Management Information System
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Week - 01
Introduction to MIS
Lecture - 04
Information Management in the Digital World

Hello and welcome back. In this session we will talk about Information Management in the Digital World. So, we have been talking about digital world quite often the last few sessions and but we will just take some now components of various aspects of digital world and go one by one. I mean all of you are aware of it, there is nothing very new because these are the things which all of us are now a days familiar with and aware of and we discuss quite often in various forum.

I will take you through them and some of the impacts and potential impacts and how they are becoming so relevant to our lives and also obviously, it is impacting our business environment, our education environment or social environment, cultural environment all of them and they are generating trillions of data. The whole thing is that, we are using these to generate trillions of data and from data we are getting information.

These are impacting our lives in a very big way to the extent that we are actually losing lot of privacy. It is a very different discussion altogether, but with so much of our information is being taken out , like the way we work, the way we talk, the way we use the internet that we reveal knowingly and unknowingly .

Sometimes these have its negative side also and there is lot of bad things which happens. Sometimes they are misused, but we will not discuss that in this class as that is a different discussion altogether. But it is all relevant as it is all part of the overall management information system we have.

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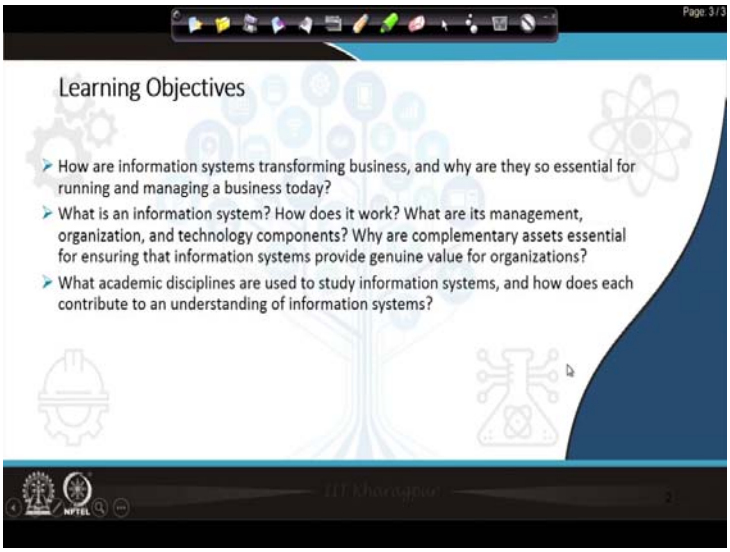

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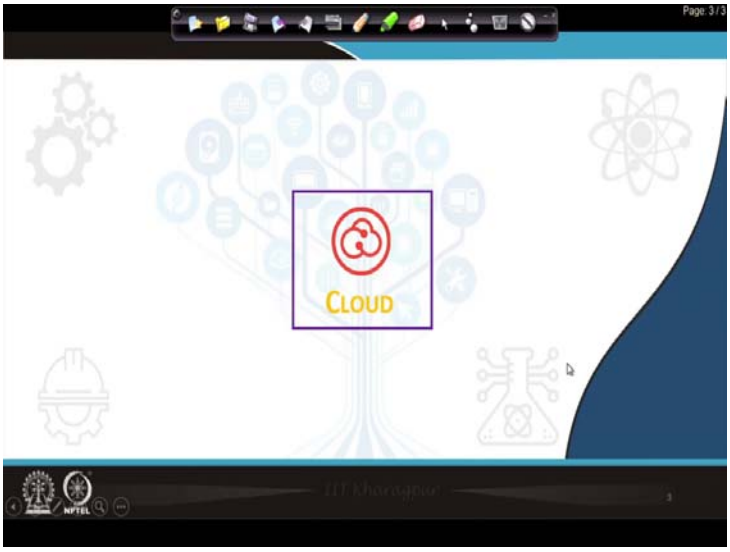

So, we will start with cloud.

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You all heard about cloud computing and cloud services and everything is in the cloud. We are doing everything in the clouds we do not, not necessarily invest today in an organisation in hardware like servers for example, to make a server farm of their own. Because that is a cost, that is an investment and then we have to replace it every 3 years or 4 years as the technology keeps changing and sometimes they becomes obsolete. That is an additional cost.

Things like a server farm which is comes up as a combination of lot of servers and you call it as a Cloud. You can run business from the cloud on a rental basis. You do not have to own and you have to just pay rent and pay rent to the extent of amounts of area or amount of volume or amount of space or server capacity and time you are utilising.

It is a question of capacity and time. As a function of capacity and time you are paying a rent like you rent a house, rent a room or a hotel room and things like that. So, it is becoming a service. It is not a product but, it is a service.

There are 4 categories of services in Cloud offerings system. They are : Infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a service (SaaS) and Business process as a service (BPaS). It is just different maturity levels of service delivery. The basic thing is infrastructure; obviously, you start with the infrastructure, where we just have a collection of servers which you can occupy and do your functionalities and you can store data.

