Management Information System
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Lecture - 04
Concept of Information - I

Good morning; today let us begin with the concept of information. We have already seen the introduction part of management information system.

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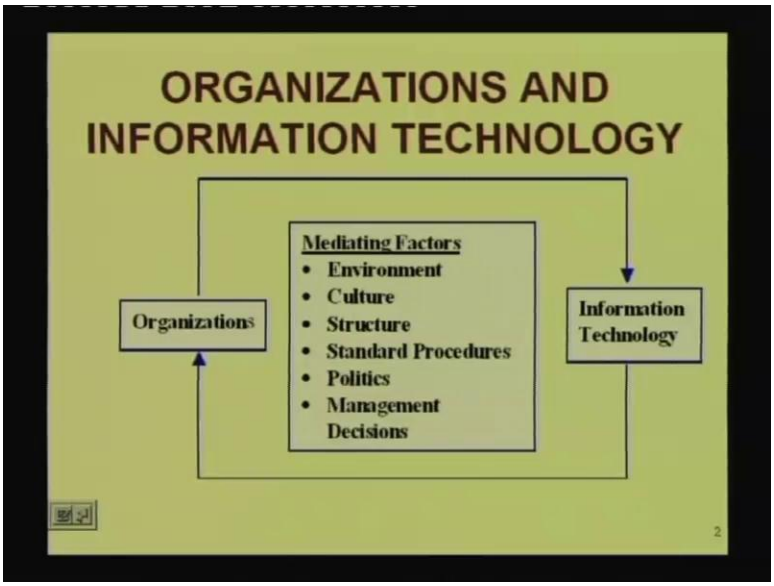

Now in this particular set of lecture first we shall see the inter connections between organization and information technology and thereafter we shall see the key features of information and end with a case study of an information technology experience of a large organization.

Now, as it is very clear from this particular picture that information technology and organization they are connected in a feedback loop. That is the organization requires information technology and information technology in turn help the organization to know change its ways of doing business, the procedures, environment, culture, structures, standard procedures, politics, management decisions all these things they have influence on the information technology.

Similarly, the information technology developments, the new developments that come in the hardware and software technology they also are connected to the needs of the organization. So that is why we can see that it is not that whatever information technology we have today that will be shaping up the organizations of tomorrow but the organizational needs should also decide which information technology be available day after.

Now there are a large number of things which gets influenced by this feedback structure. We have already seen that information technology can be used to have a competitive advantage in an organizational situation. Now the competitive advantage can only be obtained only when we can think of radically new... something which is different from the existing practices prevalent in an organizational context.

Say for example the supply chain management situation we have already seen. What really happens in the supply chain management situation; the hospitals when we have seen they were working to the traditional inventory management kind of scenario where they used to keep a huge amount of inventory in their stores and as and when they required they were actually used. But when we could build a very good connection with the supplier and the suppliers keeps supplying their material directly to the operation theatres, directly to the hospital wards then the very need of an inventory management practice in the hospital is no longer required. You know you can treat your suppliers to be keeping your inventory. So a major chunk of inventory related cost can actually be taken out. So that is that is the type of advantage that's the type of competitive advantage that information technology can actually create for an organization.

Say another simple example we can give that is about let us say when in a developed country you can think of you know... if you want let us say tailor made clothes. The tailor made clothes you you cannot get at a less price. The readymade price will always be very very less than the tailor made price. But can you think of a situation where you can actually provide the tailor made clothes at the readymade prices. If you can do it then that is an added competitive advantage to your business and you can definitely win over other competitors in the field. How this can actually be created. Really what probably could be done; if you have the right kind of information technology and if you can collect the information from the customer the

requirements of the customer from a large number of retail points, bring them in a central location I mean the information part the requirements customer requirements of tailor made clothes, put them together and then classify and produce them in definite you know centers for a specific group.

So if we think that the customers of tailor made clothes really there are ten groups of people each with similar dimension then all you need is ten manufacturing units where these tailor made clothes will be produced; obviously you have to take care of the distribution part afterwards so that the tailor made clothes can actually reach their customer.

So essentially if you look at it from the company's point of view the distribution is the only extra cost probably compared to let us say readymade clothes. But even in readymade clothes you have to have other kind of situations for example you may not be able to sale everything you still have to distribute them to your retailer points so ultimately it works out or evens out and you can actually supply tailor made clothes at the ready made price with the help of information technology.

So what kind of information technology you actually require for this. You have to have you know very quick connections network connections so that from every retailer point you can actually collect the data to the central point very very quickly. The central point should easily or automatically process the information categorize them, classify them and very quickly send it to the manufacturing or tailoring centers where the clothes will be actually made. Now if you cannot reduce the delays which might be involved the whole thing actually may not work. The whole thing hinges on supplying the material in quick time. If you really require months together to finally supply your clothes probably the situation is really not going to be very useful. So this is the kind of things that that kind of connection must be built and the organization therefore should be ready with respect to its culture, structure, standard procedures, management, decisions, political environment and everything. So that is the basic thing here.

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You can see here basically there are three basic components of information system: the management, the information, and the organization. So you you can see that for a proper information system the three must be coupled in the most suitable manner right. The management should be proper, the information should be proper, and the organization should be proper. If these things do not match then what may happen you have the information but nobody uses it. Or you have the information, you also have the management but your organization is not ready for it. So you have to connect all the three; have the information solution system and using them try to find a solution to the business challenge which is at hand.

So basically your purpose is couple management information and organization in a seamless manner into an information system to find a solution to the business challenge that you have. the example that I gave a few minutes back that is when you want to actually provide your tailor made clothes at readymade prices your challenge is you know reduce cost, provide tailor made clothes good quality clothes at a very low price that is the business challenge.

How can you go ahead with this business challenge?
You have to build an information system coupled with obviously the physical system; without physical system really nothing can happen, so as to find a business solution which is most

appropriate for the given situation right. So that is the kind of thing that is required to be built and you can see that there are really too much or a huge really savings can result if information technology can be coupled in the best possible manner.

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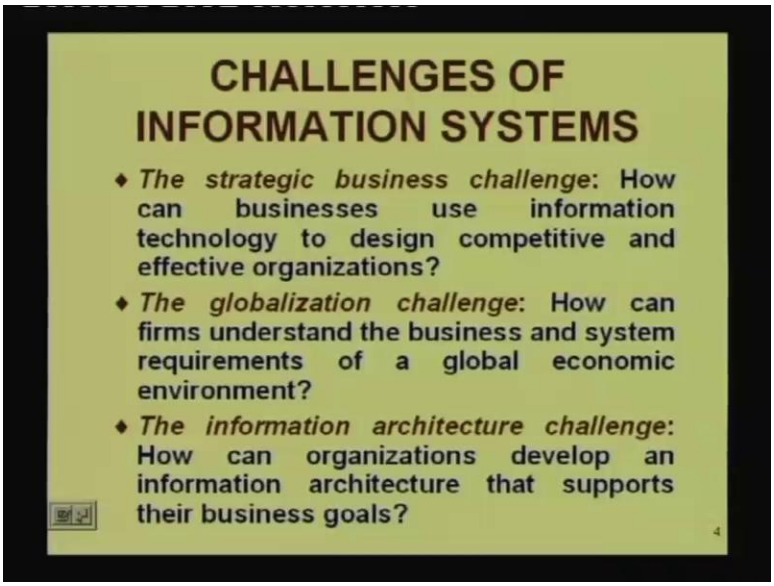

There are number of challenges that are there in information systems. The first one is called the strategic business challenge. The strategic business challenge the idea is how can the businesses use information technology to design competitive and effective organizations right. So basically use of information technology to build organizations that are competitive and effective. So this is on a strategic level; strategic level that means at the top management level.

