider range of applications.

D. Electronic Purses

Electronic Purse Card is yet another way to make payments over the net. It is very similar to a pre-paid card. For Eg: Bank issues a stored value card to its customer, the customer can then transfer value from his/her account to the card at an ATM, a personal computer, or a specially equipped telephone. The electronic purse card can be used as an ATM card as well as a credit card.

While making purchases, customers pass their cards through a vendor's point of sale terminal. No credit check or signature is needed. Validation is done through a Personal Identification Number (PIN Number).

Once the transaction is complete, funds are deducted directly from the cards and transferred to the vendor's terminal. Merchants can transfer the value of accumulated transactions to their bank accounts by telephone as frequently as they choose. When the value on a card is spent, consumers can load additional funds from their accounts to the card.

A typical On-line transaction

The below mentioned Fig. 4.12.3 shows that the online e-commerce transaction is composed of three main functions: sales, payment and delivery. The Figure depicts how the payment is viewed as a part of an on-line transaction.

Terminology Used in figure and certain sub-functions:

- ◆ **Advertising**; the company communicates its products and services (catalogue),
- ◆ **Billing**; the company produces the invoice,
- ◆ **Delivering**; the seller delivers to the buyer
- ◆ **Offering**; the company offers specific goods and services,
- ◆ **Paying**; the buyer pays the seller by giving a payment instruction, matching; the seller matches the payment information (the authorization results and the actual crediting of account) with the orders and feeds the result into the back-office,
- ◆ **Resolving**; the seller and buyer try to resolve delivery or payment issues related to the purchase.
- ◆ **Selling**; the company agrees with the customer on the content of a specific order,

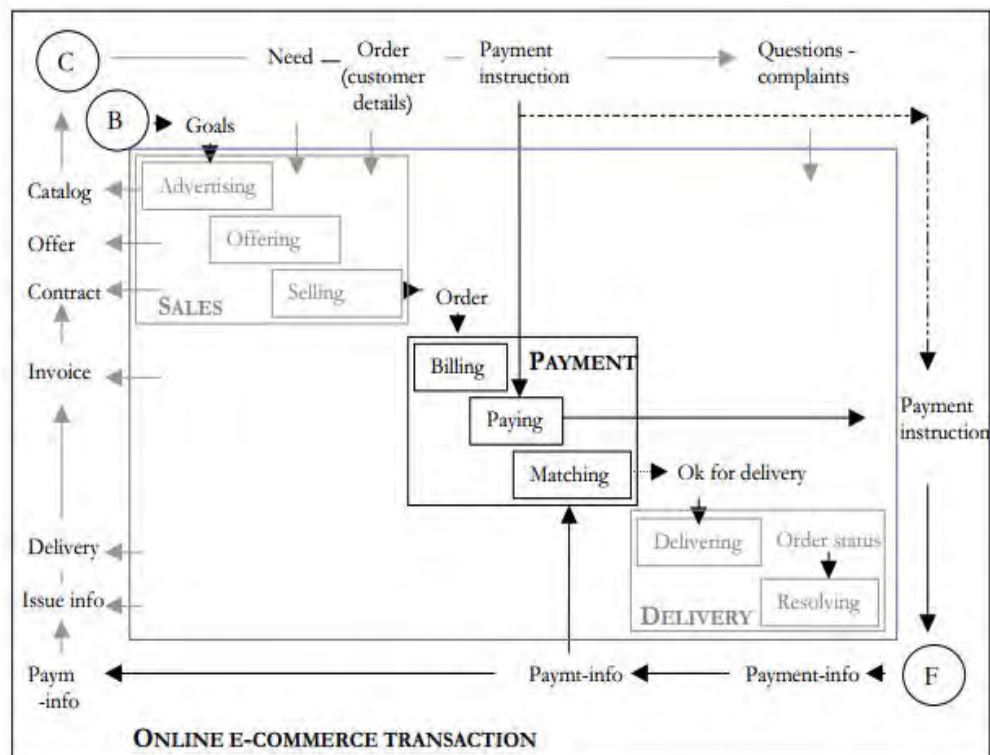


Fig. 4.12.3: Functional model of the online e-commerce transaction

However, in some cases, the payment can also be a separate off-line transaction or a transaction via a financial intermediary (depicted by the dotted line). The current payment instruments for use on the web have different characteristics in terms of risk and security.

4.13 Summary

In the present contemporary world, apart from change the thought-provoking terminology is business which is a driving force behind change, and how to insight into trade is a dynamics called integration. Organizations of the 1990's concentrated on the reengineering and redesign of their business processes in order to endorse their competitive advantage. In order to endure in the 21st century, organizations have started paying attention on integrating enterprise-wide technology solutions in an effort to progress their business processes called Business Information Systems (BIS). At the moment, more or less every organization integrates part or all of its business functions together to accomplish higher effectiveness and yield. The thrust of the argument was that Information Technology (IT), when skillfully employed could in various ways differentiate an organization from its competition, add value to its services or products in the eyes of its customers, and secure a competitive advantage in comparison to its competition.