These are the common data centres. You start with an infrastructural service. You hire a server and hire some storage capacity and you pay, the rent. The next level , the company which is owning that server farm or Cloud now gives a more value added offering called as Platform as a service (PaaS).

Examples are Amazon web service (AWS) or Azure. Azure is by Microsoft. They offer you a platform which is ready with an infrastructure and the OS (operating systems) are there inbuilt. You can use it in a better way and you can start to develop your applications there and you can do coding etcetera , whatever is required for developing the application software. Build up your own products, software products in that platform and use it or sell the application developed . Use it as a platform for developing your own specific software product and use it. That becomes your development platform, the other base facilities of the infrastructure plus operating systems and other relevant software which may be needed to develop any app for imagine android based system you want to use. So, you need the android API's for example, android product library for example, to develop your own product in that platform.

The next one is a Software as a Service. One step ahead where the Microsoft MS Office for example, Google docs etcetera so many software's you do not want to buy, you have to buy licence and say suppose in Microsoft Office, licence will cost may be 10000 rupees or 20000 rupees and you have 100 people in your office so, for each of them you need a licence software. So, 100 people into 20000 it is some money. So, I do not want to invest that money unnecessarily.

You can use software as a service that everybody may not need that Microsoft Office functionalities? Whosoever needs the Office software uses it through a cloud and you pay in a rental basis so, monthly probably with so much of hours of login of using Microsoft Word or Microsoft Excel or PowerPoint this will be your rental charges and those things often work out much cheaper. Also it is not an investment, it is not a CapEx and you can use it and you know and you do not pay when you are not using it.

And the final one is a Business Process as a Service. This is why this is the most advanced service examples like Salesforce dot com or Workday. Workday is a HR product and Salesforce is a sales and marketing product. So, it is a ERP type of thing, it

is a product by itself and it has got standard business processes built in for various industries.

Now, you can now take that business process and use it for your industry may be with little bit of customisation which they will do to tune it to your requirements. Your customer data, master data, supplier data, employee data, material data all those important master data will be uploaded and you will be running your business process as if you had your own ERP for example.

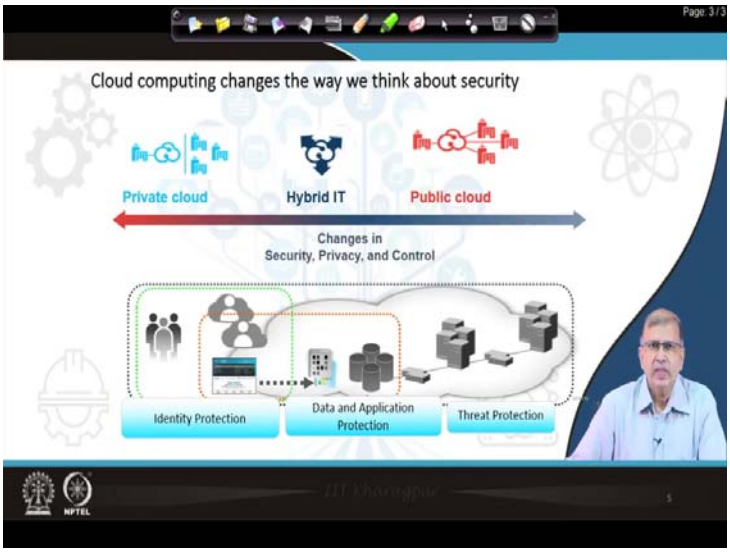
You can also implement these softwares in your site investing in servers and other hardware. But in this case, you have to buy a server, you have the hardware, you have to have a team to maintain that server, you have to have an IT team and then you have to buy the licence for the Salesforce dot com and then use it and then they have annual maintenance charges etcetera and then, they will also keep upgrading every 1 or 2 years so, you have to also upgrade etcetera . In other words, apart from initial investment , there will be recurring expenses as well.

But when you take a business process service, then first you do not have to buy a server or any hardware. You do not have to maintain them and you do not need an IT team to run those servers 24 by 7, 365 days on 3 shift because sales teams are working everywhere in the world. Then also you do not have to bother about the upgrade of the software because the software will be upgraded by the cloud service provider who is running and maintaining that Salesforce dot com tool technology.

So, everything all headache is taken care. I mean you do not have to do anything. You pay monthly or annual rental depending on the amount of transactions that you are doing.

It depends on whatever the pricing policy would be. It could be by hours; it could be number of transactions or the volume of data etcetera. Various ways of pricing such services are used, but these are of definitely much simpler for you in the sense, you do not have to invest in people (IT trained), maintenance contracts with the server supplier etc. There are so many functions and so many things to be considered when you have an asset.

Additionally, office space, air conditioning, power cost I mean so many things come in for consideration. All those things can be avoided using Cloud computing .



