Functional and Conceptual Design
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Lecture No. 06
Reverse Engg. and Redesign

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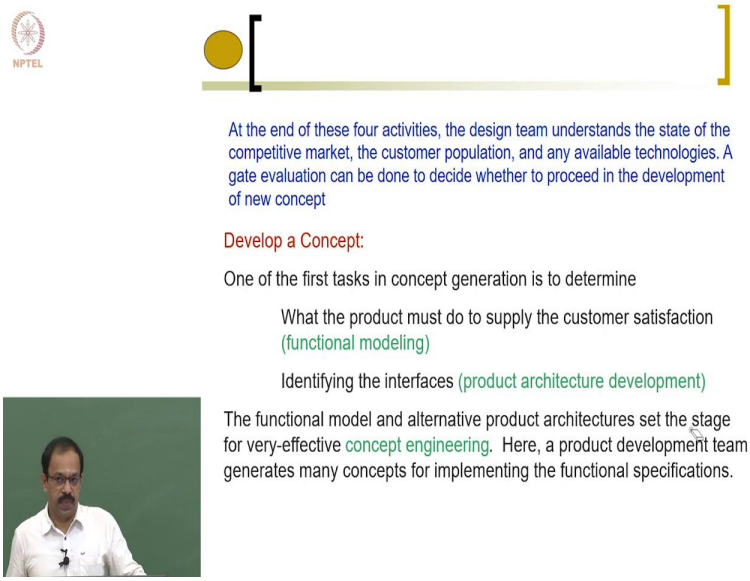

In the last class, we discussed stages in product developments. What are the 3 stages of product development? Or 4 stages, right? How many stages 3 or 4, 3 stages of product development. What are they? Understand the opportunity, implement concepts, implement a concept and then each one we went through understands the opportunity.

What do we do in that stage? What is the purpose of the stage to understand the opportunity? See whether there is a good potential to develop a product and sell it in the market. And there are 4 steps involved in understanding the opportunity. What are they? Develop the vision, market opportunity, customer need analysis and competitive analysis. At the end of all this, you will be able to understand that there is a real opportunity to develop new products.

And then the next stage develops a concept. To develop a concept of what we will do, we decided what the product should do and how the product should provide the functions needed in the product that is basically developing a concept.

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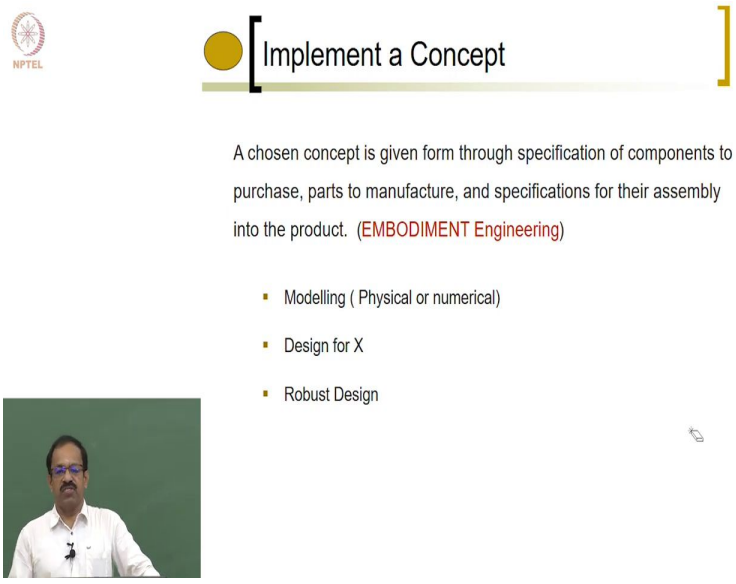

And the last one is to implement a concept. Where actually we try to build the prototype, test it, do some trial runs and then sell it in the market. So, these are the 3 important stages in developing a product, ok. So, these are the 3 stages in developing a product.

