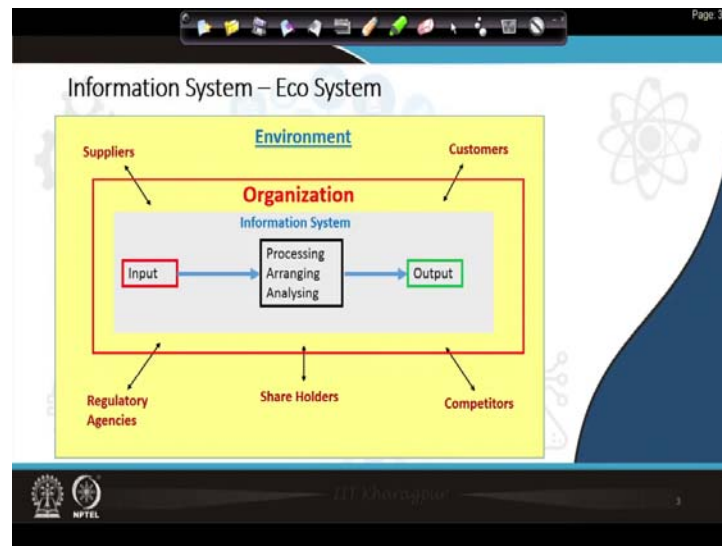


Management Information System
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Week - 01
Introduction to MIS
Lecture – 03
Dimensions of Information System

Hello and welcome back. Today we will talk about Dimensions of Information System. We have talked already about in the introduction of what MIS consists of. The various (Refer Time: 00:32) components of technology, also the organization how it is related to an organization etcetera and how the whole thing works. And now we will talk about dimensions of information system.

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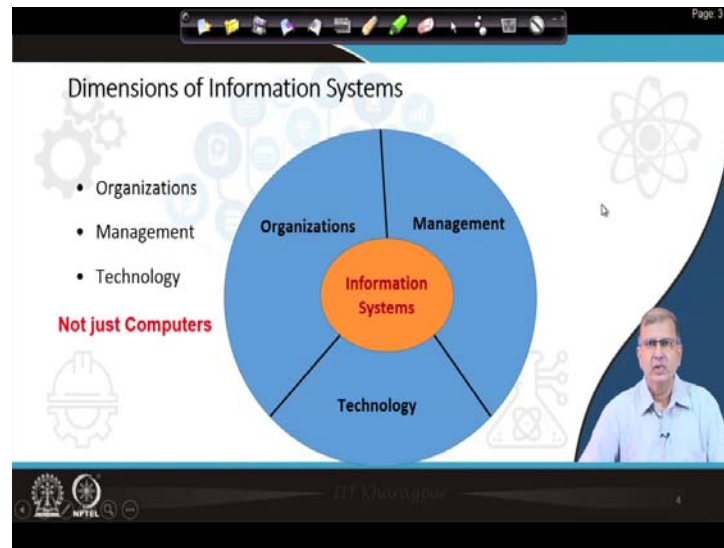
So, the ecosystem; how does it look like. If you see overall see the yellow box. The whole outside is the total environment within which we have an organization which is within the red square or rectangle that is showing the organization and within the organization, we are just showing the information system part not anything else. There are of course, many other components of the organization which we are not showing here.

Now, this is the gray box here is the information system. Here we have an input and then, we are processing, arranging, analyzing and we have an output. So, that is what we had also discussed earlier. Input > processing> output. That is briefly all about the information system at a high level. And now, if you go outside the organization who are your stakeholders are? Who are interacting with you? You have customers , suppliers , regulatory agencies that is a governmental agencies and tax authorities etcetera . Then you have your shareholders, the owners, basically the people who own the company and then you have your competitors. Employees etcetera there are many other stakeholders which is not mentioned here, but that will be within the organization not outside. So, from outside, you have customers, competitors, shareholders, regulatory agencies and suppliers. That is the overall ecosystem of an information system.

At the centre, at the core, at the heart is your information system and all of these people or the stakeholders are interacting with your information system or they are somehow linked to an information system. The outside world is seeing the organization through this Information System

They are not seeing the information system, but they are seeing the organization and within the organisation, we have your information system and through your information system, the organization is interacting with the various stakeholders with the environmental components like suppliers, customers, agencies, shareholders and competitors because finally, in a business, one of the major activity that you are doing, is you are sharing information and when you are sharing information, you have to do use your information system.