What is the use of information technology?
That means what is the information technology architecture which will help us to use information technology in the best possible manner.

Then the globalization challenge: how can firms understands the business and system requirements of a global economic environment. So, whenever we think of globalization there are very specific requirements. Say for example you may say that you will produce not in one country but in three three countries where may be the first country will be your manufacturing

units, second country also manufacturing units but in the third country you are basically using as the raw material procurement center and preprocessing right so manufacturing definitely but for preprocessing.

Now definitely if that is what you have planned or even before the plan is made you have to have adequate information and these information has to be obtained processed, continuously you know monitored and made use of because what may happen okay fine that you have the third country where you have got preprocessing units but if that country prospers very rapidly the situations change, you may also set up manufacturing units there. So it is not static information, it is the dynamic information we are talking of here.

The information architecture challenge: how can organizations develop an information architecture that supports their business goals? The information architecture is a very very important thing and to develop an information architecture for an organization a specific plan is required and how to develop these information plan we shall discuss in a later lecture.

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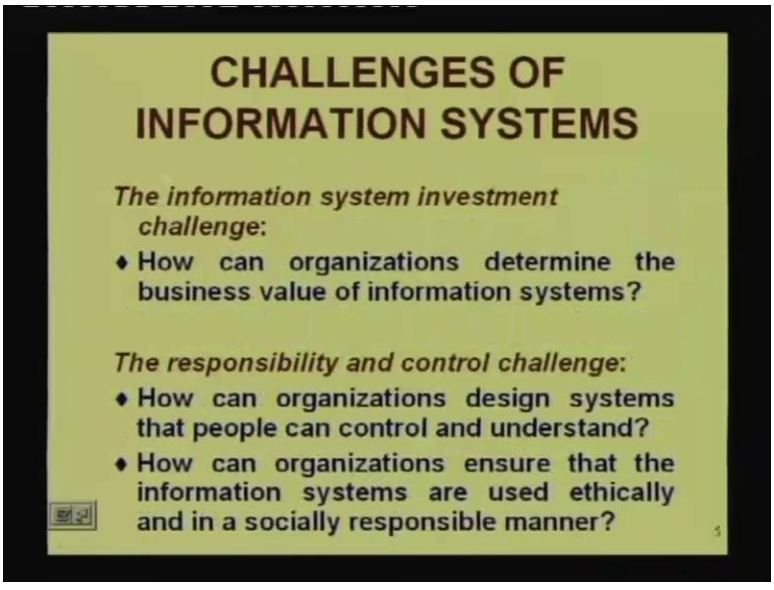

Then the information system investment challenge: how can organization determine the business value of information systems; because anything that you develop you have to justify. I mean you

can always paint very rosy pictures for the future and you can say that let us spend a huge amount of money on this now. But a better approach could be develop slowly; do not be you know try to... do not try to really go for the whole thing at the first go. Spend some money, show some results, convince the management that here is something using which the organization can gain and slowly go ahead with it. So this could be one such way that information system investment challenge can be tackled. But probably that is not the only method. There could be situation where you may have to put a huge amount of expenditure right in the beginning before any results can be obtained. So it is very important that organization determines the business value and go ahead with the investment plans.

And finally the responsibility and control challenge: How can organization design systems that people can control and understand? How can organizations ensure that the information systems are used ethically and in a socially responsible manner? So it is very important from control point of view and from responsibility point of view that we have the information technology, we have the support but can we continue because end of the day it is the people who will run the information systems, I mean without people you cannot think of any information system and therefore the success of the same.

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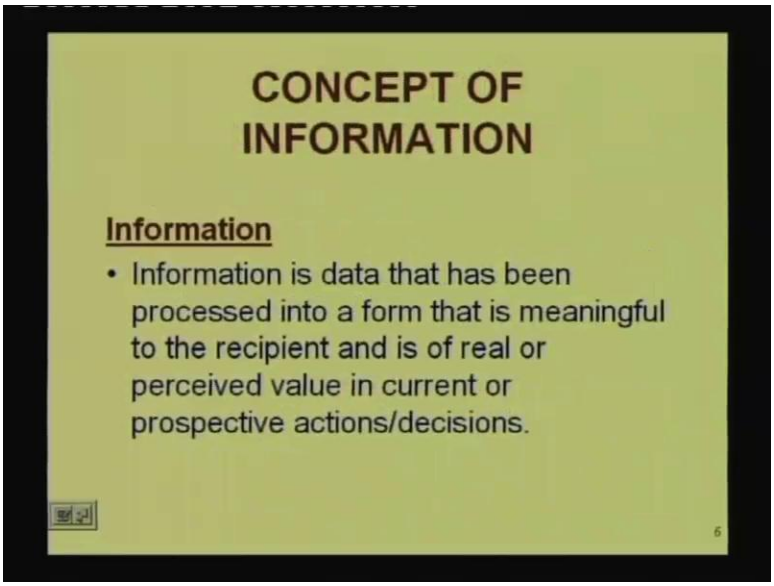

Now let us go back to our basic premise that is what is information. Basically this one simple definition we have discussed earlier. Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective actions or decisions. So it is a simple definition of information and again let me stress that it is not simply process data, it is process data which is of some value to the recipient alright for prospective actions or decisions. That means it should help the decision maker to make decisions in some way. If that is not there, if there is no what do you say that surprise value to the information, no specific use in the decision making context probably it is of little use.

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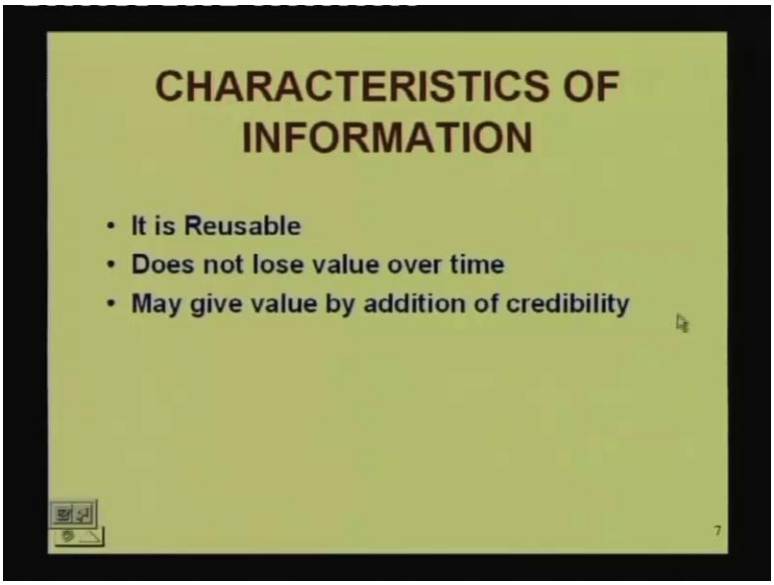

So some very interesting characteristics compared to raw material. So first and foremost the information is reusable, then does not lose value over time; information does not lose value over time. It may give value by addition of credibility. So you can see that information is reusable. So it is not that if you use information once you can again use it.