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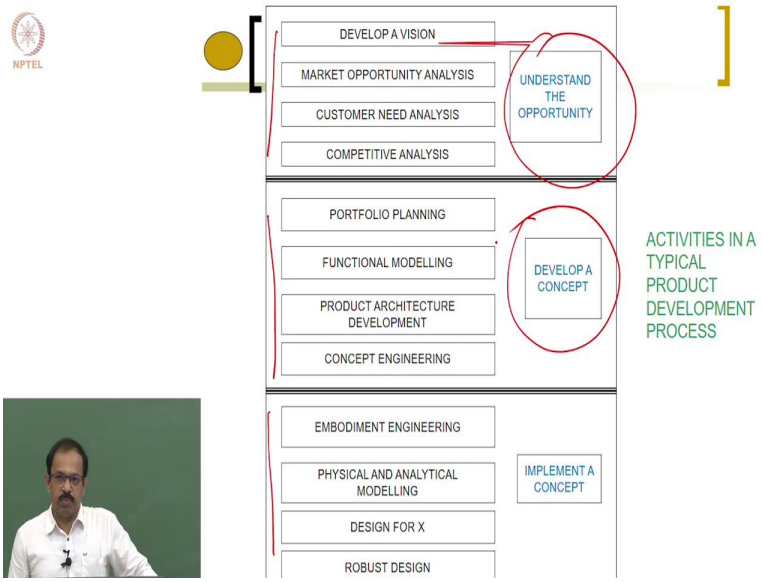

So, we have developed a vision, market opportunity analysis. So, this actually forms ‘understand the opportunity’, this forms the ‘develop concepts’ and this forms the ‘implementing a concept’. So, these are the 3 important stages in designing a new product and we will be looking at these 2 stages, ‘understand the opportunity’ and ‘develop a concept’. So, these are the 2 stages we will be looking into in detail. So, let us see some of the companies, how they actually develop the products.

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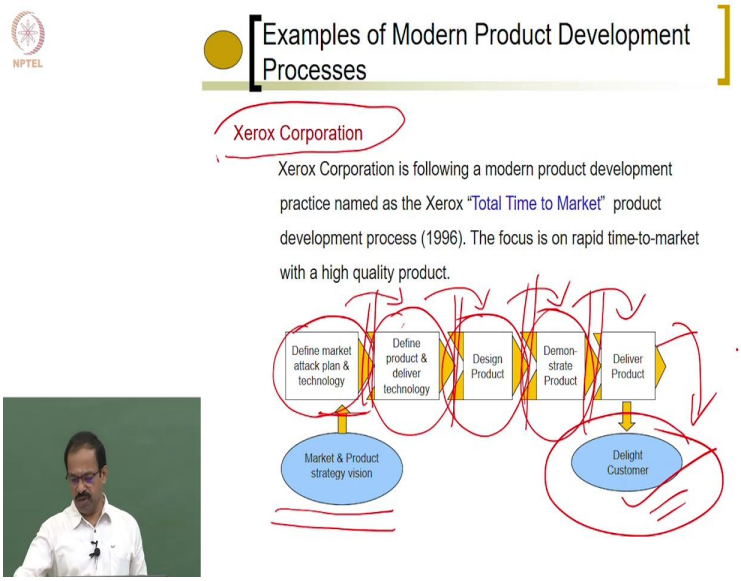

So, this actually shows the product development process of a company which is the Xerox Corporation. What do they make? Xerox, what do they make? Photocopying machines. How many people say I want to photocopy? Or how many say I want to Xerox? I want to Xerox this paper.

The Xerox has become synonymous with the photocopy. So, they are highly successful in developing products for photocopy. So, how do they actually develop the products? So, they do a product vision, so they have a vision for a new product. And then they define, how they approach the markets that is basically market opportunity analysis and marketing plan and technology and then they go for the concept developments.

