Course on E-Business
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Module No 02
Lecture 07: Information System Foundations

Welcome back, today, in today's lecture, we are going to learn about information system foundations of in e-business.

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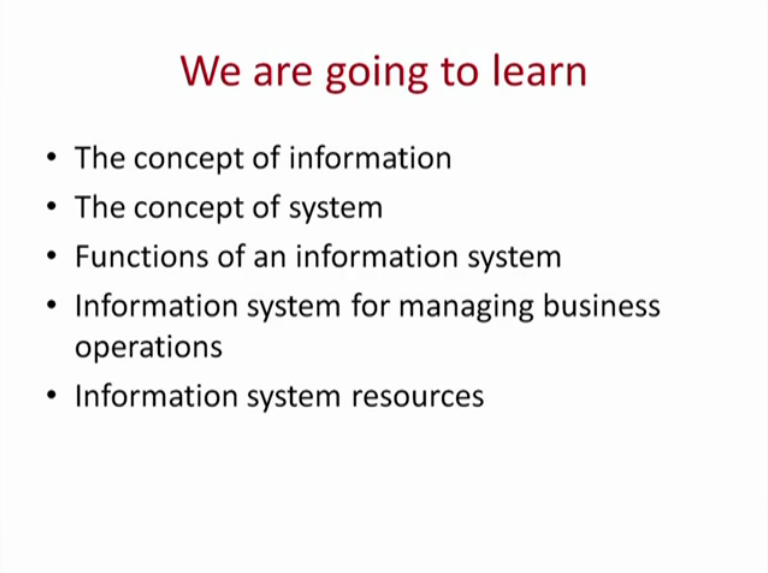

As I have already told you, this information system is the e-business has its foundation and Information Systems. In fact in the last class, we saw that our information system, the data stored in information system can help in business process reengineering and improving the process. In this, the particular lecture we are going to learn about the concept of information in a more formal way, the concept of a system, the function of an information system, the information system for managing business operations and how it is helping in managing business operations and we are going to learn about information system resources.

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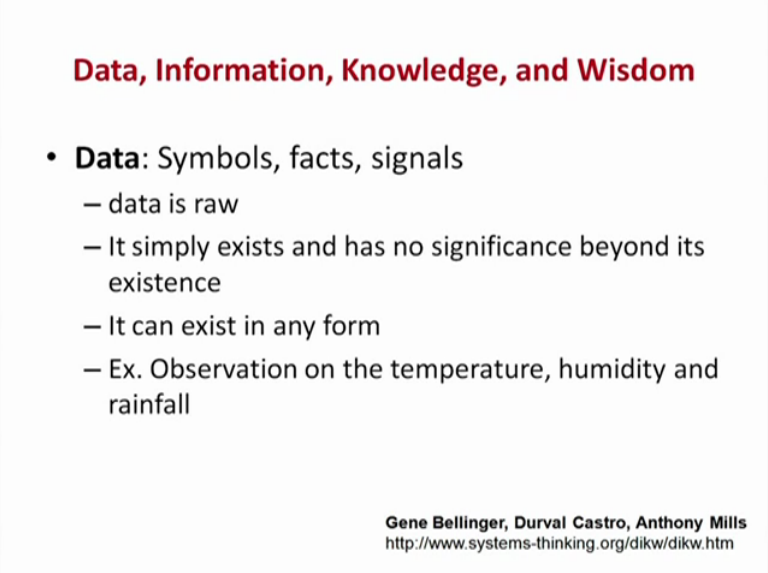

So in fact we will be talking about 4 interrelated things that is related to information. 1st one is data, 2nd one is information, 3rd one is knowledge and 4th one is wisdom. Now what exactly is the data? Everywhere whatever we let us say you are reading one newspaper. You get a number of items number of news items which may or may not be required by you but they just exist and they just exist in a raw form. So the data is basically symbol, fact or signal.

So I just gave one example of newspaper. Now think that that you are getting, from a telephone line, you are getting voice signal. So that is, again that voice is actually, the speech is actually some kind of signal. Similarly, images. Images are also some kind of signal, in the business system, when the business operations take place, business processes are carried out, huge amount of data gets generated.

So this data is basically raw and it simply exists and it does not have any significance beyond its existence. And now it can exist in any form. Just now I gave you few examples. You can take the facts represented in a newspaper article, you can see customer reviews, you can see the data that is generated from a transaction system, business system, you can think of the sensor data that gets generated while, during process automation and so on. So data can exist in any form.

Now consider one example that you are taking some observations on what is the temperature and what is the humidity and whether it is raining or not in a particular day. Now look at this.

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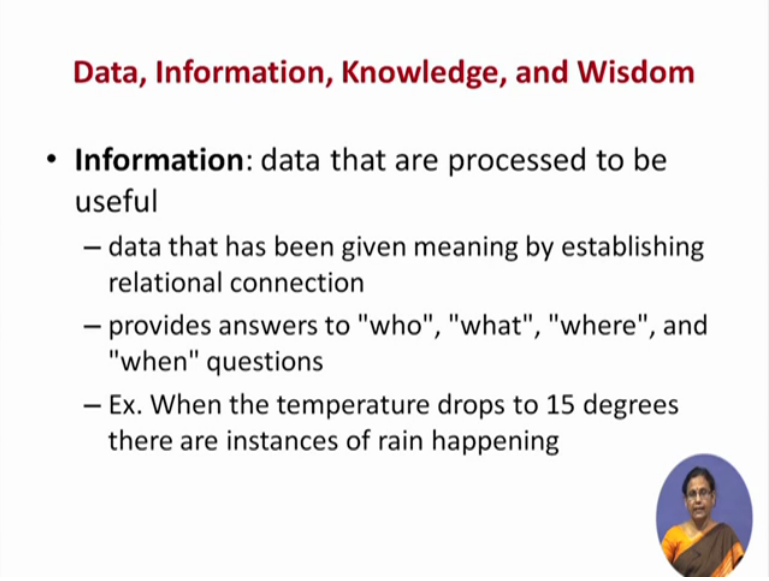

Look at this. This information, the data that you are getting, all of them may not be useful to you. Now if you extract the useful part of this data, then it is called information. Now this data as I told you earlier, if this data simply exists and it may not have some meaningful interpretation for the person who is actually reading it. Suppose you are quite ignorant about what is happening in the cricket world.