Cloud computing changes the way we think about, security because now it is no longer under your control. The servers are with somebody andyou do not know who and where. In fact, many times you may not be knowing also where is the Cloud (servers) are located.

Security definitely is always an issue with IT systems. You can have things like a private cloud and the other extreme is a public cloud. Private cloud is an cloud dedicated for you. So, nobody else no other enterprise are sharing your Cloud.

From a security perspective, this is of course, more secured than your public cloud which has security concerns because anybody can use that cloud. You do not know even if your competitors are also using that same cloud that you are using and there could be some security breach. On the security side, private cloud is obviously, much stronger, but again it is a question of cost as private cloud will be more expensive. In between you can have hybrid cloud that is, you can have your critical functions operating on a private cloud and general functions running on a public cloud.

You want to optimise your cost so that, you can say some of these are my very critical functions like sales data or the finance data. These two are very critical and important and so, I do not want to risk it. These will be in my private cloud and the balance whatever production, operation, maintenance, purchase, HR these are not so sensitive. These could be on the public cloud. By this way, you can optimise your cost.

The security angle includes identity protection, data and application protection and threat protection. We are all quite familiar with things which are happening here in the IT world, the security angle, hacking etcetera apart from the virus part. There can be lot of hacking etcetera taking place and it is happening. Nothing is full proof and risk is always there.

But there are plenty of advantages for Cloud technology, that is why this business is growing and people are going for more and more of Clouds offerings.

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From cloud, now we move to analytics. Data followed by analytics is the foundation or base of information system.

Now a days, you are hearing about big data and big data is all about the three V's of big data, namely: Volume, Variety and Velocity. All of these are exponentially increasing. In 2020 for example, 35 zettabytes of data is getting generated annually.

80 percent of world's data is unstructured and there is lot of unstructured data being generated. That is where artificial intelligence (AI) is being heard of , but we will not discuss AI now. It is coming in a big way and is being used to extract meaningful information from unstructured data because conventional data analysis tools will not be able to handle unstructured data.

90 percent of worlds data has been generated in the last two years. You can just imagine the way data is growing is simply phenomenal.

1 in 3 business leaders frequently make decision based on information, they do not trust or do not have. You need deeper insight. Everybody is looking for more of analytics . How can I get more information? I have lot of data, but can I have more information because I am not sure how I am interpreting the data whether I am doing it rightly or wrongly. I need more intelligence. , that is where AI again is coming in a big way.

1 in 2 business leaders say they do not have access to the information they need to do their jobs. You always still feel that I could have done better with more information. You are always thinking that whether I getting enough information. Do I have all the information that I need to take a balanced decision.

That question will always remain and it will always be there. You will never be satisfied with the amount of information you have, you will always look for more information. 83 percent of CIO's cited business intelligence and analytics as part of their visionary plans to enhance competitiveness.

We have discussed earlier how business intelligence, is a smart way of getting more information, better and smarter information with the help of analytics engine which runs behind those all these Business Intelligence softwares.

60 percent of CEO's need to do a better job capturing and understanding information rapidly in order to make swift business decisions. It is a question of timings. I cannot take several days to take a decision. The world is not waiting for that, and your stakeholders will not give you time. You have to take decision very fast because the world is moving very fast and you cannot wait. That is why you need lot of help from the information management system.

Need for business analytics was never much like today. The amount of y data which is coming in, somebody has to analyse that because otherwise it is all meaningless. We just have data and there is no analytics being applied will have no use. It is all garbage.

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Analytics presents security risks and opportunities. Again question of risk, hacking etcetera and then opportunities. Larger and more diverse data sets, faster analysis, deeper insights, predictive models etc. give business opportunities. There is a big data explosion shown on the left of the slide comprising of items like, personally identifiable credit card data, health data, intellectual property, social media and sensor data. All of these are useful to us but also can be hacked by others and then it becomes a Risk factor.

These are the sources which are generating huge stacks of data and subsequent analytics using, faster analysis, deeper insights and predictive models are generating lot of very useful business information, however, we have to weigh out the opportunity verses risk factors.

We get lot of advantages with all these information, but what about the risks. Somebody has to take care of the risk. One should never forget that angle. Do not just think about - advantage, advantage, advantage, but always keep track of the risk factor.

That, you do not take undue risks of damaging your customer's security for example. If you are running a bank for example, and if the bank's IT system is not very much secured, then your customers money can get stolen. You are putting your costumers at risk. You have got lot of responsibility when you running an enterprise and then you have to take care of the security system.