Does not lose value over time: obviously may not be as meaningful any more. So it may lose value in a different way but it is not you know like a raw material as time passes its use actually becomes less and less so you may not be able to use it after a very long time. So in that sense information is always having value but obviously if the context changes the value also changes.

And sometimes if the context changes in a favorable manner in the positive way then you may actually... the value may also be added; instead of decreasing value may actually go up, it may add credibility to the decision situation.

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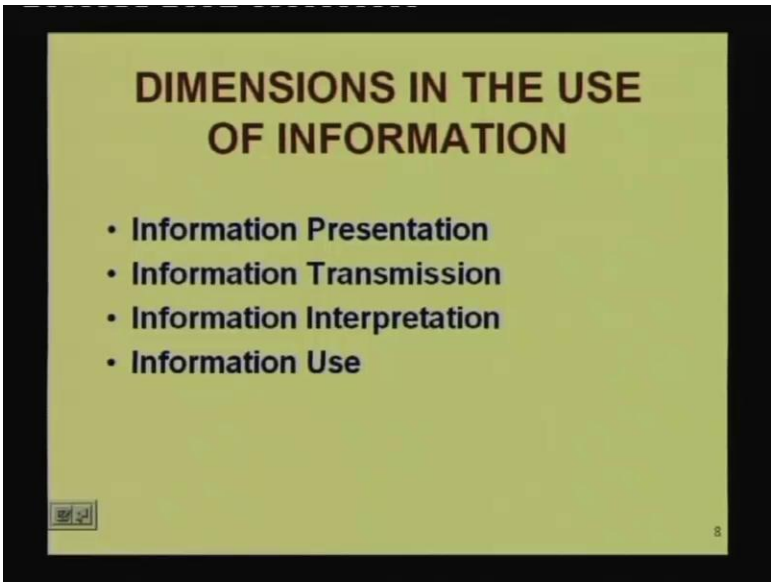

There are essentially four dimensions in the use of information: the information presentation dimension, information transmission dimension, information interpretation and finally information use. So it is information presentation, information transmission, interpretation and use. So all these four dimensions of information we shall discuss in detail that how the information should be presented, how the information should be transmitted without error, how the information should be interpreted. Because when many a time error and biases they come in in information interpretations and finally what use the information is that also should be discussed.

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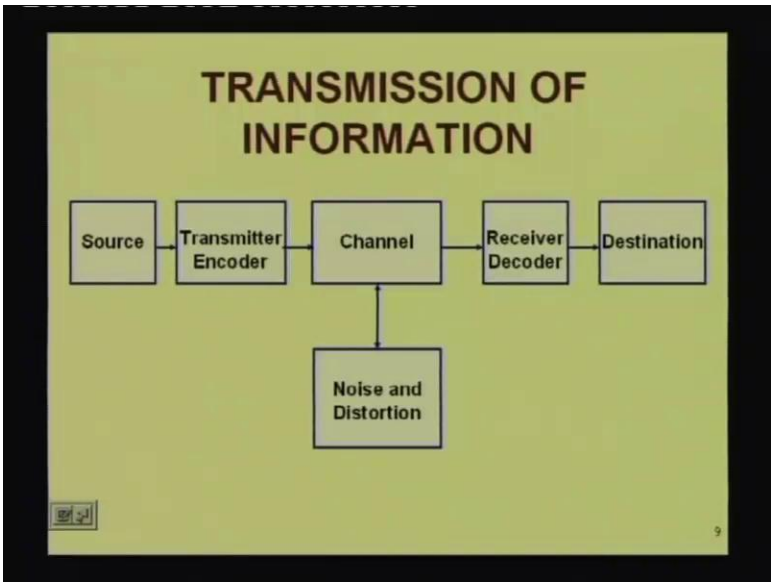

So first let us see the transmission of information. Usually what happens we have a source, from the source we have a transmitter or an encoder and the information goes through a channel and then there is a receiver or decoder and finally it goes to the destination.

Now there are various kinds of things that can happen. Both syntactic and semantic errors can actually occur in the transmission of information. So it is well-known that there could be noise or distortions distortions in the channel. So while the information is being transmitted from the encoder to the decoder in its path there may be noise and distortions which can actually occur in the information channel.

Now there could be problem in the transmission itself, the transmission may not be proper. Most probably it is in the coding. So, when you code the kind of code that you are doing and the decoding if there is a mismatch then even if you receive the information and since the encoding and decoding is not proper you may not be able to understand the information.

Finally there could be a semantic problem also. that means the information which has been send in the first place the way that particular information has been you know attempted to be sent and the way it is understood probably in a very very different manner. Say for example; suppose we

are trying to say that the performance... suppose a particular highly conservative person has gone to a sales meet and he has got a reasonable success in his endeavor in the sales meet alright; now when he sends the information he says not so good. Actually what he meant is he wanted a very very good performance a very bright performance but probably he has got success but not success to the extent that he desired. But probably from the organization's point of view that success is quite enough. So when he sends a message not so good probably if the organizational people are quite pessimistic they may think that the entire endeavor has been a failure.

So although the person wanted to send a message that he has done reasonably well although not extremely well but organization gets the message that he has failed in his mission because there is a difference in their thinking; the person is very conservative and the organization is very pessimistic in its attitude. So these are semantic problems really. But there are large syntactic problems that may occur and as you all know that there is quite a bit of technicality involved in this entire transmission process. You know there are lots and lots of things about hardware, about networking that are also very important. At this point of time we are not going to discuss them.

Specifically also there are the concepts of parity. You know that whenever let us say when you are sending something in zeros and ones if some zeros and ones are lost probably if you have additional parity bits you can always reconstruct them. So that is one great advantage in digital transmission compared to analog transmissions.

In digital transmissions even if some portion of the message has actually been lost due to noise and distortions you can always reconstruct them because you have specific parity considerations involved in the message transmission. So these are all technical features, we shall not discuss them right now.