So if some News article comes inthe sports page about cricket, you may not be able to understand. Of course, here cricket is not a very good example. Maybe, you can say some other game, let us say baseball. In case of Indian context, many of us may not be knowing about baseball. So if some News article comes about baseball, it may not be very relevant to you.

Now if the meaning can be established with the data and the data elements which are basically symbols and facts, if some relationship can be made among those limits, then it is called information. Now this information actually provides answers to who, what and where and when questions. For example, let us continue with the example that we are talking about. We are taking observations about what is the temperature, what is the humidity and so on. Now suppose we made the observation that when the temperature drops to 15 degrees, there is an instance of rain happening. Then we are actually relating this temperature to rain. And and we are also saying that when the temperature is coming to certain level, it actually raining.

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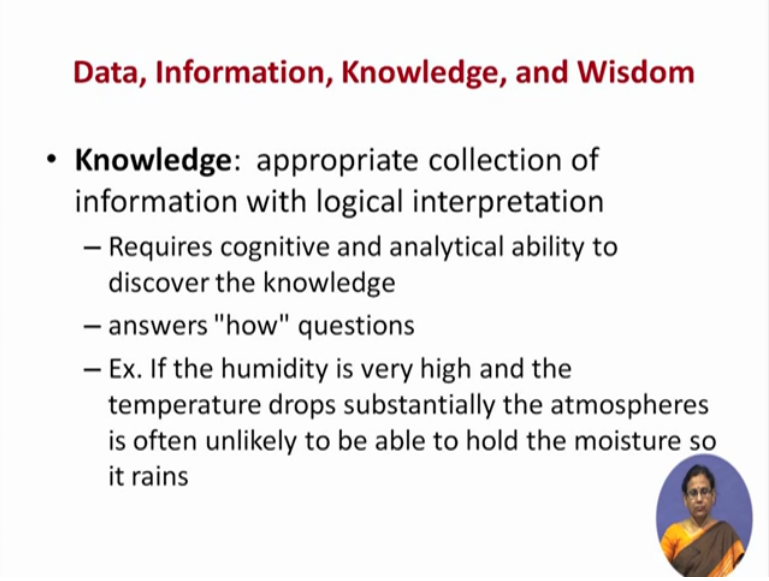

Now next, level thing is actually beyond information, it is called knowledge. Knowledge is actually appropriate collection of information with some logical interpretation. For example, let us say you are asking a child to learn about the let us say tables. Now he can, because he memorises the tables, he can say what is 2 into 2, he can readily tell you. But if you actually multiply to big numbers and ask him to find out it from the table, because it is not available, he will not know.

He simply memorises and when you ask, whatever he knows he will tell you. He never was, he never applies, the child never applied his or her cognitive and analytical ability to understand the the idea behind learning those table. And if you ask him to multiply two big numbers, he cannot actually tell you. Now knowledge is something which is beyond information and it requires cognitive and analytical ability to discover the knowledge and such knowledges are actually answer how kind of questions.

For example, continue with the situation that we were talking about, everyday we know about the temperature and humidity and we observed whether it rains or not. Now we had certain facts when we put this temperature and instance of happening whether it was raining or not together, then we observe that at a particular when the temperature is beyond certain level, the rain was happening.

Similarly, suppose we put humidity also and we saw that when humidity and temperature at certain level, it was happening. But it was it was just arranged, this humidity, temperature and rainfall was arranged in a manner from which we have to now make certain kind of interpretations, certain kind of logical interpretations. So here what is the logical interpretation? If the humidity is very high, and the temperature drops substantially, the atmosphere is often likely to able to hold moisture, so it rains.

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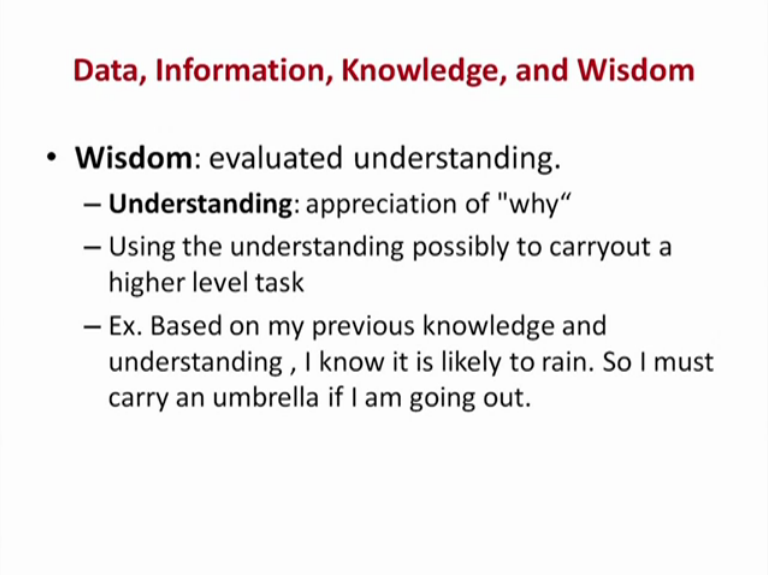