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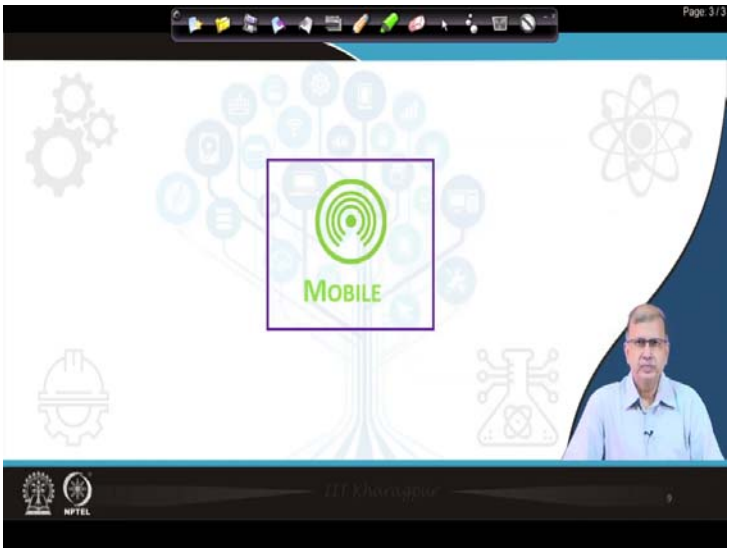

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Mobile; As mobile use grows so do security threats. The number of cell phone users is growing rapidly and very soon there may be more number of mobile phones phones than the population of the world (7 billion).

Mobile downloads increased to 108 billion in 2017 and these are all I mean numbers which all of us know. Mobile malware is growing, and malicious code is infecting more than 11.6 million devices at any time and its growing.

All of us are buying mobile, using mobile apps coming everyday etcetera, but then you will start hearing this app is diverging your information, it is taking out your information etc. We are accessing our banks through our mobile phones and we use our pins and passwords , we type and we go to our bank site and do some transactions and whatever , like seeing our balance etcetera.

If there is an application which is stealing these information then may be somebody is collecting our bank user ID, password etcetera and then he can later on login to my bank account and take me money away.

These things happen and we see in the newspapers almost every day we read such things happening , digital scams etc. It is a very risky thing no doubt, but the advantages are so many that they out way all these risks and we cannot today think of living without these applications and facilities of doing such transactions from anywhere and anytime. Take for example, ATMs. We know that in ATM lot of things happen like people steel your pin and after you leave the ATM they take out money from your account. We have seen in newspapers about many such incidents

But can we think of a life without ATM. I mean we cannot now go back to that same old bank, go there, stand in a queue, fill up a form or submit a cheque, then wait in a teller counter and after a long wait, they will call by numbers and then you will go and then they will hand your cash. You will not and nobody will even think of going back to that system what we use to do 10 years back.

Today there is plenty of ATM's we just walk in, there is no crowd, no people there you just walk in takes 2 minutes you get your cash, you leave the place and you can do many things apart from taking cash. You can deposit cash, get your account balance and also do many other functions from ATM and from your phone.

Are we ready to sacrifice all these advantages because there are certain risks or threats or bad things which had happened and which are happening to people? Specially they target elderly people who are not, very conscious or mobile conscious.

There is a group of vulnerable people, especially in the rural areas where they are not educated enough and are not IT educated and they can be fooled and cheated. But still the advantages are huge and we cannot go back really. Instead ,we have to focus on

security, security, security how to make things more secure and also to educate and train people on the usage of these technologies.

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Internet of things and industry 4 dot 0. People connecting to things. This is a very interesting diagram where you see a person who is running and then there is a ECG sensor, he is carrying and which is monitoring his heart beat etcetera.

Then he has got a motion sensor, which is monitoring how much he is walking, running etcetera and then on the hand he has a motion sensor which is connected wirelessly to his phone and the phone is connected through the internet and then that information can be shared with his doctor sitting in the hospital or it can give other reports etcetera.

A person's health can be monitored remotely by his doctor or office or the hospital consultant etcetera in this fashion. It is known as Internet of Things (IoT). Using internet, we can connect sensors to a data collecting device. A sensor can be connected to either computer or to a phone or to another sensor etcetera using wireless internet. The internet is the backbone through which all these connections are been done. This is how we are doing this sensor based connections and which is now known as internet of things – IoT. IoT is coming up everywhere and we are talking about smart cities you must have heard about smart cities. That is heavily dependent on internet of things (IoT) where for example, the smart toll plaza , we do not now pay cash when we cross a toll in a highway. There is a camera which reads the RFID card pasted on my car's front wind

screen and the camera reads that RFID, reads my card number and they deduct the toll charge from my bank account.

I do not have to take out cash and pay. This saves time and traffic can move faster. Tthis is an example of internet of things – IoT which we are now everyday using in any highway toll station.

Similar things are happening everywhere. This technology is getting used in many places and you will see more and more of all sensor based things in places like Supermarkets for example. There will be sensors which will be monitoring you and then from your mobile phone data , they will probably know what your preferences are and they will keep sending advertisements for example, to your mobile handset for products. They know you like Amul milk and they will send advertisement of Amul milk or they will probably guide you to the area where you will find Amul milk. This can be of great help in quickly locating things that you want to buy.