That is defined product and delivery technology. What they are supposed to do. And then they decide what are the things to be provided, what are the features to be provided in the products and then they design the products and then demonstrate is basically implementing the concepts and then delivering the product and then they ensure that the customers are delighted with their products.

So, this is the requirement of any company, they want to delight their customers with the products. And to delight the customer, they need to provide the features the customers definitely want and the customers may like to have some features the customers do not even expect. You provide more features than what the first customer can expect and the customers will be delighted.

So, that is the way how Xerox Corporation develops the product and sells it in the market. So, each stage you will be having gates in each stage so there will be different gates. Each gate will be evaluated, strategy will be evaluated and then it will go to the next stage, next stage, then we will go to the market and delight the customer. You have many stages and gates and at the end of the final gate, you have a product which goes to the customer. What is your roll number? Now, let us take another example of so, this is the example for the Stage Gate process. The next example is what is the other product development process on a stage gate? Spiral. So, who uses spiral gates? Software Company.

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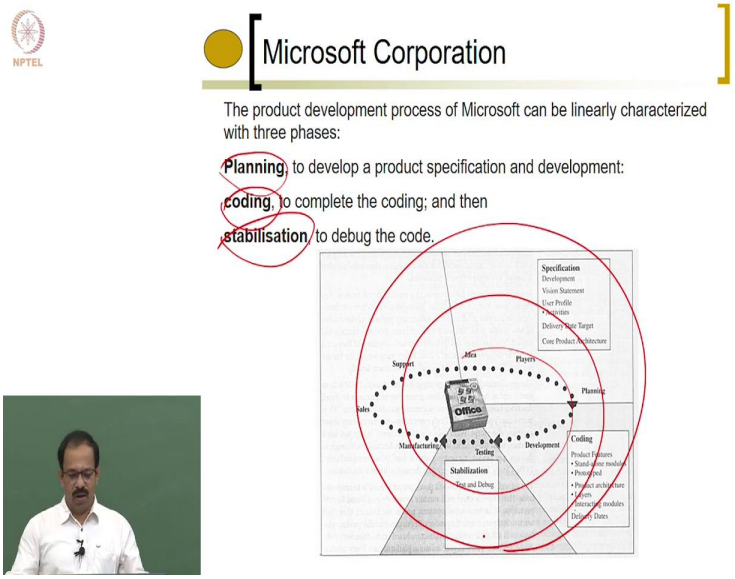

So, let us see how the Microsoft Corporation develops their products. They have 3 stages of planning, coding and stabilization. So, this will be 1 cycle and then again it will go to 1 more cycle where again they will do the planning, coding, stabilization; this keeps on happening like this and it will go through Multiple Stage Gate process and finally, they will release the product and that is the spiral design process followed by Microsoft Corporation.

This way you will see any company you take, any manufacturer you take you will see that they follow a process which will be either a Stage Gate process or a Spiral Design process. Of course, the nomenclature may be slightly different, but the companies will be having stages and gates to ensure that the product is really worth taking forward and customers will be happy to use the product. So, that is the way companies develop the product, got it? Any questions?

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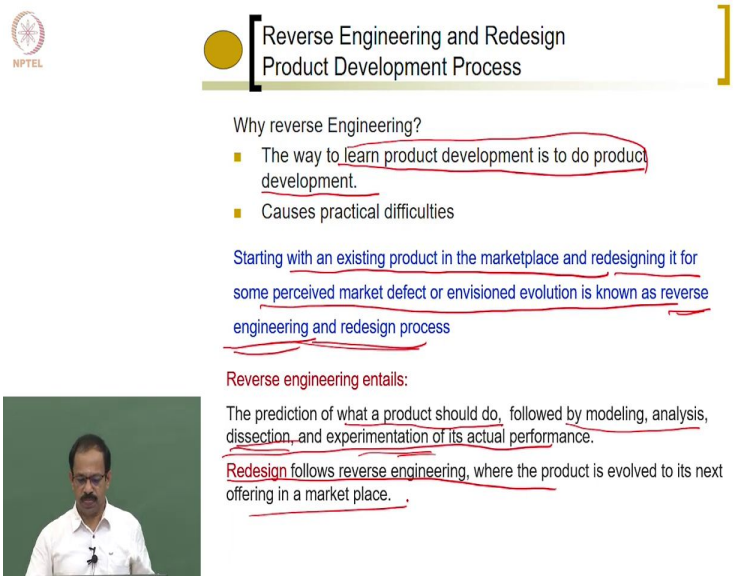