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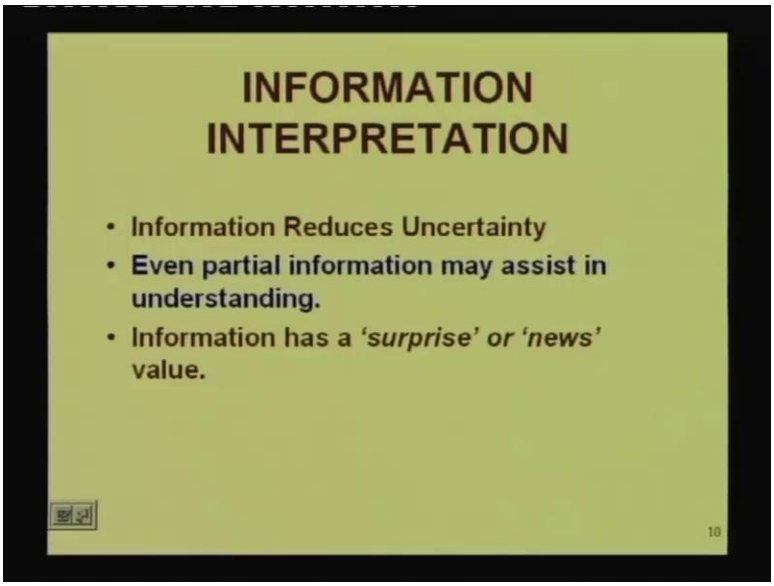

There are other very interesting things about information interpretation. The first one is information reduces uncertainty right. So, even partial information may assist in understanding. I shall give an example how information reduces uncertainty; and then information has a surprise or a news value. In fact the information content it has been shown is maximum when... you you see that whenever we have the surprise or news value also to be the maximum.

So basically the idea here is that whenever someone receives information and if he uses this information in a decision making context it is expected that this particular information will help the particular decision maker in reducing its decisions search space in some way or the other.

Suppose you are really choosing between various candidates, candidates' solutions let us say. now any information that actually cuts down... suppose you you are basically choosing certain locations, certain location decision you are making where to set up your factory and if you have let us say 4, 16 locations all over India a specific information that comes that this particular unit is to be located in southern region only and out of these 16 locations you basically have 4 locations in the southern region so this particular information immediately cuts down your solution space or search space from 16 to 4. So this particular information that this particular location to be located in a southern region only may be a ministry directive that immediately

gives us information, this message has information content simply because it reduces the number of alternatives. In fact this has been put in a mathematical form as well. Let us see what kind of mathematical form it basically gives us.

So let us say in an interview there are 10 equally likely possible candidates. So information content or positively identifying the best candidate is log210 so which is 3.32. Now this log2I is a measure of information content whenever we are having equally likely candidates alright. But if they are not equally likely candidates if there is a probability involved then what we need to do is we need to put basically pi log2pi you know that is we have to instead of equally likely that is 10 we have to multiply them with their specific probabilities; instead of log210 we have to take log2pi individual probabilities and then multiply the whole thing by pi individual probabilities and then sum them up alright. So that is the kind of formula, I am not going into details. So that is the kind of formula that we may have to use.

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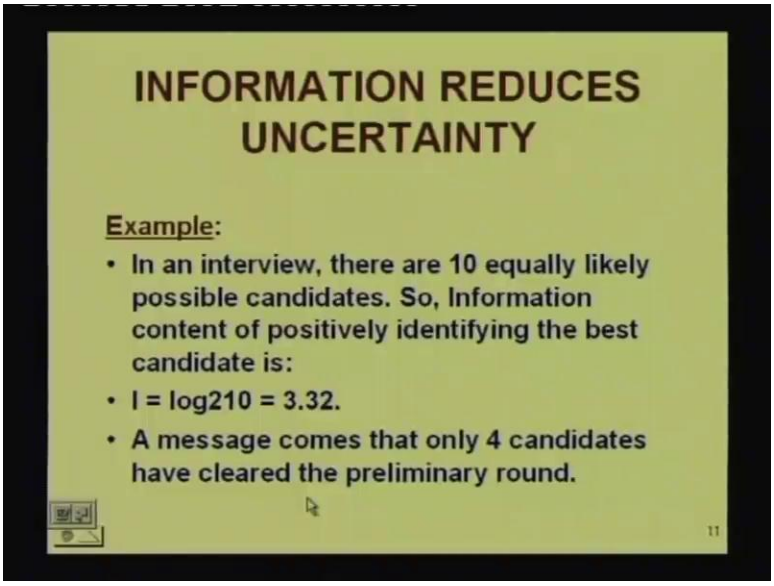

For equally likely candidates the formula gets simplified it is simply log210 alright so this log210 is nothing but 3.32 so this is basically the information content.

Now, when a message comes that only four candidates have cleared the preliminary round that means from 10 equally likely candidates we have now 4 equally likely candidates then we see that new information content is log24 which is 2 because 2 to the power of 2 is 4 thus information value of the partial information or the message is 3.32 minus 1 that is 1.32.

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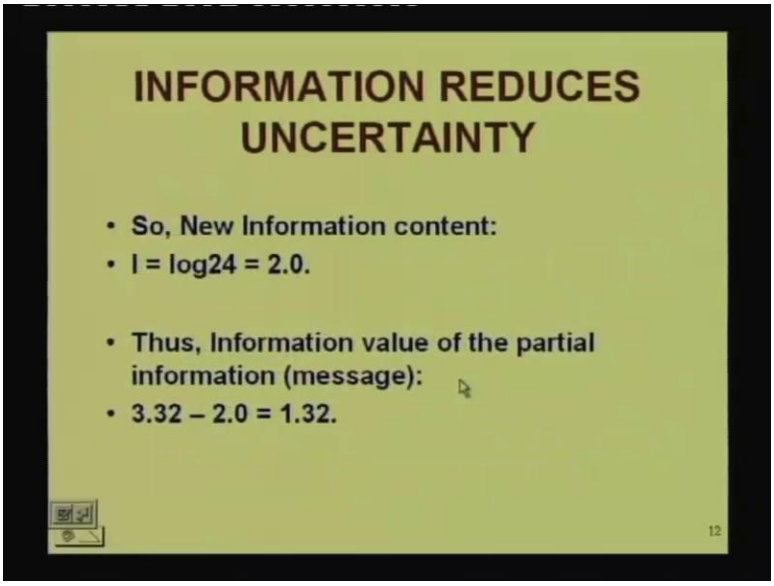

So we can now we should be able to calculate we should be able to calculate the information content of this. Say information content of a message. Let us say we have 16 equally likely locations. So what is information here? It should be log 2 16 which is 4 because 2 to the power 4 equal to 16. Now 4 equally likely locations in south India as we have seen southern part of the country I equal to log 2 4 equal to 2 alright.

So what is the information content of message?

Info content of the message therefore is 4 minus 2 equal to 2. so from this very simple example we see that you know it is information content when the messages are equally likely it is 2 to the power 4 so 2 to the power 4 is 16 therefore I is 4. So log 2 n, very simple formula; let us remember, let us not go into other complicated formula formula that might be used because in in managerial situations it is really very difficult to assign probabilities particularly to unknown things right. So i think equally likely is a fair enough assumption in management situations. So in

that situation if information comes that cuts down the space from 16 to 4 from this particular formula we can say that information content of the message is 2.