Things will become more and more such data driven and there are supermarkets in China and many places where there is no human being present to help you. You just walk in, go to the place, take out all thing, pay at the counter, where you have to just swipe your card and things get paid. Unmanned supermarkets are becoming a reality in many places. Whether this is good or bad I do not know as there are various perspectives, but that is how technology is moving.

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, connecting information people and things is a greatest reurce ever to drive insightful action. , now, I mean it is becoming life is becoming completely different the way we work, the way we think because we are all now connected.

, there is a internet of connect content, internet of people and internet of things. , we first started by contents like all these computers now connected through internet. , I can access a server mewhere and get my contents. Suppose I start do a search in Google and then, I want to find out like that any case study if I give you will go to Google search and get the information about that case study. , that is internet of content.

, now a days a content is available. You just have to search you go to Wikipedia and you get all the information you want and it is like an online encyclopaedia. , you do want to find out anything mething about say pyramids you search Egypt pyramids and they will all history etcetera etcetera.

And then, internet of people is when we are all connected again through mobile phone and emails and chats etcetera. , we are all connected anywhere , we can you know WhatsApp chat and etcetera mobile phone. , we have internet of people now it is internet of things now all we uses devices, the system internet of things , when I walk into a room, the room was dark, but when I walk in the rooms suddenly lights switch on. , there is a sensor which is sensing motion. , when a person walks in sensor motion and it switches on the light.

Similarly, when you go out of the room, the lights dim off, switch off. , its saving electricity. , again there is a sensor which is sensing a human being there is no human being no lights are not required , lights are switched off. , that is how we are now you know integrating things. , it is now internet of things. , started with internet of content, then move to internet of people and then now we have internet of things.

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Now if take IoT it is every a manufacturing domain. , this is how now we are moving in to industry 4 dot 0. Manufacturing domain, we have a responsive supply chain, we have things called predictive maintenance , maintenance work is not when a break down happens, but today predictive that is we can know that in next 1 month time this machine needs a maintenance otherwise it will break down. , we do it in advance. , there is no loss of production you can plan the maintenance.

Connected asset management, all assets are connected. , you know life etcetera etcetera etcetera. Connected logistics, when trucks move it can be tracked for example, when you place order on Amazon as an example you can track your delivery.

, they will tell you on the date it has been picked up from the centre logistic from the factory, then they will say it is now on the way, it has reached mewhere, it has reached Delhi and then third day it has reached your place suppose you stay in Calcutta, Calcutta the next day it says it will deliver tomorrow by 10 o clock. , you can track your you know order how it is moving that is connected logistics.

Similarly, connected retailing and that same example can be used here and connected factories. , factories are al now a days if you have multiple factories in an organisation, they all can be connected.

Now human ciety's ecosystem is connected home. Now the homes are getting connected. Connected cities, I talked you about talked about smart city, but again these are all different you know topics , which can you can take talk hours on these connected cities.

Connected car, now a days with a battery remain in this electric cars, the cars can you know they get connected, they can talk to each other, you know you can al you have you know we are talking about pilot driverless cars, car automatically can drive without the need of a driver.

It is not still yet to be legalized, but technically its possible and in another 1 or 2 years far you will see drive driverless cars and then, connected health care hospital system like you are monitoring your ECG that picture I had shown you. , it is IoT everywhere.

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Now industry 4 dot 0 is has been defined as a name for the current trend of automation and data exchange in manufacturing technologies. , if you now just shift your attention to all using these sensors and content device to a factory, manufacturing technology including cyber physical systems, the internet of things, cloud computing, cognitive computing that is again related to artificial intelligence and creating the smart factory.

, that is industry 4 dot 0 it industry started with industry 1 dot 0 which was steam engine, 2 dot 0 was when we got electricity that was industry 2 dot 0 generation the first generation, second generation.

Industry 3 dot 0 was when we brought in computers and robots and me automation that was the generation third and now we are talking about the fourth generation of industry today which is automation, data exchange, IoT, cyber physical systems, cloud computing etcetera and we are calling it as a smart factory.

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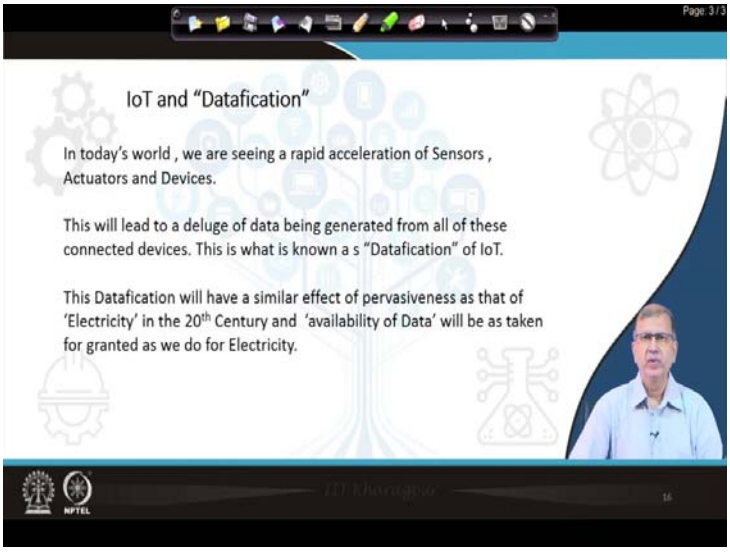

, IoT and datafication in today's world, we are seeing a rapid acceleration on these sensors, actuators and devices. This will lead to deluge of data. , finally, it is all data what the sensor is doing is generating data for all of these connected devices this is what is known as datafication of IoT. , it is all that trillions of data what numbers I had shown you earlier, it is all coming from all these sensors.