Now beyond knowledge, there is something which is called wisdom and which is about evaluating the understanding of certain situations about which we already have certain knowledge. Now what is understanding? Understanding is appreciation of why something is happening and using that understanding possibly, you carry out certain high-level tasks. For example, based on my previous knowledge, I know that when exactly it is going to rain, it is not about the data, it is my it is data from which I put it together to know that humidity, temperature and rainfall, whether rain is happening or not and after certain time, I derived the knowledge that when that humidity is very high, temperature is very low and we are getting rainfall.

With that knowledge, now I know, now I know that looking at today's temperature, humidity, etc, I know that it is going to rain. And if it is likely to rain, what action should I take? Maybe if I am going out, I should carry my umbrella.

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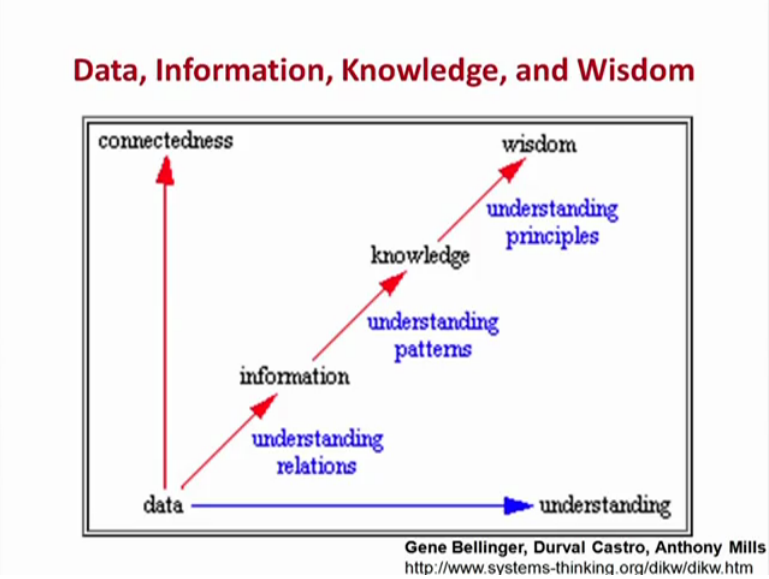

Now if we put it together that the data the in two-dimension with understanding and connectedness, then data with certain relationship becomes information and from the information when you discover certain pattern, it is knowledge. And from the knowledge if you discover certain principles, it becomes a wisdom.

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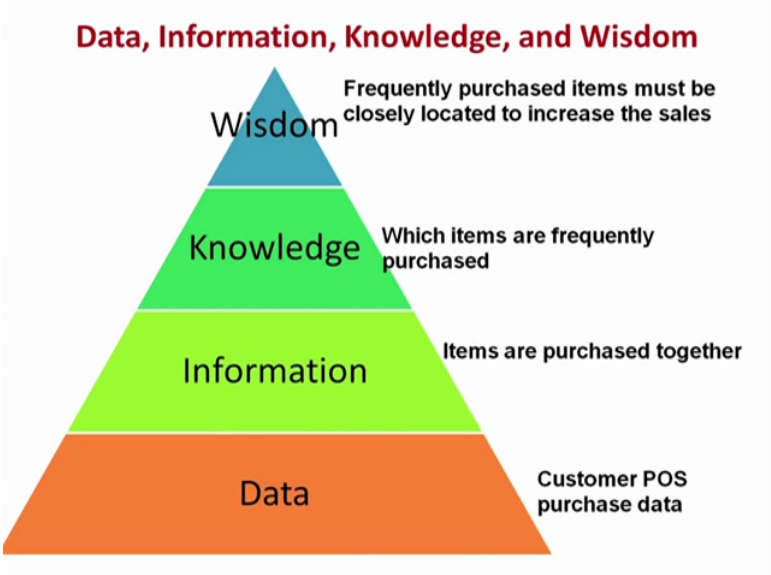

Let us have one example from the business domain. So far we have been talking about some examples which were not from business domain. Now looking at the business domain, in fact we can actually put this data, information, knowledge and wisdom in a triangular manner. From

huge amount of data, we get little less information which is actually a part of the data, some relevant part of the data.

Then we summarise this, from this information, we get some meaningful insights, that is called knowledge and from knowledge, again it becomes narrower and what we get is wisdom. Now consider this example. This, from a point of sales, the customers purchase data gets collected from point of sales device. It is just data and you generate huge amount of data with each transaction entering into the system.

Now at a later time when you analyse this data, you see that there are many items which are purchased together. So this is our information which items are purchased together. Now out of these items which are purchased together, is there any set of interesting items which were very often purchase together? So if those items we take into consideration, then we say it is knowledge in this particular example.

For example, which items are frequently purchased together? Then with this knowledge that such, such and such items are frequently purchased together, what exactly we are going to do? We have now got knowledgeable about the items which are frequently purchased together, so we would like to get some business value out of it. Now what is the business value? How can we get the business value out of it?

Let us put those items which are often purchased together, side by side in the aisle so that the whenever the buyer is buying one of the items, he will be because of the past information trail, we know that he will be most likely, this person will be will also may buying the other items. So if we put them together, put the items together, in fact his search time throughout the store decreases and he is likely put that item in his in his shopping cart and in this process, the sales might increase.