We talked about reverse engineering in 1 of the classes, I told you that reverse engineer engineering is basically to ensure that if some products are not meeting the expectations of the customer or the customers are not happy, then we try to redesign the products by looking at the

product, what is there inside the products and then try to develop a new product that is basically known as reverse engineering.

It is also a process of developing products. And sometimes we use this for learning product development. Basically to learn product development, we use reverse engineering. The reason is that a concrete understanding of how products are developed helps you to get an idea how to make a good product. We need to have some concrete experience in order to develop a new product.

So, that is what we are actually trying to do in the lab class for you to get some concrete knowledge or experience of real products, and then you can look at the product and then see how this product can be improved or how they are actually developing this product and how it can be improved. That is why we use reverse engineering here. Reverse engineering is used by many companies to develop products, but what we are looking at is to see how reverse engineering can be used for learning product design.

This is what we are trying to do here. Starting with an existing product in the marketplace and redesigning it for some perceived market defects is known as reverse engineering. So, I have a product like this and I have some problems with it, so I will try to see if I can develop this product to a better one. So, I will try to understand what is happening inside, I will open this, try to understand all the parts and then I will find that, ok, this particular button is not properly placed or it is actually creating a problem.

Can I redo these buttons and then make it as a new product? That is basically reverse engineering. So, I do understand all this happening inside and then try to redesign it and this is known as reverse engineering. So, in existing products we try to modify by some process some

methods and we call this reverse engineering and redesign because reverse engineering and redesign process.

Of course, in this course we will not be doing a redesign of the existing product but we will try to understand what is happening inside each product and then try to get an idea how they are actually developing, how they develop the product and what this product does in order to meet the customer's requirements. That is what the purpose of reverse engineering is, it entails the prediction of what the product should do, followed by modeling analysis, the section and explanation of its actual performance.

We try to understand what the product is supposed to do and then try to understand how it is being done and then do some actual dissection of the products and then experimentation of its actual performance and then do a redesign to make the design better. Many industries will try to reverse engineer the products existing in the market to overcome some of the perceived difficulties or some shortcomings of the product and get a new product. So, that is basically known as reverse engineering and redesign process.

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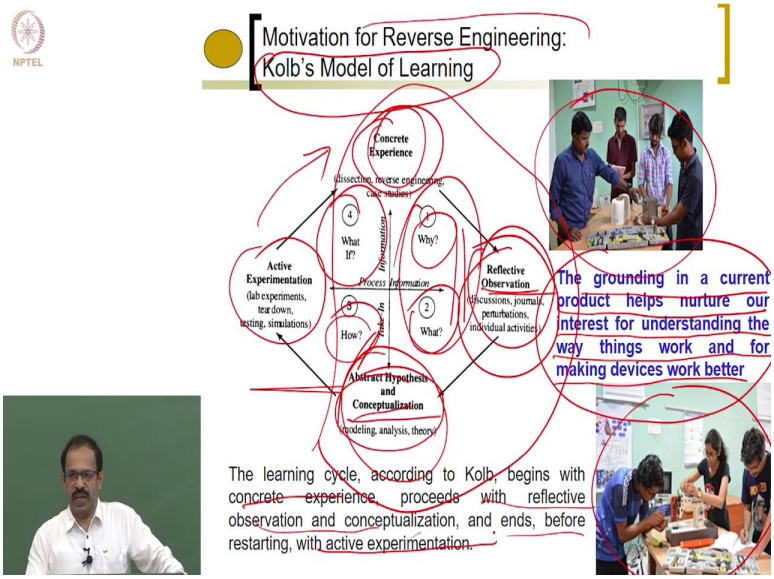

So, for us what is the importance of reverse engineering? We are not going to redesign the existing product for this class. But why are we doing reverse engineering? Why are we doing this kind of exercise? To understand the product. So, last lab class we did a dissection of a broad class. How many of you participated in the dissection?