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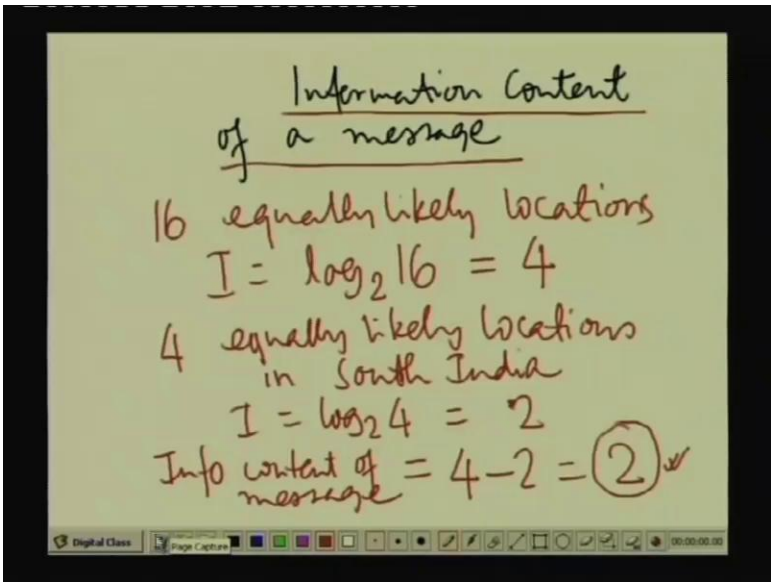

So this is like a measure is a measure in some way or the other which tells basically that what is... so if we say that information has a surprise value it is actually it can actually quantify. So it is some way to quantify the information content right. So as we have seen here in this particular example there are 10 equally likely candidates I log 210 it was 3.32 and when it is coming down to 4 we have seen that it becomes 2 log 2 4 it is not log 24, log 2 4 and it becomes 2 so information value of partial information in this case is 3.32 minus 2 that is 1.32 so that is the thing.

So in this case you know it it we understand that if we have a measure of information and a particular message comes and using that message we see that this particular message reduces the information content and therefore we can say that information has reduced uncertainty to some extent.

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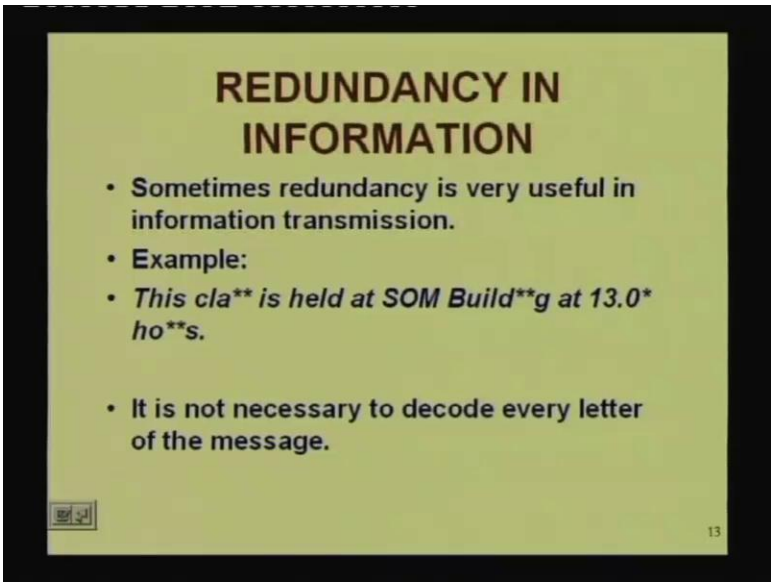

Then this this particular context the concept of redundancy sorry the information content also gives the idea of redundancy. See redundancy is is a part of any information processing. In fact if you look at our English language the English language is full of redundancy. Say for example; just look at this particular thing this class or this cla star star is held at SOM build star star g at 13.0 star ho star star s.

I mean if we look at this particular sentence we can very easily say that this class is held at SOM building at 13 hours; obviously it may not be 13 hours it could be 13:05 hours or 13:08 hours but whatever that is only few minutes only. basically we can interpret from this example even though you can see 1 2 3 4 5 6 7 seven characters are missing from this particular message but even then we can make out when the class is being held at the SOM building right. So therefore we can see that the English language as such contains a lot of redundancy and this redundancy is good because even if we do not get the information in the proper fashion, even if we get only partial information there are because of certain transmission errors but even then we get the message. So redundancy is inbuilt in English language that we use.

However, when we transmit information we do not really transmit the full English statement because it may require lot many bits and bytes and therefore the load will really increase. We try

to encode messages in 0s and 1s and we try to use a very condensed kind of thing so naturally we cannot have so much redundancy; too much redundancy we cannot keep we have to reduce the redundancy so obviously you know it is a what you call trade-off.

If you reduce redundancy your networking, your transmission is more efficient because it can be retransmitted with less volume in less time, quickly all those things. But if redundancy is very very less say... think of a situation where zero redundancy no redundancy at all, when there is no redundancy at all you can still have send the information but if there is a single bit of transmission error it cannot be rectified. Therefore there is a chance that information that is received at the destination may not be of the right quality. So that is why redundancy is almost always added in information but to what extent that depends on the situation.

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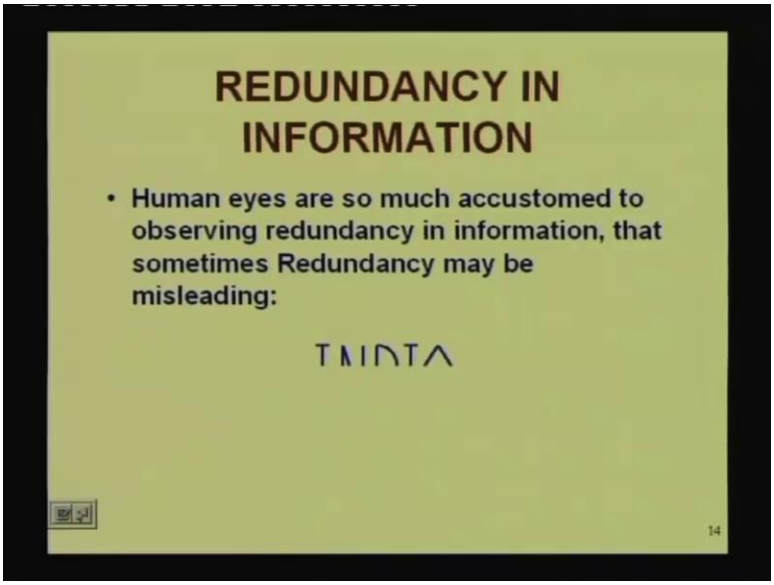

Sometimes there is a problem of redundancy as well. Human eyes are so much accustomed to observing redundancy in information that sometimes redundancy may be misleading. So what happens because we have so much of redundancy everywhere in our life particularly in the language we speak, the language we read that by looking at a some portion of the letters or characters we make up for the rest alright? So if we see IND we just read it as India alright; it may not be India also it may be something else. so in this case I have not shown it horizontally I

have shown it as a vertical cut so you know how do you read this? Most likely at the first look you will simply read it as India alright; it might be a India only but it may not be so also.