This datafication will have a similar effect of pervasiveness as that of electricity in the 20th century and availability of data will be as taken for granted as we do for electricity like I told in the beginning, in the previous one of the lectures that the way we consider electricity, the same we will we are now considering data.

, without data we will be you know we will feel lost like without electricity if there is no power for 1 or 2 days, we are completely lost I mean we have everything all our systems shutdown and we are completely become completely helpless. , mething similar will be happening with data.

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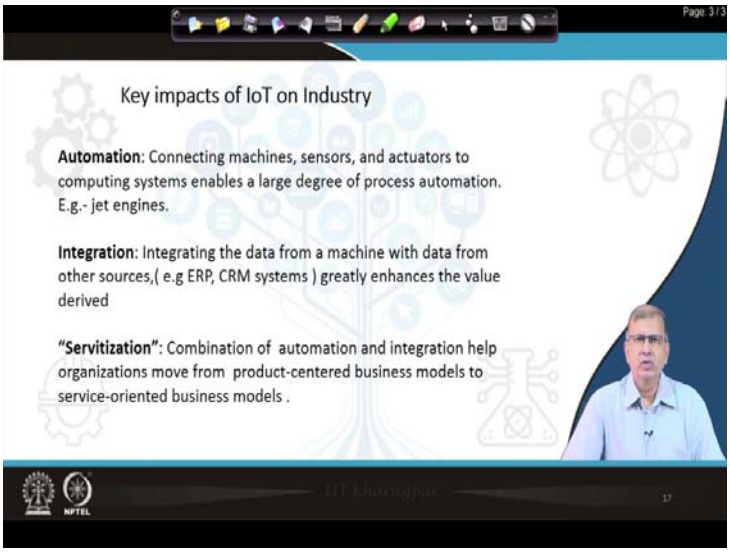

, key impacts of IOT on industry. , automation integration and servitization. , automation of course, we know connecting machines, sensors and actuators to computing systems enables a large degree of process automation.

Integration, integering integrating the data from a machine with data from other urces example, ERP etcetera are greatly enhances the value derived because you have to integrate things because the data needs to you know talk to each other. , data from one urce and data from another urce, then it interact and talk that, you can do me meaningful stuff.

Servitization combination of automation and integration help organizations move from product centered business models to service oriented. , it is you must have seen that or else there is a trend we are moving towards more of service orientations. , like the ftware as a service the cloud , it is not a product now it is a service. , we give a ftware as a service, business process as services.

, in many areas you will see like car company automobile companies are giving renting out cars for example, that is as a service. , they are al doing many service activities like the oil companies I told you, you know al doing restaurants and running retail stores in their petrol pumps that is as a service apart from selling their product.

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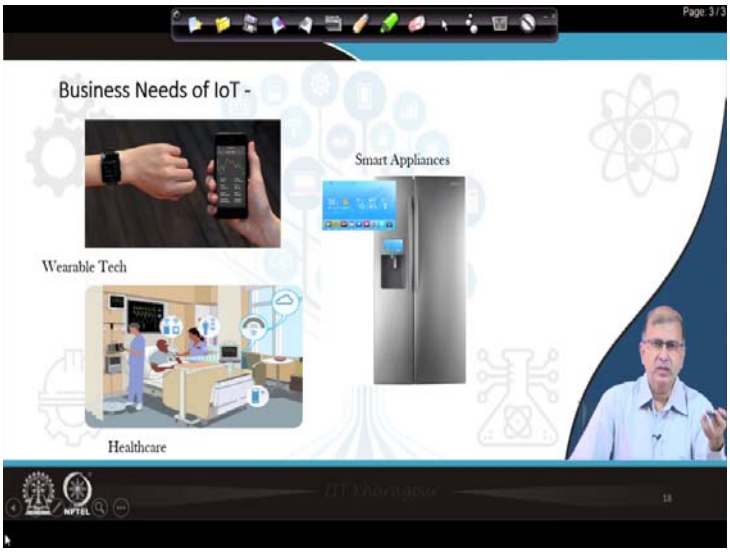

, business needs of IoT there are me examples wearable technology, you know we wear smart watch and all that. Healthcare, everything is connected. Smart appliances, these are refrigerators which can order food. For example, your stock is out you are storing butter in your refrigerator, the stock comes out comes low there is a sensor, it will sense it and through IoT it will order through Amazon that for supply of butter. , after two days your butter will come.