All of you or some of you just watched it? So, did you learn something from that? Or it was the first time that you were doing a dissection? How many of you are doing it for the first-time opening products? Ok, few of you. Yeah. So, now, if you do this for multiple times, you will get a lot of information about how products work, how each product is providing outputs and you provide electricity, you are getting an output at the end of the product.

So, what are the things that happen in between and how the designer makes it possible to happen is understood through product dissection exercises. So, reverse engineering basically follows this principle for learning purposes. There is something called a Kolb's Model of Learning. It says that the best way to learn things is basically to experience so the moment you experience things, you know, what is needed for doing that.

You will be getting the best experience or best learning through experience. So, the Kolb's learning model basically tells you that every learning starts with a concrete experience. How many times somebody tells you how to swim, you will experience, you will learn only when you do, do experience the swimming. Similarly driving can tell 100 hours of theory about driving, but the moment you start experiencing it, then only you start learning it.

So, design is also like that you need to have some kind of concrete experience to start with the learning process. Reverse engineering basically tells you that the grounding in a current product

helps nurture our interest for understanding the way things work and for making devices work better. That is the whole idea.

If you know the current products and how it works, that only will help you design the better process. If you do not know how this works, you will never be able to redesign or improve the body. So, the grounding in a current product helps a designer to design a better product.

That is the whole idea of reverse engineering and learning through experience. The Kolb's Model tells that you start with concrete experience, i.e., you want to learn something, you get an experience of that. So, if you want to design a product, you experience how the product works. You open up the product, understand each part, what is the role of each part in the product?

And what is the size dimensions, what it actually does, how is it being assembled, all those things you understand, and then do the reflective observation. Why is it doing something? What is it? What makes it to do something thing that is basically the reflective observation discussions, you discuss this product with your peers or even your assistant, teaching assistants or the technicians discuss with them why is it needed, why a particular gear is provided or why a belt drive is there are a particular component is assembled in 2 parts or 3 parts.

So, are those things you question and then you will understand why and what of the products. So, once you know why it works and what this is, what it makes to work, then you start how to improve it or how to do something different or how to make a new conceptualization, abstract hypothesis and conceptualization. So, now you know very well about what is happening. Now, you try to start thinking of how to improve it, what can be done to make it, make this product better, and then start working on it and then go what if you try to change something and then see what happens in the product that is produced what if I do experimentation.

You start experimenting with the new designs or the new concepts and then get the experience. That actually completes the cycle of redesign process reverse engineering and redesign process. You will be doing these 3 parts: the concrete experience, reflective observation and to some extent, a conceptualization on how to improve the product. During the lab, you are expected to do these 3 parts and then get a good idea of the existing product so that you can be a good designer or you can think of redesigning the product.

That is the whole idea of having the lab session on reverse engineering, any questions? All right. Whenever you do the lab exercise, and you are trying to prepare a report, keep these things in mind the whole purpose of doing this. Why are we doing this? We are doing this to get a good experience of what is happening in the products, ok that is the concrete experience and to understand why and what makes this product possible, or why is it so?

And what makes it do something which you expect it to do? Or you expect, why is it not doing something which you want to do? So, understanding this, why and what helps you to clearly tell what is good about the product and what is bad about the product? When you write the reports, try to answer these questions, what is good, what is bad and why is it doing what it is doing?