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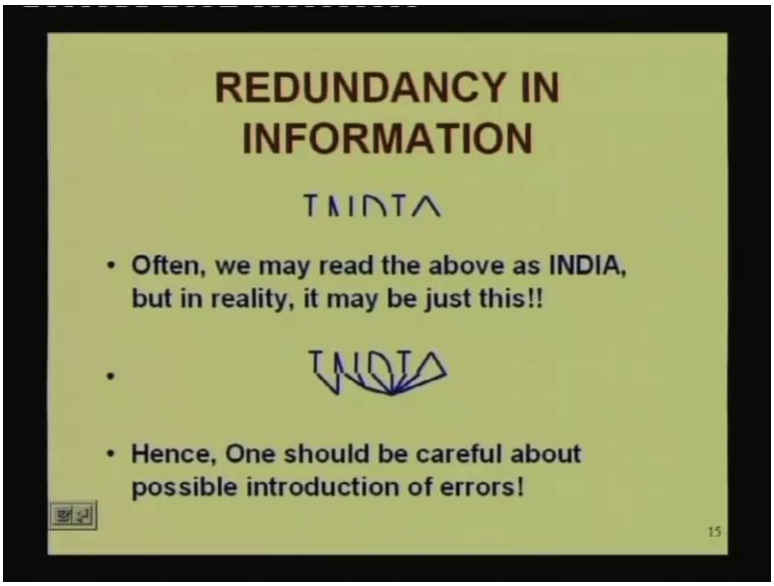

So as you can see here although you have read it as India but it may be just this alright it is not India but it may be simply something else alright; something else or some peculiar kind of characters jumbled up and some drawing drawn by some child or something like that. Hence one should be careful about possible introduction of errors at the time whenever we are dealing with redundancy of information. Because see there are... redundancy is good but when there is too much redundancy then people will have their own filtering mechanism and the filtering mechanism may be so much then errors may come in because of too much redundancy. So these are some of the issues.

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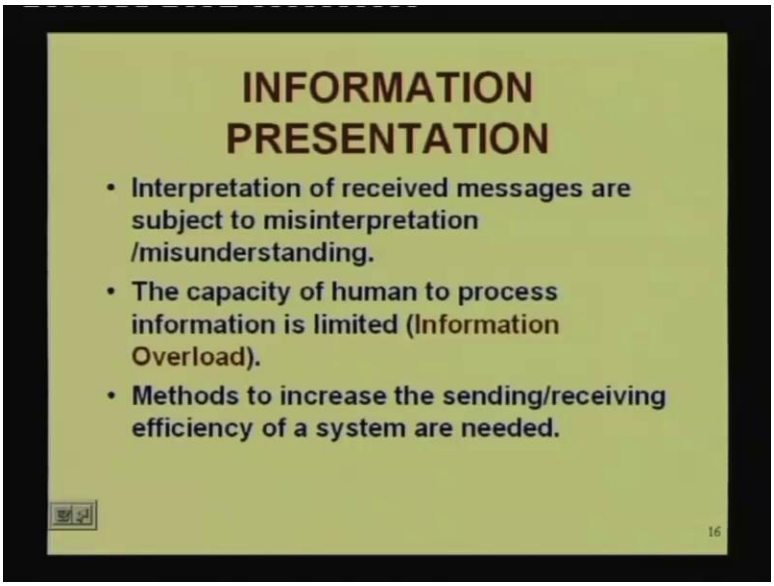

Now once we have understood that then let us look a little bit on information presentation. That is in information presentation the interpretation of received messages are subject to misinterpretation or misunderstanding so the capacity of human to process information is limited, so we should have methods to increase the sending or receiving efficiency of a system. That means whenever we are presenting information we should be careful that there should be some way to reduce reduce the information load otherwise what may happen there may be information overload.

Suppose you are a top man in an organization and everybody down the line is sending full detailed report to you then probably you can never read them. So we have seen managers who never read any report but they just depend on their informal hunches and they depend on the informal communication that they are having alright. So moment you get a big report you make a telephone call that okay you have sent me a big report what it is all about.

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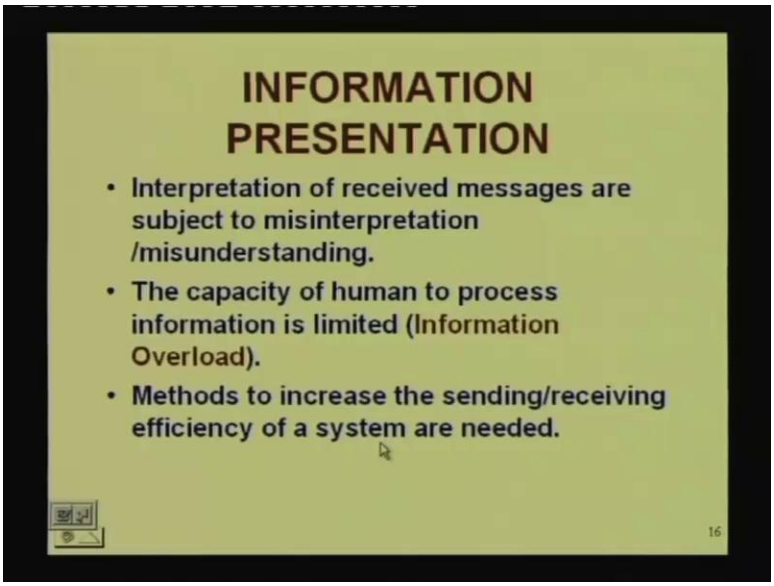

So what he is saying at that time probably you give much more weightage to that particular telephonic conversation rather than the big report itself right. So that is the basic idea that it is not really the information content of the whole detail that is important to you as a top man, you basically require a summary or the gist. So it is always important for... as the MIS reports move up what you call MIS triangle it is necessary that you filter information, you summarize information and do not send the detailed reports as it is right so there should be methods to increase the sending or receiving efficiency of a system. That is very important. So, as far as theory is concerned we stop here. But let us take up a case study on a very specific organization in the next few minutes and try to understand what exactly is required or how this particular company has gone ahead and created an information technology solution in their organization.

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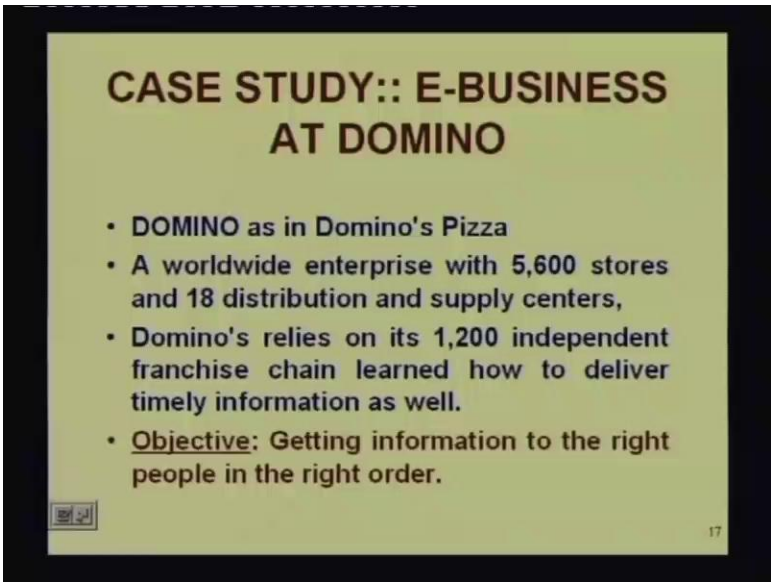

So there are two aspects: one is why the information system is required, what was the problem and what is the solution right. So first we must understand the need of it; if there is no need there should not be any information system. Many a time we are allured by the thinking that we have to have computers. If you have let us say 30 employees and you have to pay salaries to them you can always think of computers. But probably even a simple manual system could be quite okay quite okay.