So this is how we have used the data and found out the wisdom out of it by discovering certain knowledge and we use this knowledge to carry out the next level task.

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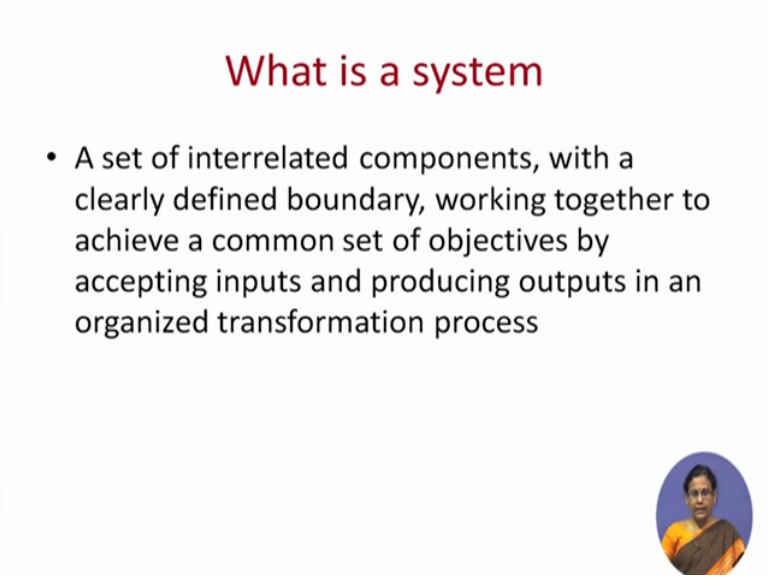

See, we were actually discussing about the information system, the 1st term we have discussed, that is the information and 2nd term that we are going to discuss is the system. Now what is this system? System is a set of interrelated components with a clearly defined boundary working together to achieve a common set of objectives by accepting and producing output in an organised transformation process. This is a formal definition of a system

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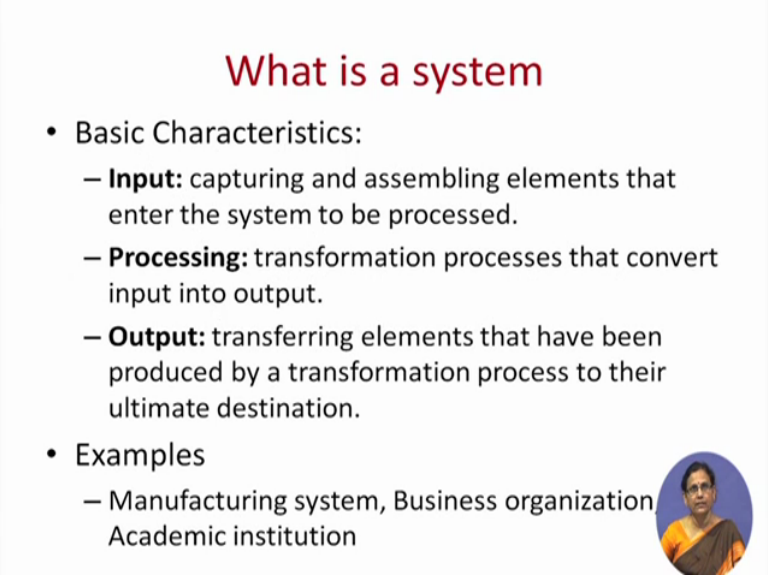

Every system has 3 basic characteristics. It, the system takes input, it does some kind of processing or transformation and it produces the output. Almost everything that we see is a

system. For example, consider one academic system like that of ours. In an academic institution, what is the input? Input is the students, the faculty members and other stuff. And how what kind of transformation takes place within this system? The faculty members actually teach the students.

And when the students are taught, what do you get out of this? After this, they complete their degree and they go out. And similarly consider a Manufacturing system. In a manufacturing system, what is the input? The input is the raw material and and within this may be some kind of manufacturing takes place within the system, that is that is processing and finally the finished good comes out of the system. So it is one manufacturing system.

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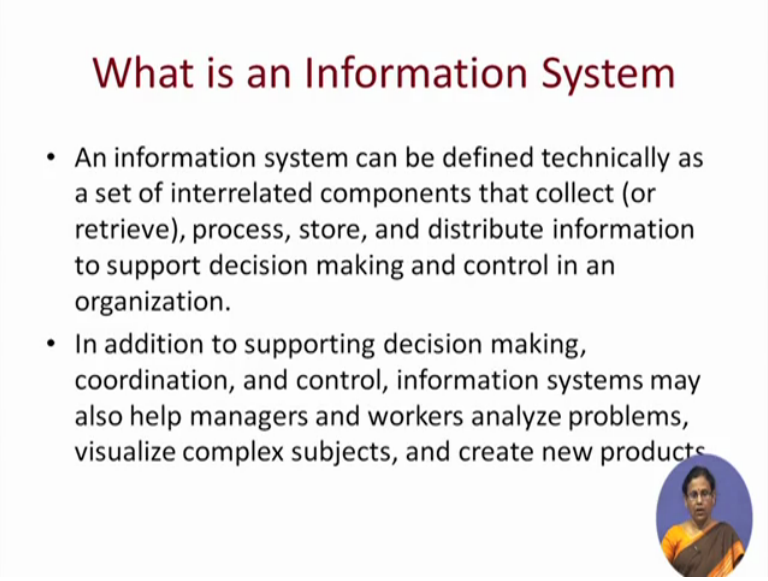

Now in this line, we now need to define what is an information system. So an information system can be defined technically as a set of interrelated components that collects or retrieves, process, store and distribute information, to support decision-making and control in an organisation. Information system is a part of a business organisation but business organisation itself is one system.