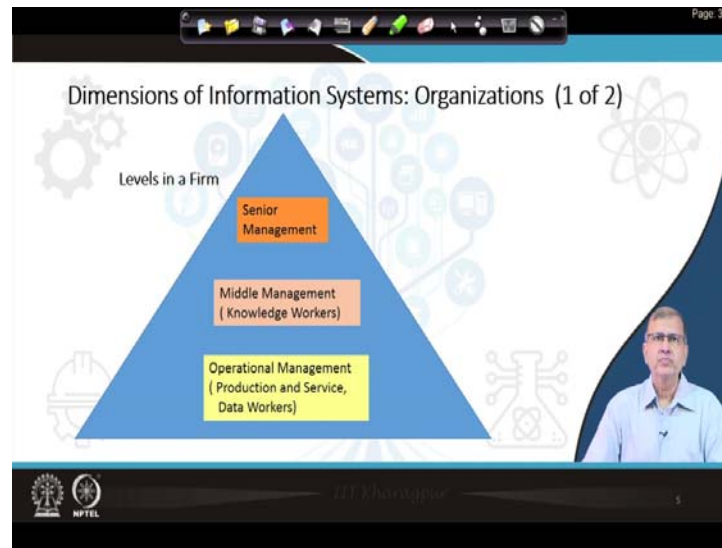
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Dimensions of the information systems is the main theme of today's this lecture . As I said, information system is at the center and then we have organizations, management and technology as the dimensions of this Information system

All that I wanted to tell you is that or you should note it (Information system) is just not computers. So, when we talk about MIS or information system, just do not think computers. I mean of course, yes when you enter an organization or you go to an EDP section or whatever or the bank you see computers in front of the person and everybody you see , is looking at a computer typing something into the computer. He has a keyboard, he has a screen and computer. Physically what you see is a computer, but information system is not just the computer. It is the other three dimensions viz. organizations, management and technology which represent IS (Information System).

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Hierarchical levels in a firm; If you take an organizations hierarchical structure you have three major levels. I mean not necessarily three, but broadly we can classify into three levels.

So, we have senior management on top, and then we have middle management. This is a very simplistic view so, that you can understand the various levels. Middle management we call them mainly knowledge workers because these are the people who take decisions and they need information. So, they need a lot of information.

Operational management at the level lower level who are actually running the show, running the business, the production and the service and they are the data workers. They are called data workers because they are generating and collecting data. E.g. When you do a sale, you are collecting a data that I sold 10 pieces of component to a customer x , 5 pieces to customer y, 20 pieces to customer z and 100 pieces each to a customer b, c, d etc. Throughout the day I am doing this. I am selling and I am generating the daily sales data. So many pieces at such and such price to such and such customer. This is how the data will be structured. Date – Time – Customer name - Quantity – Price.

Now, what the middle management will do is based on these, (the knowledge workers) then will generate a MIS report, the management report like the one report I had talked about earlier that north, south, east, west they have sold 40 lakhs, 50 lakhs, 30 lakhs worth of goods etcetera. These information comes up only when you collect the data at

that operational level. That is a very vital bottom of the pyramid level, the lower (operational) level who are actually collecting the data and that is the starting point of your information system.

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Dimensions of Information Systems: Organizations (2 of 2)

- Separation of business functions
 - Sales and Marketing
 - Human resources
 - Finance and Accounting
 - Manufacturing and Production

"Every business is different."

Class Exercise – Study the "Dabbawala" business of food delivery systems in Mumbai. What type of Information System is practiced for achieving 'Zero' defect service round the year.

NPTEL IIT Madras

Separation of business functions. Now that was hierarchical level and then now we go to into the functional outlook. So, the business can be structured as I said one was the hierarchy senior management, middle management, lower management and then, we have the pillars, the different departments which are the business functions. So, what are they?

They are Sales and Marketing , Human Resources, Finance and Accounting, Manufacturing and Production etc. Of course, there could be many other departments depending if it is a service industry or it is a manufacturing industry etcetera or it is a bank. Generally we think about these are the four major functional areas , viz. manufacturing and production, finance and accounting, human resources and sales and marketing.

But you should also keep in mind that, every business is different. So, although these functions are common across most companies, but their business is different, the business models are different and the business processes are different.

The point here is that the same MIS used by one company may not be used by another company. The hardware's can be common, but the software's can vary, the applications can vary, the tools can vary, depending on the particular business requirement. So, the functions are common, but business process wise they will differ.

There is another exercise for your self-study: you must have heard about the famous dabbawalla, of Mumbai, the people who deliver your lunch dabbas to your office.