Ultimately what is the purpose?

The purpose is not a computer printed stationary; the purpose is to run the payroll in the most efficient manner. So if the manual method of paying salary is most efficient then what is the problem? That is why you see the information system is not for the sake of information system. Many of us think probably sometimes that if I get a computer printed report probably it is better than the manually printed report, nothing at all. The manually printed manually printed report or manually prepared report is as good as the computer printed report if they contain the same information.

So the basic idea is not it is coming from computers or it is not coming from computers. The basic idea is why the computer is required and the purpose for which the computer system has

been installed to what extent that purpose is being served. If the purpose is not being served probably it is not worth it. So this is the first test any computer information system should be undergoing that if this system is not there where is the problem; if there is no problem you should not have the system.

Anyhow these are true for probably small organizations. But whenever we have very large organizations with multitude of problems in geographically dispersed locations then we have to definitely go for the computer, there is really no other substitute.

So this is the example of Domino; Domino as in Domino's pizza. In this case the this particular organization is an worldwide enterprise with 5600 stores and 18 distribution and supply centers so it is a huge number and it relies on its 1200 independent franchise chain learned how to delivered timely information as well.

So basically what happened that since domino relies on its 1200 independent franchise chain it is the franchisees which which... remember they are basically independent, it is not that they are employees, they are not really employees so they are franchisees and they are serving the Domino's but the point is the Domino has to ensure that the same quality persists everywhere, this is very important for them. So they should really pass on information quickly and obtain information quickly from them. The problem is that geographically dispersed, very far from one another and the company's headquarter is quite small so all that thing is coming up; the objective is getting information to the right people in the right order right. So we have to give the information very quickly and in the proper format. So that is very important.

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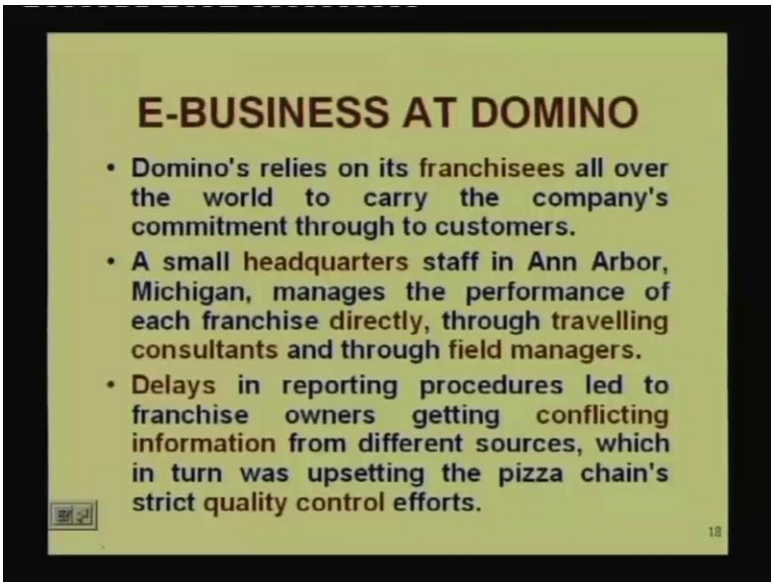

Now, Domino's relies on its franchisees all over the world to carry the company's commitment through to the customer; it is very important. There is a very small headquarters staff in Ann Arbor Michigan, manages the performance of each franchise directly through travelling consultants and through field managers. So there are three methods: one is the performance is measured by direct measures by travelling consultants and by field managers.

Now one thing that will be coming up later on that is say how do you manage when you have a large organization, geographically very large organization and geographically distributed, how do you manage. Basically if you... what kind of control should you exercise? Basically if you really try very very what do you call organic mode of management that means you want to control each and every step of the subsidiaries you are bound to fail. You have to think that each such franchise should be a viable unit. You you cannot make decisions for them, they have to make their own decisions alright. What you can do you can enable them, you can empower them. Being the headquarters of the organization to which their subsidiaries that is the only thing that you can do; enable and empower alright and keep close tab on what is really happening, fine.
So those are the issues. In fact we will discuss it someday.

The basic idea therefore for any organization is that that there should be viable units only then the franchisees in this case can actually survive alright. So you cannot control. So basically there should be information exchange so as to create a situation where this is possible.

Now delays in reporting procedures led to franchise owners getting conflicting information from different sources right which in turn was upsetting the pizza chain's strict quality control efforts. So see the point is if even if you give all independence and empowering and all that but then after all they are franchisees so they have to get the information at the correct time. So if you have put certain quality control strictures that should reach them as early as possible there should not be any delay. If there is a delay then what will happen they may get information from a different source or may be from other franchisees or may be from competitors and they may make their own kind of standards and the whole thing would be highly confusing alright. So that is why it's very important that very good information structure is actually built.

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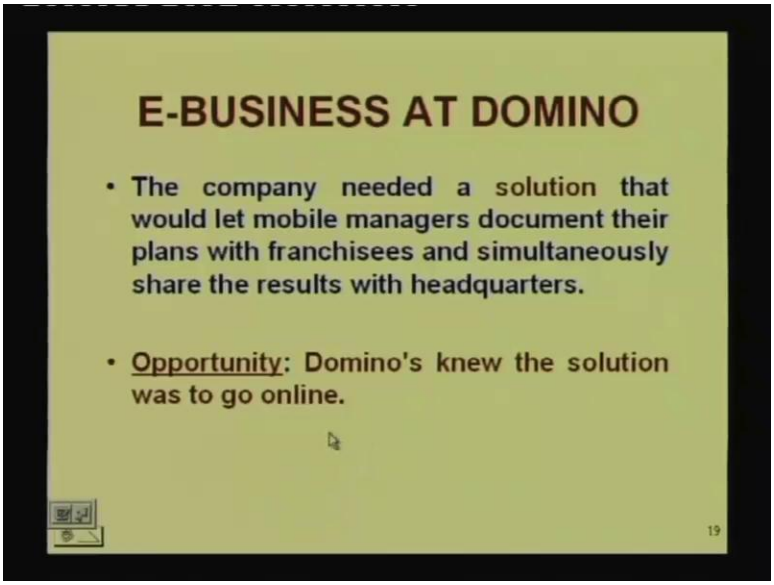

So the company needed a solution that would let mobile managers document their plans with franchisees and simultaneously share the result with the headquarters alright? Therefore you see on one hand you have the managers who are highly mobile, you have the franchisees geographically distributed, you have the headquarter which is rather small and really they cannot

take information overload. So what is required is that Domino's knew the solution was to go online; they have no other option but to go online to take care of the situation.