Now in such information system, in addition to supporting fiction making, coordination and control, they may help the managers and workers to analyse problems, visualise complex subjects and create new products. In fact, we have already seen that in order to improve, if you

would like to improve your business process, you have to go for business process re-engineering, you require certain input from the information system because information system is the one which actually collects the data about the transactions happening in the system and it produces relevant output that is required by the management for taking decisions for business process improvement.

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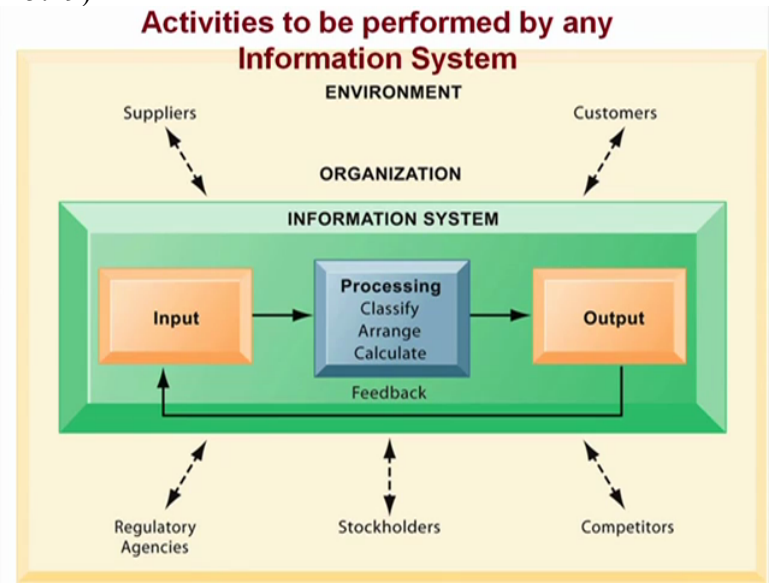

Again, this is a schematic diagram of information system. As I was telling you, it has 3 parts. As like any other system, it takes input, it produces output and it does some kind of processing. Now what is the processing in case of information system? It can classify, arrange, calculate, it can it can also have certain models, inbuilt models as well. And from this output, many times, you take feedback which again acts as the input to the system.

Now this information system resides within the organisation and who are the people who get benefits out of it? It is not only the people within the organisation, it is also the people who the stakeholders who also are outside the organisation. So all of them are benefited from the information system.

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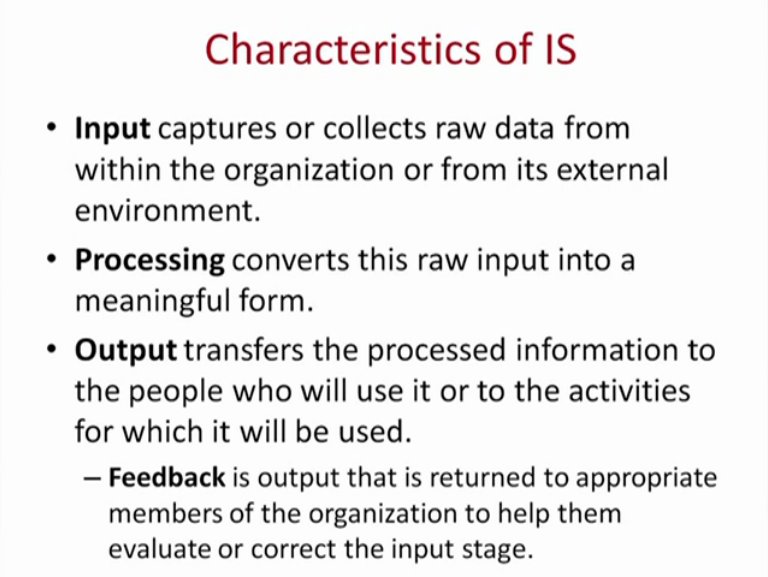

So here, the input is actually capturing and collecting the raw data from within the organisation or from the external environment and processing is the act of converting this raw input into some meaningful form. And what is the output? Output is the processed information and it will be sent to the people doing various activities in the organisation and from those people who will be using this information, they can also generate some kind of feedback and this feedback is the output that is again returned to the appropriate members of the organisation to help them evaluating the correct input stage i mean to make the correction at the input stage.

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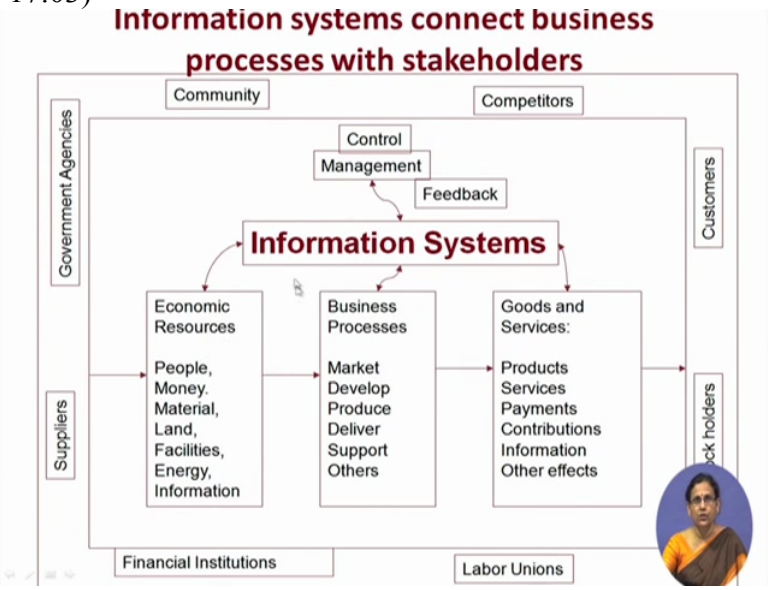

So in fact, as I was telling you, e-business is about automating the business processes. Now how do you automate the business processes? Information system is the entity which helps you collect, not only collecting the information but it helps you connecting the entities within and outside the organisation and automating the business processes. This for example here you consider now what is the input in the organisation?