They collect it from a house and deliver it to office and they are doing it for hundreds and thousands of people. They collect it, and then go by local train to a central point and then they distribute using the hub and spoke model. Probably they all meet at Dadar and then from Dadar, they distribute north line, west line, central line and so many lines in Bombay etcetera. Finally, it is delivered to your desk in your office at the right time. So, if you are expecting your lunch dabba to come at 1, it will come at 1 o'clock roughly.

It is a very classic supply-chain operation which has been studied as a business case by various B schools including Harvard, IIM Ahmedabad etc. Prince Charles is a big fan of this dabbawalla, he has studied this model, he has come and met them, and he is friends with the dabbawala owner to the extent that they attended their his marriage. Study this case and find out, what kind of MIS is practiced for achieving 0 defect service round the year. Throughout the year, 20 days a month, 5 or 6 days a week Monday to Friday I mean month after month, year after year they are delivering to thousands of people without any defect. They are a six sigma organizations and they have actually achieved nearly zero defect performance.

It is a phenomenal organization. I request you to please study through internet and try to find, what sort of information system are they using - formal, informal, using computers or using their brains or memory whatever. You will find this is a very interesting case study.

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Dimensions of Information Systems: Management

- Managers set **Organizational Strategy** for responding to business challenges
- In addition, managers must act **creatively**
 - Creation of new products and services
 - Occasionally re-creating the organization (e.g. Mergers , acquisitions , hiving-off , Joint Venture , Collaboration etc.)

Class Discussion – MIS issues related to the recent merger of Public Sector Banks

Dimensions of information system. Managers set organisational strategy for responding to business challenges. So, we have challenges every day like right now we are a facing a big challenge , the Corona crisis which is not only a challenge for the medical system but also for the business and the economy. What is important here is, the organizational strategy that is required to meet this particular challenge.

In addition, managers also need to act very creatively. So, creativity is a very important characteristics of a good manager. You have to be original, you have to be innovative, you have to be creative and you have to come up with new ideas which should be very different as traditional things will not work for these new challenges like the corona virus challenge which came as a new thing.

I have to develop my strategy based on my creativity because I never studied this type of problem before. It was not in my textbook when I studied management, there was nothing called pandemic and what happens if everybody has to stay at home and they cannot travel to office. How do I manage such a situation? No textbook has it, no management school has taught this in MBA courses.

But today, I have to run the business and somehow survive because it is a question of survival so, I have to be creative to come up with some new strategy. Creation of new products and services, occasionally changing the organization, if required for example, mergers, acquisitions, hiving off, joint venture, collaborations.

Again, sometimes it so happens that, my organization is not doing well, I am not being able to survive. So, what do I do? Can I merge with somebody more successful or can I go for acquisition and acquire another company or maybe I can give up a part of my company e.g , the loss picking division to another company or with somebody who is interested to form a joint venture, collaboration etcetera.

So, all of such things happen when you want to recreate and change the organization. There are plenty of examples available. Example of a large Indian Joint venture is Maruti Suzuki .

Sometimes, I need a partner because the partner brings in money and also most important in most cases for India, example the partner brings in technology. When I do not have the technology, I take a joint venture partner who brings in the technology and both of us bring the equal amount of equity, fund etcetera and we can start a business.

Mergers , like the banks for example, the government decides that three banks will merge into one bank. Last year state bank merged with all the other subsidiary state banks. Many public sector banks (about 6 or 7) were merged with Punjab National Bank in April 2020.

Mergers keep happening so that, the organizations can be made stronger , because due to competition , small banks, can have lot of problems in surviving.

Lot of scams are happening in our banks and banks are going under a loss. So, to help them to survive, mergers may be required, so that weak banks can be combined to form one big strong bank. These mergers impact information system in big way.

A class discussion for you MIS issues relate to the recent merger of public sector banks like three banks were merged now they have difference in their MIS systems which will affect how they work after the merger. So, how do MIS issues get resolved? When you become one, you have to homogenize as you cannot have three different information systems working in a same organization. So, how do you handle such situation?

I would suggest if you can do some reading on your own this will be interesting and this had happened recently , in last 1 or 2 years when several public sector banks got merged

in India. Please read about that and find out how they handled their information system merger homogenization.

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The slide is titled "Dimensions of Information Systems: Technology" and is presented in a video player interface. The slide content includes a bulleted list of technology dimensions: Computer hardware and software; Data management technology; Networking and Telecommunications technology (with sub-bullets for Networks, the Internet, intranets and extranets, and World Wide Web); and IT infrastructure, which provides the platform for the system. A red text box states "Information technology is at the heart of information systems." The slide also features a small video inset of a man in a light blue shirt and a background graphic of a tree with nodes. The video player shows a toolbar at the top and the NPTEL logo at the bottom.