, the those refrigerators are there I mean there are it is already available in the market and they will be very expensive, but still they are available in the western world, may be me of them have come to India al. , you do not have to order, the refrigerator will do your work. , whatever item you store, there is a stock level and it will see that it is maintained.

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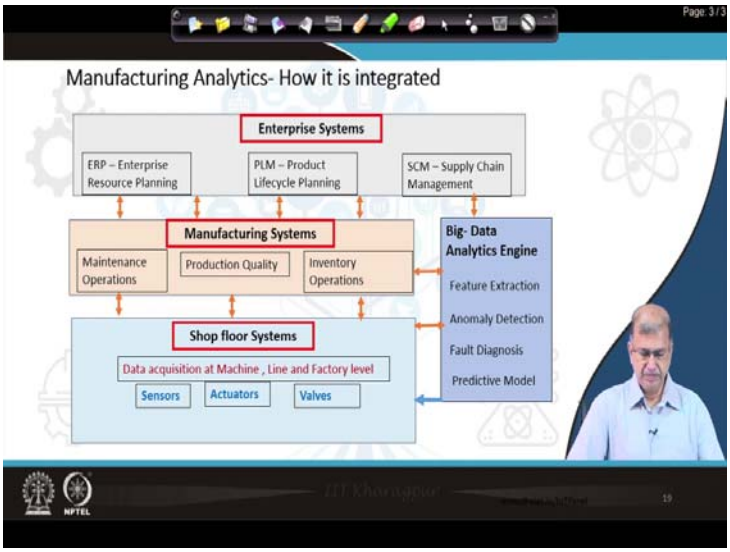

Manufacturing analytics how it is generated integrated. , this is over all integration on top you have the enterprise system ERP, PLM, SCM we will discuss about these in a subsequent lecture.

Then you have the manufacturing systems; maintenance operation, production quality, inventory operations and then, you have the shop floor systems at the bottom data acquisition the data acquisition machine, line and factory level, sensors, actuators and valves and on the right everything is getting connected with big data and the analytics engine; feature extraction, anomaly detection, fault diagnosis, predictive model.

, that is your smart factory industry 4 dot 0. , you are using big data analytics engine to generate information on various features anomaly detection, fault diagnosis, predictive model, predictive maintenance etcetera etcetera and see how it is connected with the entire enterprise system, the ERP type ftware, the manufacturing systems and the shop floor systems. , it is all are connected world.

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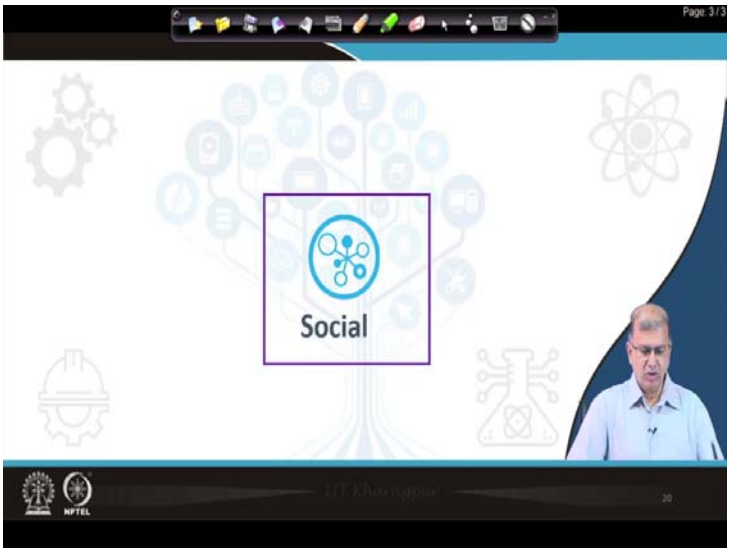

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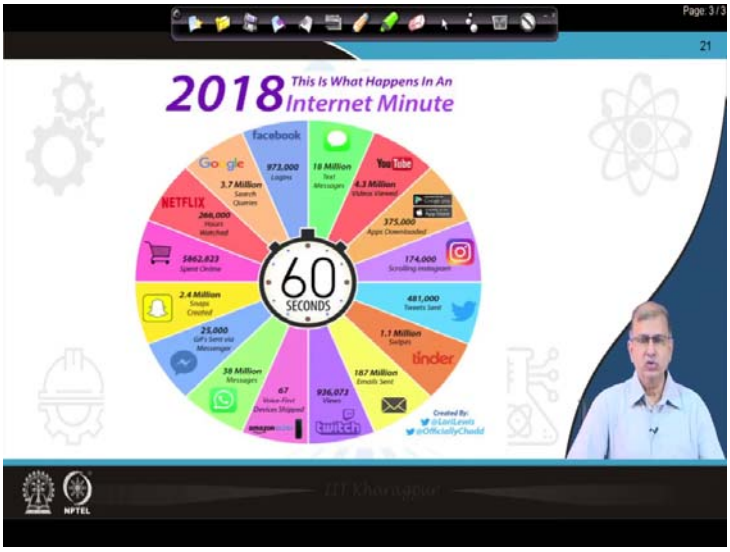