Input the organisation is the various economic resources like people, money, material, land facilities, energy and information. And the information about all these entities are input the information system. And observations carry out many business processes corresponding to the 4 functional areas that we have already discussed and information system automates it. Organisations produce goods and services and information keeps data about them and provides this data to the appropriate stakeholders.

The management takes output of, uses the output of the information system for controlling the organisation and based on their feedback, the input to the information system as well as to the organisation can be improved for getting better output. And this information system not only connect this internal entities, it also connects the external stakeholders of the organisation.

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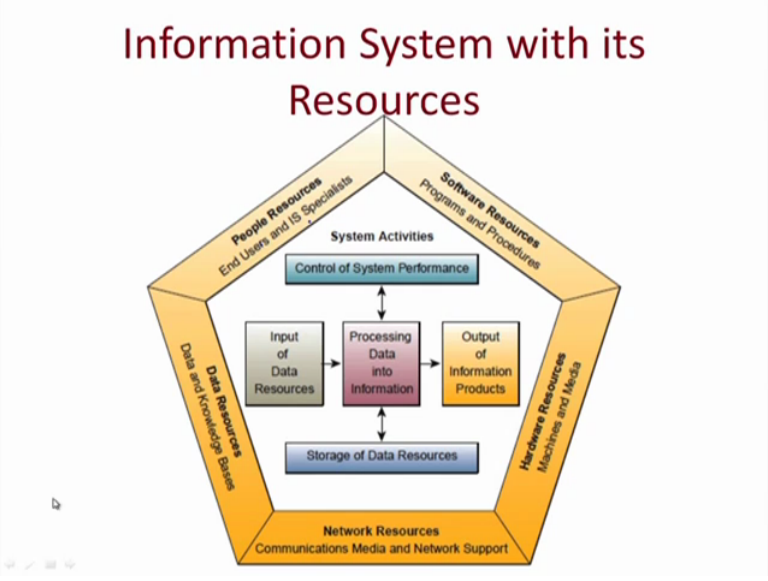

Now let us have a look at what are the resources associated with an information system in an organisation. This information system as we have already discussed, the input to the information

system is the data at its output is the information. So likewise, to store this data, you need some kind of resource where you will be storing the data. You need some kind of resource to process the data and you need some kind of resource to provide this output to the appropriate stakeholders.

So which means, you need, you have some kind of data resources for keeping this data and knowledges, you have certain hardware and software resources for processing the data and to processing the data and displaying the data and to send this data to appropriate stakeholders, you need to take help of network resources like communication network, et cetera. And there are many people involved over here and we are going to have a discussion on each of these topic.

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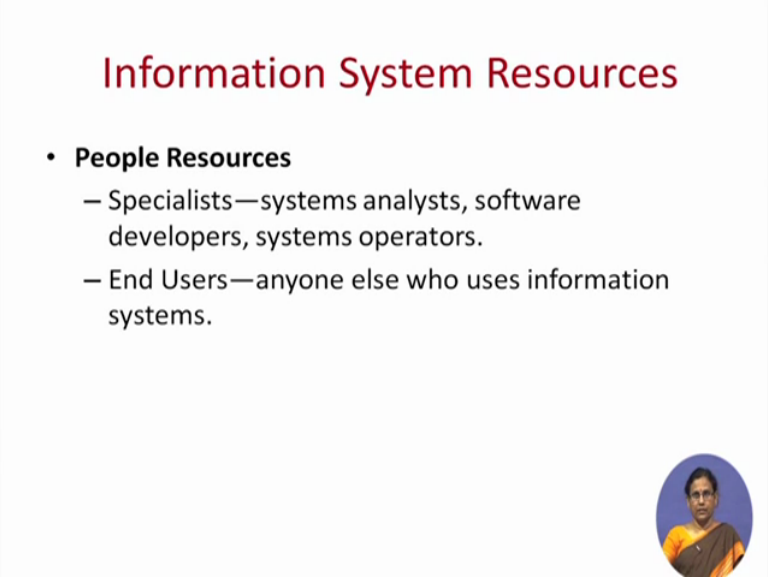

Now look at this. The 1st resource of an information system is the people resource. We can broadly classify people resource into 2 categories. 1st one is specialists and 2nd one is end users. Now who are specialists? Specialists are the people who are actually into the system development. So they can be systems analyst, they can be software developers, they can be system operators and basically they, these specialists are technical people but this, the role of these technical people is about creating the information system and managing the information system.

But the information system output is actually going to many of the stakeholders. Now who are these stakeholders? These stakeholders are the people we call them as end users and these end users are somebody who uses this information. This end user can come from any level of management, they can be at the low-level, they can be at the middle level or they can be at the strategic level. We have already discussed about the 3 levels of management, so this end user can come from any level.