From a technology perspective, the dimension of an information system are as, we had discussed: hardware and software. We know that we need fundamentally computer hardware and software and the data management technology or applications / tools. You need another tool to handle the data (ERP for example) is one such tool , which captures data and then helps you to generate report.

Business intelligence type of tools are used to manage your data and convert data into meaningful reports, intelligent reports, smart reports so that, it helps managers to take better decisions. Because if I get more information and better quality of information, different ways of looking at the same information , you get a lot of views. This is done by slicing and dicing of the available data and the information (in the form of charts , graphs etc.) can be seen from angles to get more clarity and I can get a better perspective or I can get different perspectives.

What happens if my customers are from North India? What happens if my customers are from East India? What happens if my customers are from the North East? So many perspectives are required and for taking smart decisions and that is where such tools help.

Networking and telecommunication technologies are very important of course, as without network, (internet, intranet, worldwide web) nothing moves today. So, we cannot think about a life without internet for example, and all the computers we use are connected with in an organization which is called intranet or LAN (local area network).

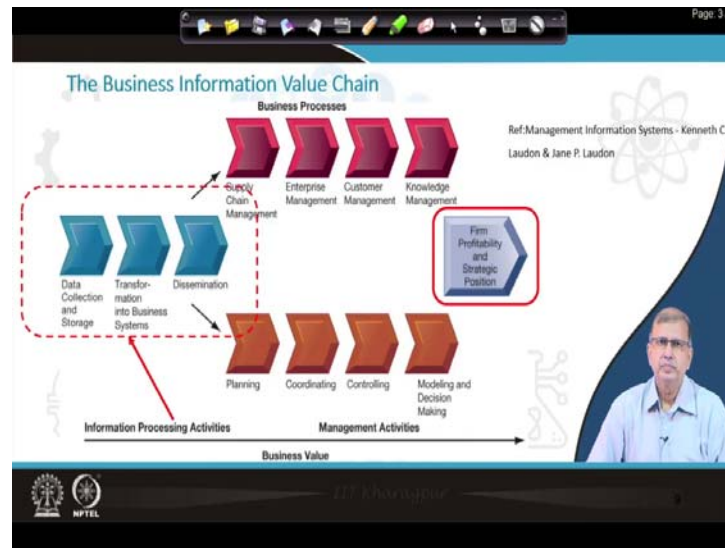
All the offices in the country for example, will be connected through extranets. That is called WAN (wide area networks) not only the country, but also for a multinational company which has got offices in many countries in the world. All of them will be connected through their own extranet or WAN (wide area network) .

And then finally, we have the www (world wide web) . Using this (www) we can connect anybody to anybody from anywhere in the world. That is the open connectivity. Anybody having a web service can talk to each other or they can connect with each other for exchanging data. These are the very essential dimensions of information technology from the technology perspective of information system.

IT infrastructure provides a platform on which the system is built on. Finally, we are talking about how the management information system will be built on this IT platform. The IT infrastructure provides a platform and on that platform, we build this knowledge system through which we manage the entire knowledge data base of any organization.

What we say finally is that, information technology is at the heart of information systems. So, the heart is the technology without these technical components we cannot run an information system. We need hardware, we need software, we need connectivity. So, we need to be interconnected of course through Internet (which is the backbone) and we also need computers and softwares.

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The business information value chain. See on the left is the information processing activities. What are they? Data collection and storage, transformation into business systems. So, first is a collection part like how much sales you are doing etcetera , I collect and store. You have to store somewhere using a computer and then, transform the stored data into business information .

And then dissemination. Dissemination means now you spread it out. Take out a report and then give it to the person concerned because you do not give everything to everybody. The purchase related information, the vendor related information etc. I will give it to the purchase manager. The sales related information I will give it to the sales manager, the manufacturing related information I will give it to the production manager, production in charge and all the finance related information I will give it to the finance manager.

Now the business processes they are on the top layer. The top layer business processes consist of supply chain management, enterprise management, customer management, knowledge management. These are the different processes where the actual transactions are happening and generating data. Whenever a transaction happens, it creates data. The output of any transaction is a data apart from what business action / outcome it is supposed to do. From an information system MIS perspective, the output of any

transaction is data and you collect the data and then convert and disseminate it in the MIS section shown on the left hand side of the chart.