And then see how can we improve upon it conceptually, it will take some more time for you to come up with new ideas and concepts to make it better but the ultimate aim is to see how do you improve an existing product that is where if you open up my inbox you should try to find out what is good and what is bad about it and how to make it betterments then you are becoming a good designer.

So, the learning cycle, which I already mentioned to you. It begins with concrete experience, proceeds with reflective observation and conceptualization and ends before starting with active experimentation. That is that you make it and then try and experiment with the new products that is basically the Kolb's Model of Learning which we are following in order to make sure that you understand the products in a much better way.

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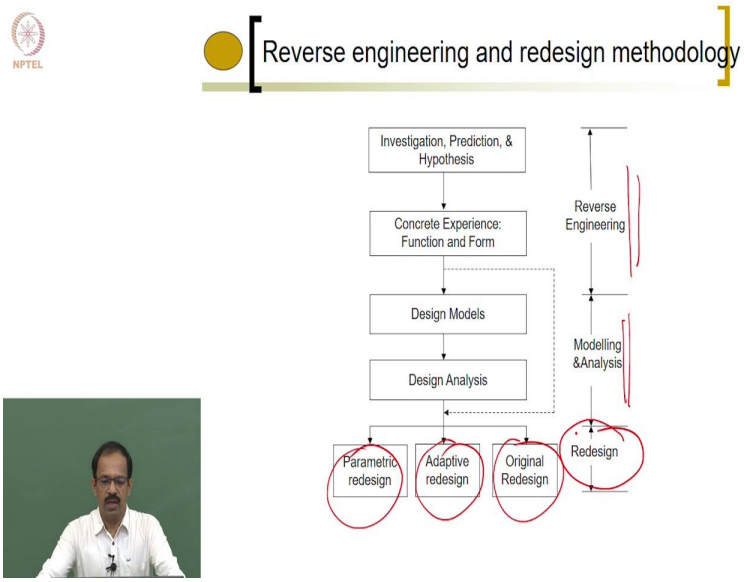

So, this is the summary of the reverse engineering, you investigate prediction and hypothesis, concrete experience some function and form and that becomes the reverse engineering and then you design the new product, then it becomes modeling analysis and redesign. So, redesign can actually happen through adaptive design, original design or parametric design, these are the 3 methods by which you can design, original design, adaptive design and changing the parameters. So, any one of these can be used to redesign the products that is reverse engineering and redesign methodology.

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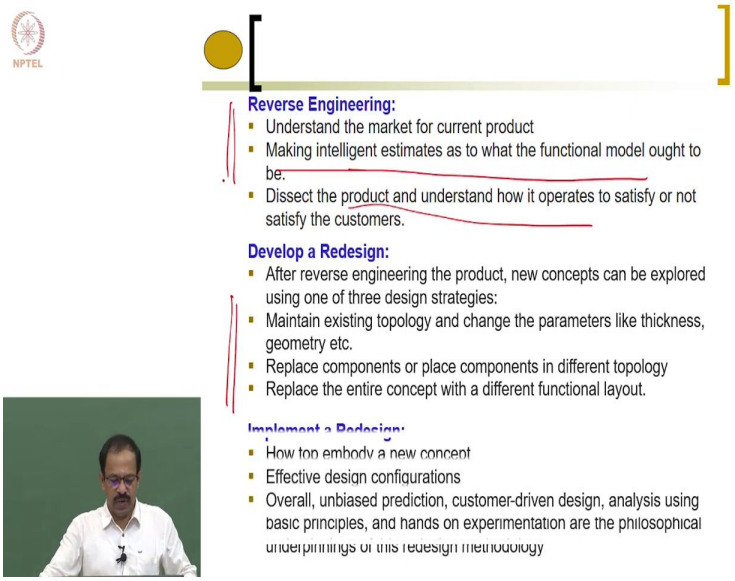

So, we start with reverse engineering, understand the market for current products, making intelligent estimates of what the functional model ought to be and dissect the products and then develop a redesign. We saw how we actually design the new products using methods or understanding the market and then developing a redesign.