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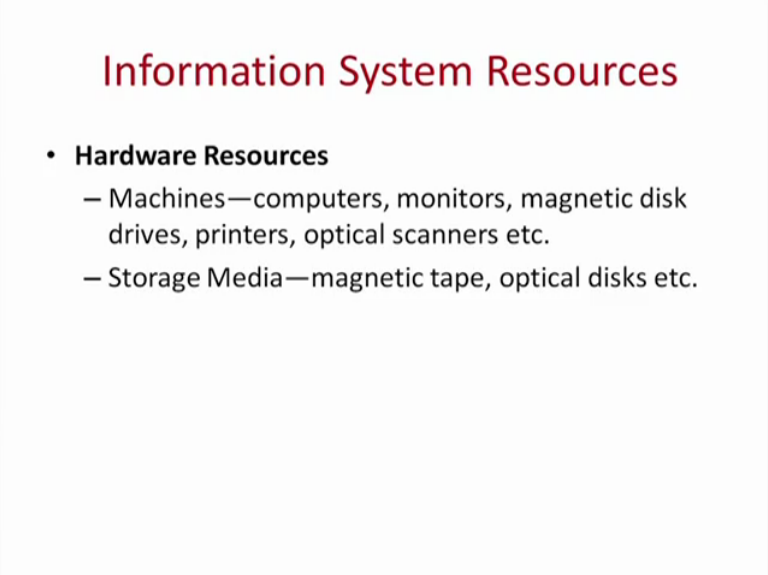

The 2nd resource is actually hardware resource. Hardware resource as I told you if for processing the information, you need some kind of hardware, some kind of computer and besides this computer, you need many kind of storage devices and in fact in any business organisation, for collecting data, collecting online data, it is not only machines and storage media, it can be any other devices which helps you even collecting the data.

These machines include these computers, monitors, magnetic disks printers optical spanners, et cetera. Storage media can be magnetic tape, optical disc, et cetera, there can be other hardware resources which helps in data collection like in industrial process, if you would like to monitor and control the process, it will be sensors and so on.

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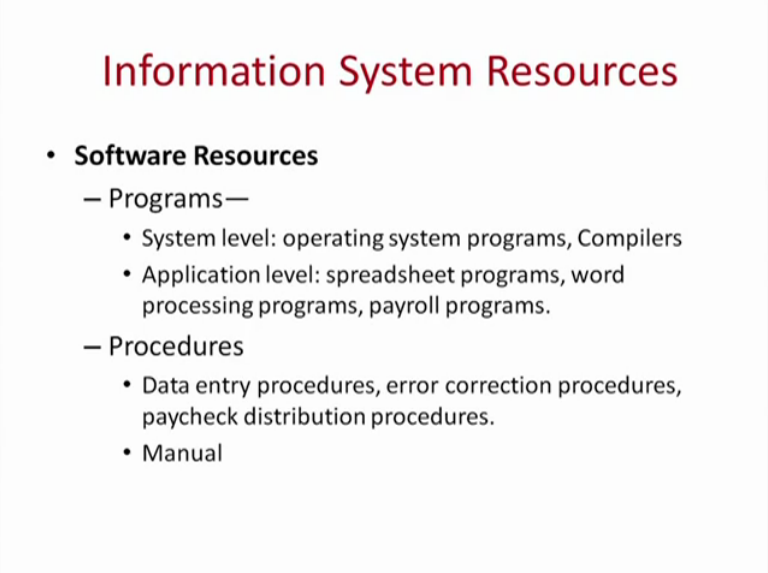

Then the 3rd resource is actually the software resource. A software resource again we can have 2 things under the software resource. One is the program and 2nd one is the procedure. Again, in the program, we can broadly classified into 2 classes, the programs which reside at the system level, then the program which reside at the application level. Now what is the system level? To run the basic hardware, we need operating system, that is the 1st resource that we are going to use.

And then, to run our programs, we need some kind of compilers that can be also at the systems sub level. But using these basic resources, we can have certain application level programs. These application level programs can be either provided by the vendors or they can be developed in-house. For example, if you have a spreadsheet program or a wordprocessing program, it is an application level program but actually, you get this application level program from from some software file.

However, suppose you had indigenously developing your payroll program, let us say in java, you are developing your payroll program, then that program uses certain level program like a compiler or an interpreter for or certain runtime environment for running it and that is being used by the end users. So your payroll program which is developed by internal your organisation is also considered a application level program.

The 2nd entity is actually procedures. So what are these features? Once the system is ready and the end users are supposed to use, end users are going to use the system, they need to be trained. And not only they need to be trained, they are provided, they are need to be provided with manuals and that manual actually establishes the procedure how a certain work needs to be carried out.

This work includes your data entry procedure, your error correction procedure, your let us say was the paycheque is these are examples only, once the paycheque is ready, then how to distribute it? So actually it involves not only the the activities which are carried out by the information system, but it can be, it can go beyond. So it is the set of activities which are to be carried out by the end users and they are put in a form of a manual.