In the lower side here, what you see is management activities. What are these management activities? Planning we have been talking planning, right as managers you start the day with planning, and then you are coordinating. Coordinating means integrating various functions. We will talk about this more, when we talk about ERP (enterprise resource planning) as to what coordination is all about. The production manager has to coordinate with the purchase manager because he needs to know when his vendor will be giving the raw material or the sub assembly or the components which he needs for his final production line. This is an example of coordination.

The purchase manager has to coordinate with the finance department because he needs money to buy things. So, he has to coordinate with the finance guy and the sales guy has to coordinate with the production manager because he needs to know when his material will be ready for the customer because the customer is waiting for it and he is calling him up as to when he (customer) will get his material.

HR is of course, there, which talks with everybody regarding employees etcetera. Everywhere we need to have a lot of control functions because the business is all about controls and we have to control things because otherwise it will become unmanageable.

Based on the information you are getting from your MIS system, you work with models and what-if scenarios and then you make decisions , for example , whether to give discount, when shall we give the discount during the Durga puja vacation, during Christmas vacation, during the summer seasons etcetera. Many products can be seasonal products like air conditioner , refrigerator etc. and they sell more during April, May, June the hot months, they do not sell so much in the November, December . So, shall we give discounts in the winter so that we can sell some air conditioners during the lean season. All such decision-making is being done here. This is the management activity.

Finally, is the firms profitability and strategic position. So, ultimately, whatever we are doing is basically to ensure profitability and strategic positioning of the organization.

This diagram is taken from the textbook MIS by Ken Laudon and Laudon. It is a very significant diagram and you should try understand the entire business information value chain.

Because it takes care of three basic things like the business process, the management activities and information processing activity and shows us how Information Processing is linked with the two main arms of the business, namely, the business processes and the management activities.

These are the two main arms the one on top and the one of the bottom and they are being supported by the MIS - the information processing activities because without this they will not be able to survive on their own.

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Complementary Assets: Organizational Capital and the Right Business Model (1 of 2)

- Assets required to derive value from a primary investment
- Firms supporting technology investments with investment in complementary assets receive superior returns
- Example: Invest in technology and the people to make it work properly

e.g - Petroleum Companies having Retail business in Petrol Pumps

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Complementary assets. Organizational capital and the right business model. Assets required to derive value from a primary investment. So, you have many primary business that is where you need assets to derive value from your primary investment . Assets means whatever is being used e.g. machineries, plants, information system etcetera we consider information system also an asset. So, you need to derive value from a primary investment.

Firms supporting technology investments with investment in complementary assets receives superior returns. Apart from your basic assets which you need like plant and

machinery etcetera to make your products , you need to encourage investment in information technology . This has been seen to give superior returns. We have been talking how MIS helps business in making decisions, making smart decisions, making intelligent decisions etcetera , which result in getting better performance.

A very interesting thing happens when you invest in technology and the people to make it work properly. I will give you an example how it happens, it not so much in India but we find this very common in Europe and US petrol pumps. The oil companies their business is to sell petroleum or diesel and all stuff like that. But along with that, in their petrol pumps they also do lot of retail business. They have a retail store and those stores are very popular and they also have a restaurant. So, people stop to take petrol and then they buy things and then have coffee and snacks. So, that is also owned by that oil company. So, the oil company is not only selling oil, it is also selling retail products and doing a restaurant business as well. This is an example of complementary asset.

That is where information management system helps that you can run very disconnected business environments and business activities using the help of complementary assets along with the help of information technology. It is a question of selecting the right business model.

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Complementary Assets: Organizational Capital and the Right Business Model (2 of 2)

- Complementary assets
 - Examples of organizational assets
 - Appropriate business model
 - Efficient business processes
 - Examples of managerial assets
 - Incentives for management innovation
 - Teamwork and collaborative work environments
 - Examples of social assets
 - The Internet and telecommunications infrastructure
 - Technology standards

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Some of the examples of organisational assets are appropriate business model, efficient business process that is what we know, that we have now the complementary assets one

of them is the organization part. The organizational assets will be appropriate business model and efficient business process. Like the example I gave oil company running a retail business. They have to have an appropriate business model of doing the two very dissimilar things at the same place and parallelly. You have to have an efficient business process to manage these two very different type of businesses.

Now if you consider what are the examples of managerial assets. There are incentives for management innovation and there is a teamwork and collaborative work environment. Teamwork and collaborative work environment is very important as I was discussing in the previous two slides before , that in the organizational perspective you need coordination amongst functions. Between production, purchase, sales, finance, HR everywhere coordination is the key. Collaborative work environment is very important and that is again a part of teamwork. Without teamwork, you cannot have collaborative work environments.