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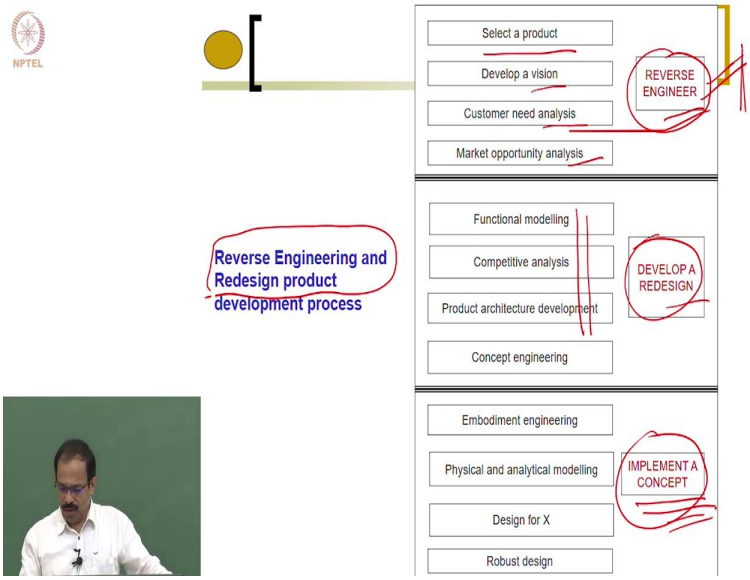

So, we can actually summarize this in these 3 that is reverse engineering, develop a redesign and implement the concepts. That is the reverse engineering stages. First, you do a reverse

engineering of the existing process. Select the products, develop a new vision for developing the product, customer need analysis, market opportunity analysis and then functional modeling, competitive analysis, product architecture development.

And then finally, implementing a concept that is the reverse engineering and redesigning product development process. The new product development process, we saw instead of reverse engineering, we will be having the stage, the new product developments there are 2 things 1 is new product development, the other 1 is reverse engineering and redesign new completely new product development you develop a vision and then develop a concept and then implement a concept. So, this instead of this, you will be having reverse engineering, then develop a redesign and implement a concept. So, these are the 3 stages that you will be having in the reverse engineering process.

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So, let me summarize what we discussed in the last 3-4 classes. We briefly talked about the objective of engineering design, and then we talked about the type of design and redesign. What are the types of design we discussed? Original design, adaptive design, variant design or sometimes called as parametric design also; variant design or parametric design. And then we

talked about 2 stages or 2 product development processes: the Stage Gate process and spiral model process. And then we talked about different stages in product development. So, we know that this is Stage Gate and in Stage Gate there are multiple stages.

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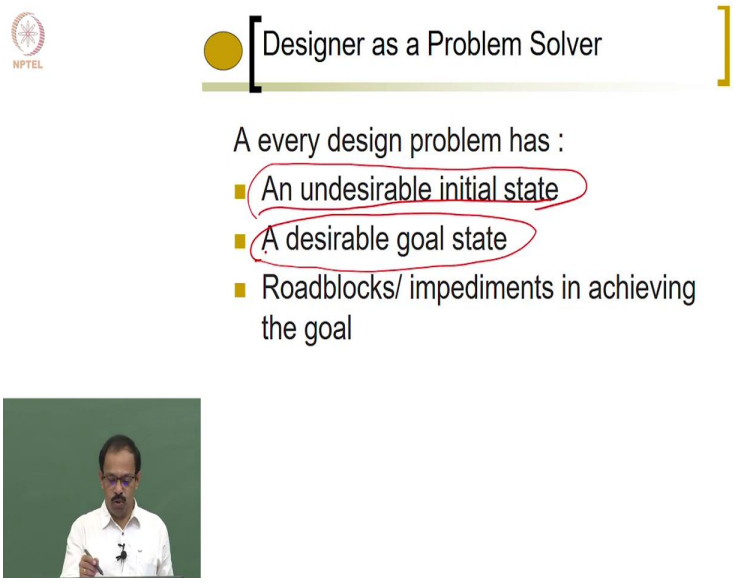