Finally, cial we know what happens in a internet minute? In one minute across the internet in various things like Facebook and Twitter and WhatsApp etcetera many you know billions, trillions of data is getting generated, many emails send, many millions swipes, many tweets, many apps downloaded, many videos see in YouTube etcetera , these are just numbers. , what happens in 60 seconds. , you can see amount of transaction which is happening in the internet. , that is what is important.

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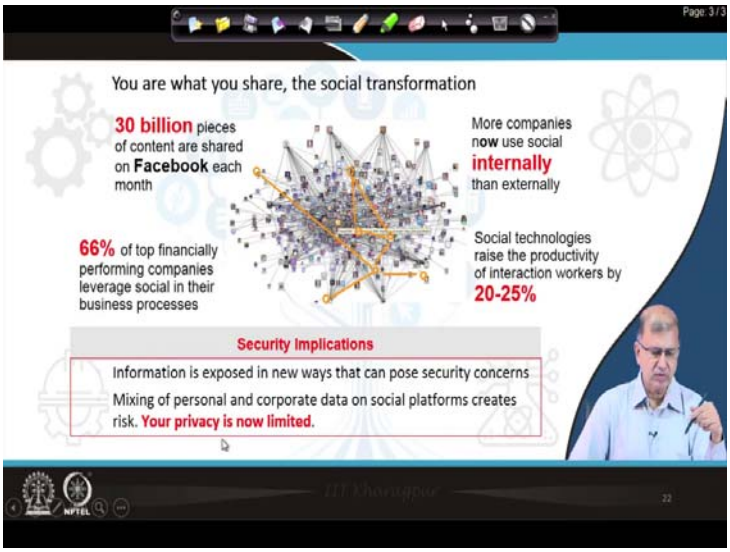

, you are what you share, the cial transformation. Finally, when you are finally, you know getting exposed because you are sharing much of things like in Facebook, when you are sharing all your pictures and express your likes and dislikes, then the world comes to know what you like, what you dislike and then, that is your personal information which is now public information's no longer private.

, security implications; information is exposed in new ways that can pose security concerns. Mixing of personal and corporate data on cial platforms create risk. Your privacy is now limited.

Now you are sitting in your office and if you are sharing me information related you to your office in your Facebook for example, then that is a breach of protocol your corporate data. , you have to be very careful.

metimes we are not careful enough, metimes our office chat etcetera are on the WhatsApp we share certain in information's within colleagues or even if your boss is there al in your part of your WhatsApp group and that can become metimes not good and there can be me bad impact of that, negative impact of those things.

, we have to be very careful in the cial media when you are exchanging information, personal information be extremely careful because these can be damaging even your CV, biodata, LinkedIn etcetera and now a days for interviews people or candidates they are

referring through their cial media platform what he is posting on Facebook, what are his ideas, what are his what does he think about say politics or whatever and based on that can influence your hiring or your interview recruitment etcetera.

, you need to be very careful, very very careful what about what you are posting in your cial platforms your thoughts, ideas be very very careful.

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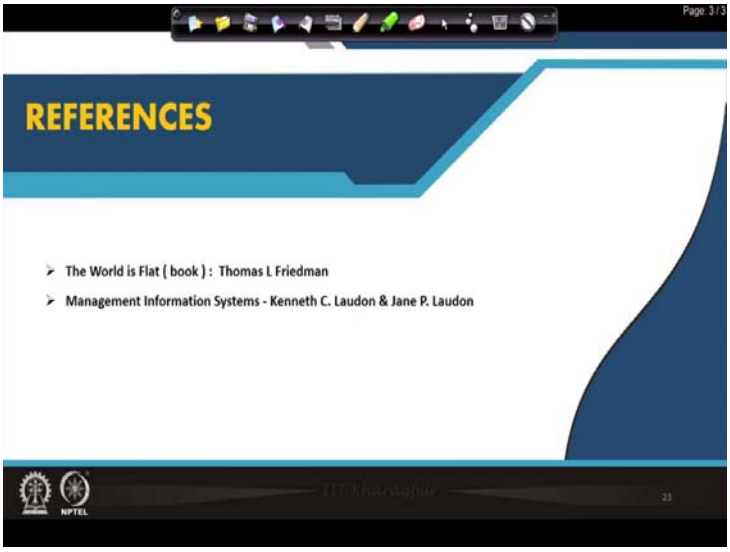

, with that I would like to end today's session and now again with that say warning to all of you that, in cial platform you are now become heavy users, but it has got lot of risks be very careful about that.

And thank you very much.