You have to give incentives for management innovations. Innovation is a very big topic like anything new thing happens we have to innovate and we have to find out new ways of doing things and we have to incentivise that. When you incentivise, people in the organization get challenged and they are encouraged to innovate. This is a very important managerial asset. If you have employees innovating , employees are encouraged to come up with innovations that is a very good managerial asset in the sense that more a company innovates, the more successful it will be in its business because innovation is the key for success.

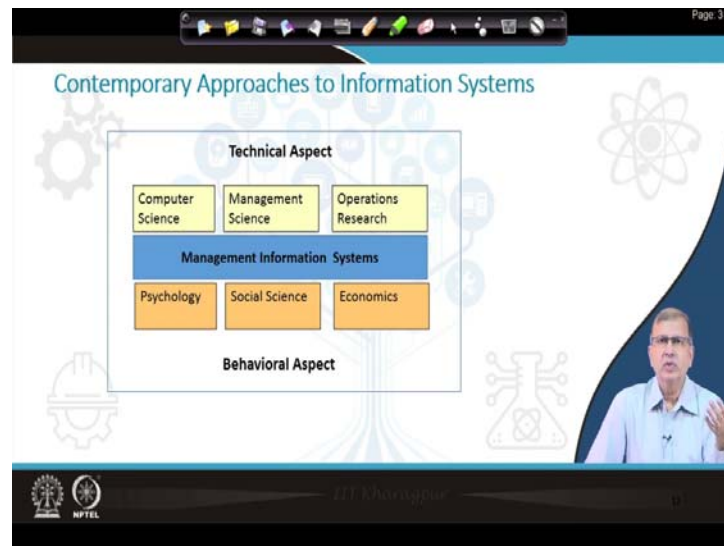
Examples of social assets; the internet and telecommunication infrastructure and technology standards. Now because of internet and telecommunication infrastructure as I was talking, we can now communicate very easily. So, this has become a social asset in the sense, you can contact, you can reach out to anybody to your customers, to your suppliers anywhere in the world.

So, now a day's geographic location is not important so today I want to talk to anybody in London, I can do it, I can call up, I can talk, I can see, we can do a video chat etcetera. So, we can interact socially very easily because of this technology of internet and telecommunications infrastructure.

The technology standards the way it is improving every day and the things are becoming easier and cheaper. Making a video call which was not so easy 6 months back or it was not free, now it is free. Google talk is free, Zoom is free and we can call easily anybody for free.

These are some of the complementary assets which are becoming organizational capital and it is helping us to develop the right kind of business model.

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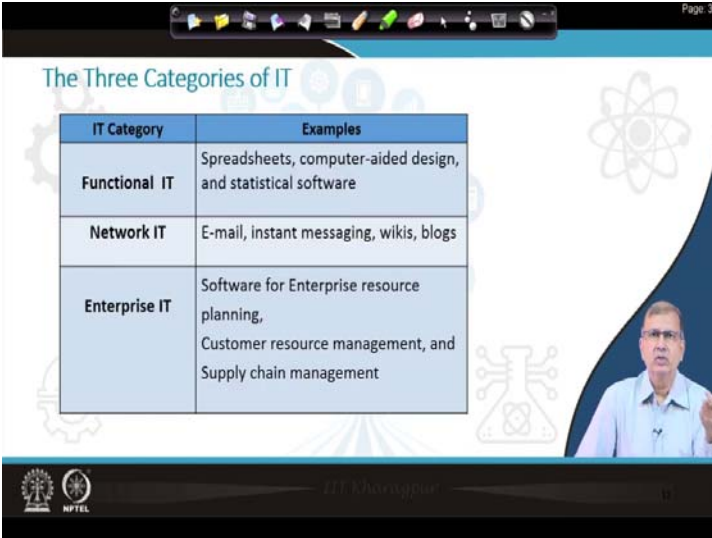
Contemporary approaches to information system : MIS at the centre, and we have Technical aspect which we have been talking about for some time. In the beginning I had told you we will be discussing the subject areas which are involved with MIS e.g. computer science, management science and operations research because operation research is all about data analytics.

On the other side you see Behavioural aspects, we are talking about psychology, social science and economics. So, that is now has become the spread of MIS the information system. It is not only involving computer science, management science and operations research which we could probably you know easily guess yes MIS is all about computers, management of decision making and operation research is all about models like the supply chain models and data analysis etcetera , but also is now involving subjects related to Behavioural science.

But what about behavioural aspects of psychology, social science and economics. Human behaviour and how we interact with others - the psychology part of it etcetera and the micro and macro macroeconomics issues all are now playing a role in MIS. These areas are also becoming a part of the information system.