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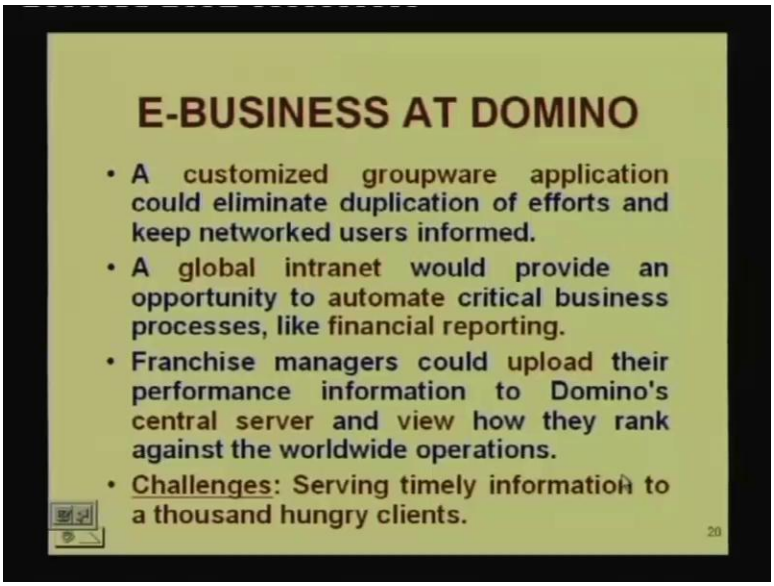

So what exactly they did they went for a customized groupware application that could eliminate duplication of efforts and keep network users informed.

A global internet would provide an opportunity to automate critical business processes like financial reporting.

Franchise managers could upload their performance information to Domino's central server and view how they rank against the worldwide operations.

So basically they have to go for a customized groupware application, they have to hire a global internet to automate their critical business processes like financial reporting and then the franchise managers could upload their information and should view the rank against their operations. That means they can see each other's performance and gear themselves up. So serving timely information to a 1000 hungry clients that is the challenge.

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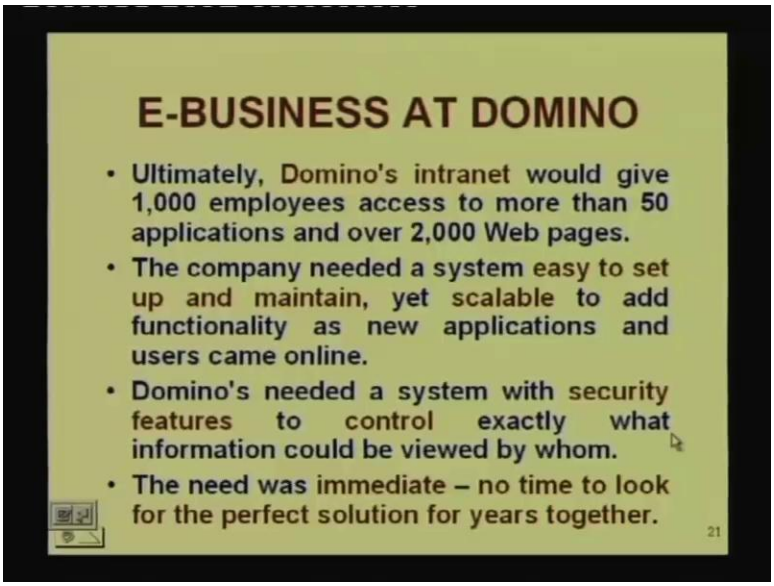

So what has been done?

Ultimately Domino's internet would give 1000 employees access to more than 50 applications and over 2000 web pages that is the plan. The company needed a system easy to setup and maintain yet scalable to add functionality as new applications and users came online. So company has to have an easy to setup and maintainable system but scalable; scalable here means that as time passes it should be possible to add new functionalities.

Domino's needed a system with security features to control exactly what information could be viewed by whom and it is immediate, you cannot really wait for the perfect solution for years together alright that it should immediately this need be fulfilled that means you cannot wait.

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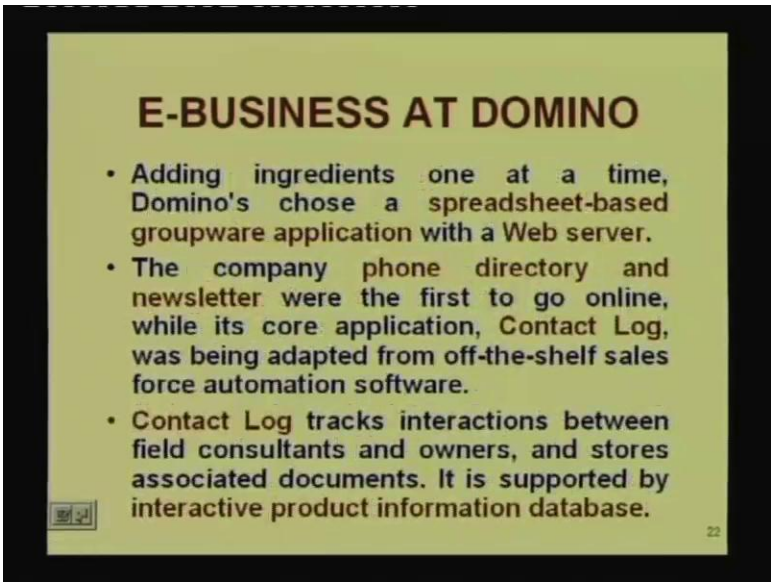

So adding ingredients one at a time Domino's choose a spread sheet base groupware application with a web server.

The company's phone directory and newsletter were the first to go online, while its core application, contact log, was being adapted from off-the-shelf sales force automation software.

Contact log tracks interactions between field consultants and owners, and stores associated documents. It is supported by interactive product information database.

So it went for a spread sheet base groupware application along with the web server, the phone directory and newsletter were the first to go online and then contact log has been put into the web.

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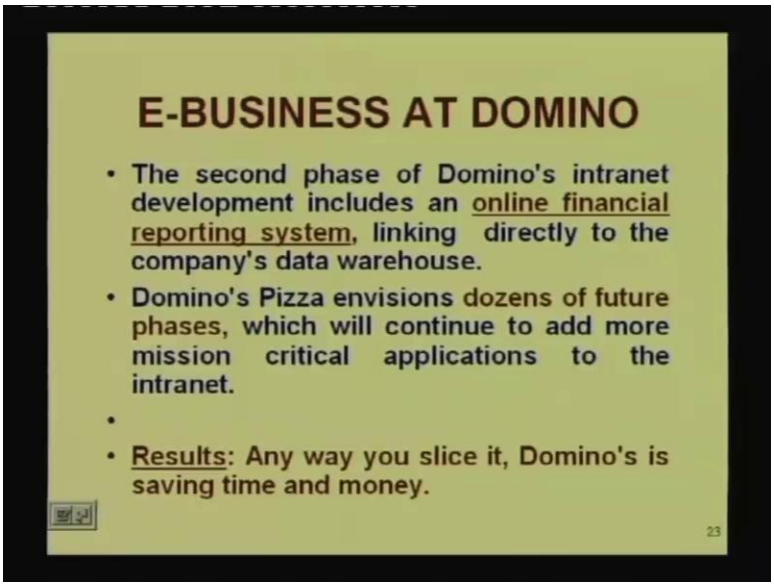

The second phase of Domino's internet development includes an online financial reporting system linking directly to the company's data warehouse.

The pizza envisions dozens of future phases, which will continue to add more mission critical applications to the internet. And so you can see any way you slice it, Domino's is saving time money through this E-business application. Thank you very much.