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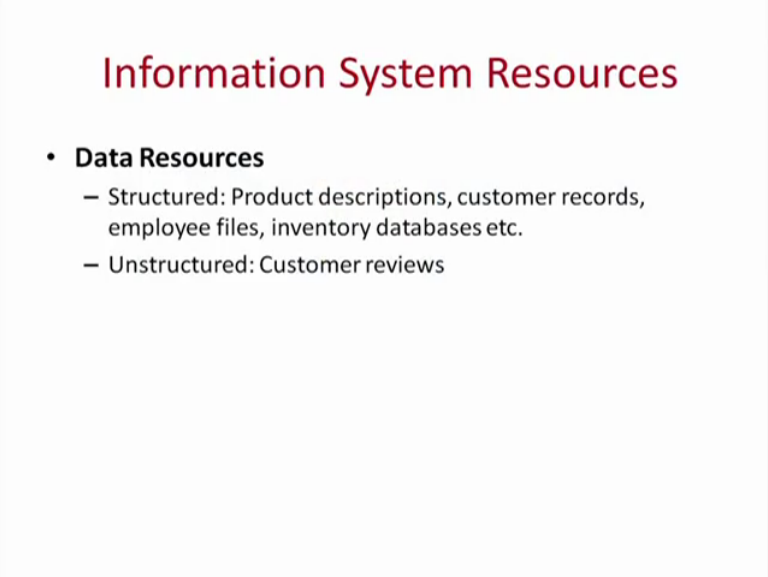

Then the next resource is your data resource. Now here, we are going to divide this data resource into broadly into 2 parts. 1st one is the structured data, 2nd one is the unstructured data. Structured data is the one in which you can say you can put it in a tabular form. You can put it in a tabular form. There can be rows, there can be columns. So such kind of data can be put into traditional, relational database kind of system.

The examples include your description, product description, your keeping about the customer records, employee file and inventory databases and so on. But the data is not limited to this

structured form. Specifically in today's world, huge amount of data comes in unstructured form. In short while after maybe in few lectures we will be talking little bit about the big data, this unstructured data which comes in huge amount.

Basically Internet is mostly responsible for generating this data. For example, consider your customer reviews. Your customer reviews for the products, they come in huge numbers. Many people can give their reviews okay? And this data is basically text data, this is in unstructured form. Consider about your stock price of stock price come comes in, you that frequency, it is a very high-frequency data.

So data can be structured or unstructured and in fact data can be classified in many ways but right now we are not going to talk about it.

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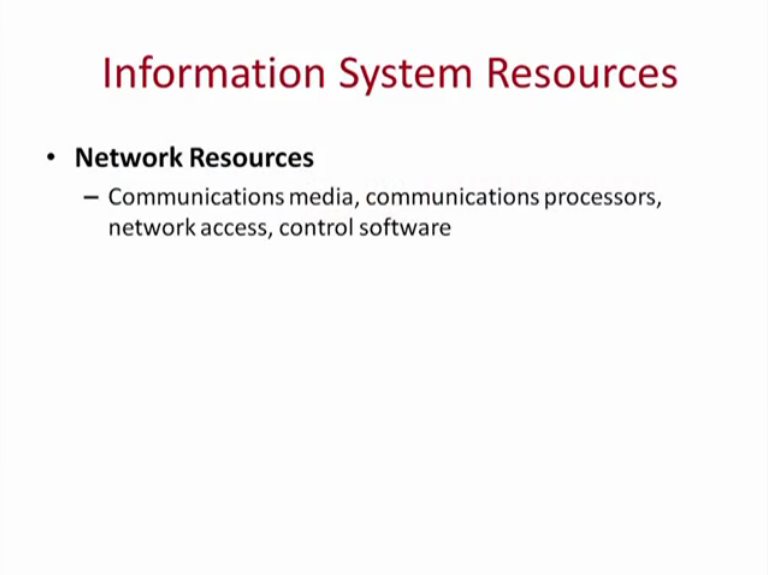

Then the next resource is your network resource. This network resource includes your communication media. In fact every organisation has a network infrastructure, this includes your local area network and connecting to the Internet and so on which involves many hardware devices and many many software to control those hardware devices. So we can say, they are communication media, communication processors, network access and control softwares.

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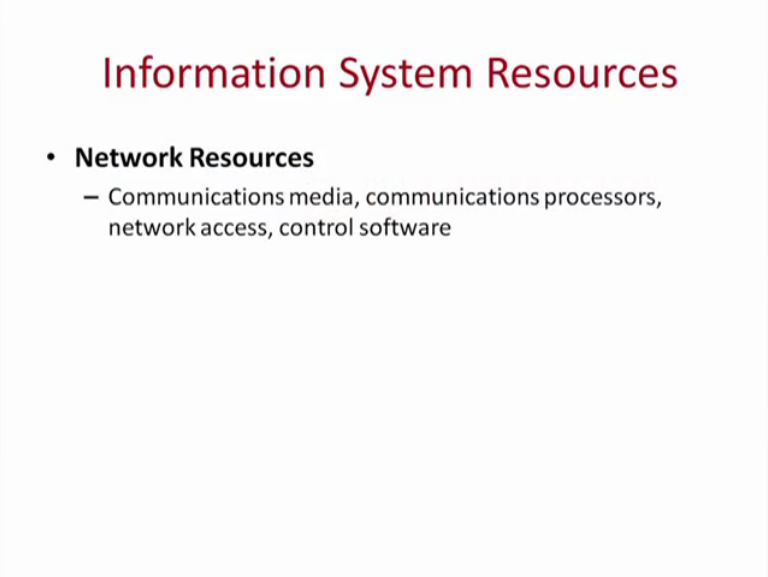

Next resource that we are going to consider is the information product. This information product is actually the output of the information system. This includes this management reports, these business, various business documents, and this can come in either text form or in graphics format. And you can also have audio responses and various forms which comes out of the information system. So these are the resources.

To sum it up, we have many resources. We have data resources, we have hardware resources, we have software resources, we have networking resources okay? Then finally we have your information products. With this, we end this lecture. Thank you very much and next class we will be continuing with this particular topic but we will have, we will go deeper into various types of information system. Thank you very much.