That is what the your ecosystem is now gradually growing in terms of knowledge area. These are the various knowledge areas which are also an inherent part of your information system ecosystem you can say. So, even subjects like psychology, social science and economics are being now considered in the study of MIS.

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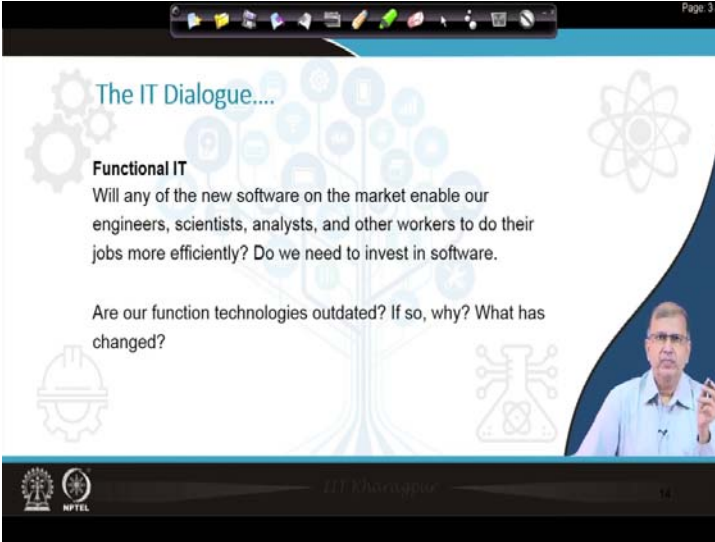


| IT Category | Examples |
|---------------|--|
| Functional IT | Spreadsheets, computer-aided design, and statistical software |
| Network IT | E-mail, instant messaging, wikis, blogs |
| Enterprise IT | Software for Enterprise resource planning, Customer resource management, and Supply chain management |

The three categories of IT; Structure wise there are three IT categories. Functional, Network and Enterprise IT Functional IT is spreadsheet, computer aided design and statistical software (examples of functional IT). Network IT is email, instant messaging, wikis, blogs etcetera. These are called network IT because these use internet and networking.

Enterprise IT refers to the business environment , e.g. software for enterprise resource planning ERP which will again talk later and customer resource management CRM and supply chain management SCM etc. and these we will touch upon when we will discuss in a different session. These are known as Enterprise IT.

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The IT Dialogue....

Functional IT
Will any of the new software on the market enable our engineers, scientists, analysts, and other workers to do their jobs more efficiently? Do we need to invest in software.

Are our function technologies outdated? If so, why? What has changed?

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The discussion for Functional IT's is whether any of the new software in the market will enable our engineer, scientist, analyst and other workers to do their jobs more efficiently? Do we need to invest in new software? Now these are the questions as a manager you have to look into when you are starting a new company and you are now thinking what sort of information system should you have.

What softwares do we need to select? Which will be more effective? Enable our engineers, scientists, analysts and other works do their work jobs more efficiently. Always remember IT is an enabler. IT helps you to do your work in a better and faster way. If technologies are getting outdated , you will need to find out what to buy to replace these.

These are the questions as a finance manager (CFO) which you will need to ask to your CIO. When he comes in and says sir we need to buy these new software you may ask why? Why do I need it? What is the advantage? What is happening to my existing one is it not doing the job ? why do you need it? So, the CIO has to now justify. Softwares are expensive and hence all new purchases will need to be justified with business benefits.

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The IT Dialogue...

Network IT

- How do our people collaborate? Do we know what technologies they're using?
- If we wanted to get broad feedback on an important topic, how would we do it?
- How do we know what our people are working on and what they think the hot topics are?

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When you are talking about network IT, you ask , how do our people collaborate? Do we know what technologies they are using? So, collaboration is again a very big activity in an organisation. Nowadays, we are not in the same place, spread out and you are all at virtual locations everywhere spread out so, you need to collaborate.

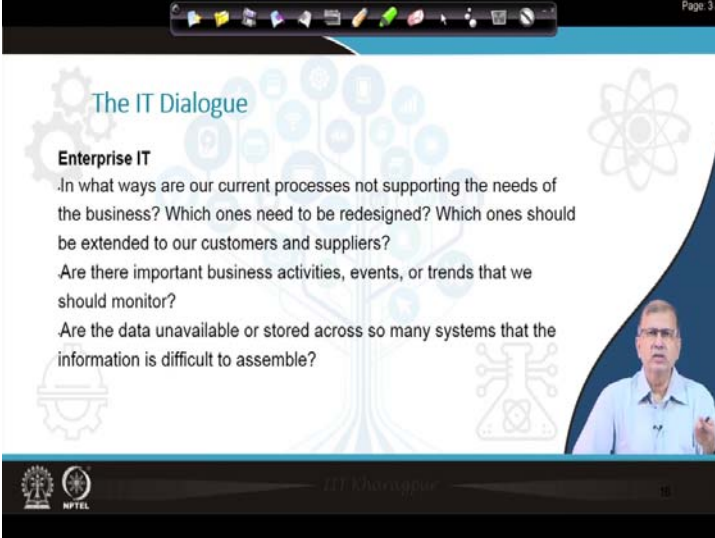
For this you need collaborating tools, chat tools, other platforms where you can collaborate, file sharing platforms, cloud sharing drives where you store files in clouds and can share with other people.

If you wanted to get broad feedback on an important topic how would we do it? How do I get a feedback system? People are spread out. So, what sort of technology can I use? Can we create a Google Form and get feedback online from people or from customers? How do I know what the employees are working on and what they think about the hot topics being currently discussed. I mean how do I know what they doing so, what software should I use, can I use a blog for example, can I use wikis.

Tools like Wikis can be used where people can edit and put their ideas and then, we can have a discussion forum, for example. They can write blogs on new ideas to explore for contribution and feedback as to whether the idea is a good one or not. Others can comment on this idea and the discussion can go on for further improvement or rejection of the idea.

So, that is how wikis and blogs are used in the social environment network IT in a big way in various companies to generate ideas, for innovation, for coming up with new ideas, encouraging people to come up with new ideas, discussion forum, encouraging them, supporting them, giving additional ideas so that people can work and because you do not see people for you know months, years, as they all spread out across the world but still you have to work.

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The image shows a presentation slide titled "The IT Dialogue" with a speaker in the bottom right corner. The slide content is as follows:

The IT Dialogue

Enterprise IT

.In what ways are our current processes not supporting the needs of the business? Which ones need to be redesigned? Which ones should be extended to our customers and suppliers?

.Are there important business activities, events, or trends that we should monitor?

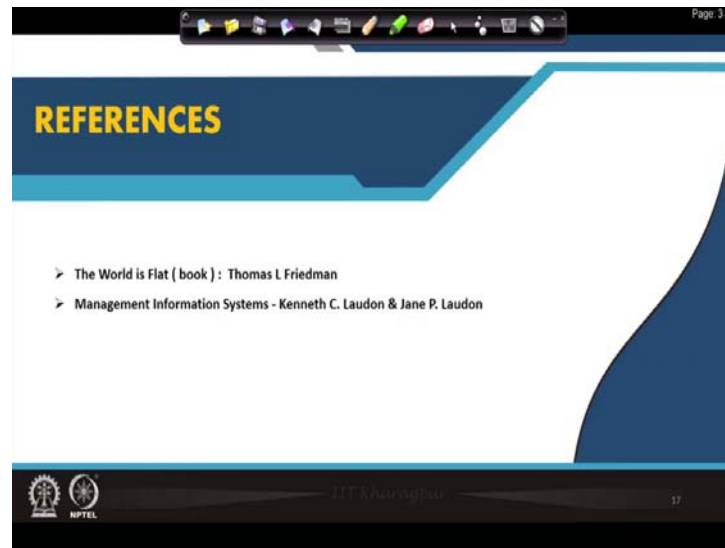
.Are the data unavailable or stored across so many systems that the information is difficult to assemble?

The slide features a background with a stylized tree of nodes and icons representing various IT and business concepts. The speaker is a man in a light blue shirt, gesturing with his right hand. The slide is part of a presentation, as indicated by the "Page 3 / 3" label in the top right corner and the NPTEL logo in the bottom left corner.

Enterprise IT is what you are doing in your business, in what ways are our current softwares are supporting the needs of the business because the ERP software's are very expensive. So, you have to very judicious, and you have to make your judgment as to whether I shall invest now or should I go for a simple system or a expensive system as these are very complicated software, difficult and expensive to maintain. You have to take a very conscious judgment, very important management decision as to what sort of software's I should invest is and implement.

Are there business activities, events or trends important that we should monitor? Are the data unavailable or stored across so many systems that the information is difficult to assemble? You may have too many islands of different software's for different applications, which are not connected. So, how will you get meaningful business information. So, all those sort of questions we will again discuss during while the ERP session.

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Dimensions of IT system I have covered today in brief and I gave you one some case studies for self-reading. I would request you try to read them on your own because they will give you very interesting insights, when you go through those cases.

Thank you very much.