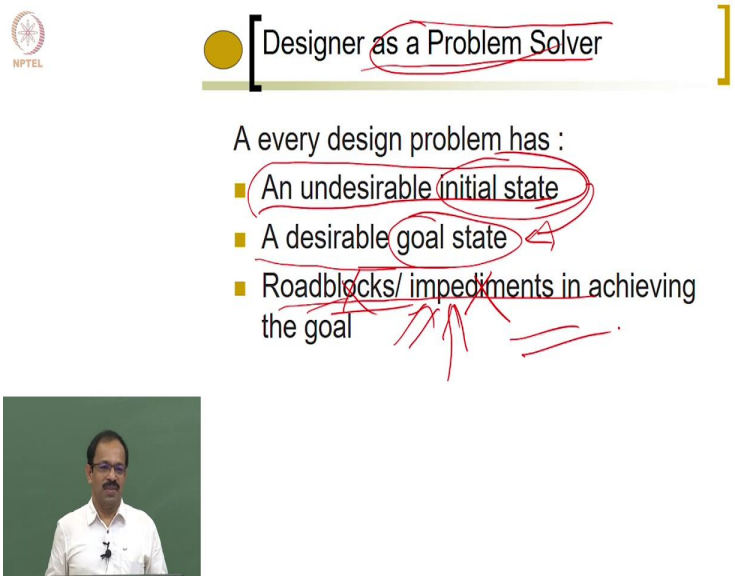

So, we will start this in the next class. Let us just discuss some general things about designers. If you take any design problem or you take a designer as a problem solver. So, any design problem has 3 stages or 3 components, I can say that you have an undesirable initial stage, you start with

an undesirable initial state, "oh, this is not working the way I want" that is my undesirable initial stage. Any product design problem you take, you will see that ok, my cycle is not giving me the speed as a watch that is your undesirable initial state or I need to pedal either way from my hostel to the class.

That is my undesirable initial stage. So, you are not happy with something or you feel something is not good or something is not working the way you want and that becomes your undesirable initial state in the product development and then you have a desirable goal stage, you know that, "ok I do not want to put any effort, I want to reach my classroom from the hostel without much effort" or any other issues you face.

Somebody will say, ok, I would sweat a lot, right from hostel to classroom. That is your undesirable initial state, what you want, you do not want to get sweat, yeah. So, no sweat, that is your desirable initial state and desirable goal state. So, you have an initial state, which is very much unfavorable, and you have a very desirable goal state also. Now, as a designer, your job is basically to move from here to here.

You want to convert this undesirable stage to your goal stage. For every designer, every problem solving is what is needed. The whole question is, how do we actually reach because there will be a lot of roadblocks and impediments in achieving that goal. There will be a lot of difficulties in converting that undesirable goal to a desirable and undesirable initial state.

So, the moment you actually solve this, and you try to overcome these things, then you are becoming a designer, you are actually getting a new product. So, every designer is basically a problem solver. He is trying to solve a problem, which he saw and how he solves depends on

how creative and how imaginative he is in removing the challenges. So, that is where actually the designer comes as a problem solver.

So, when I say I have a problem with the projector, I know what the problem is. I know the undesirable initial states. I know what the required state is so yeah, I do not want to connect my laptop to the system, the moment I switch on my laptop and press a button it should get connected, I do not care how it happens. So, I have an initial stage which is undesirable, I have a goal state which is desirable.

Now, the question is, how do I reach them? Or can I remove this cable between this projector and that laptop? If I can solve that, then I am getting a new product. So, as a designer, what I will see I look at ok, what is happening in this cable and is there another way to connect from here to there without using a cable that is my challenge. So, I hear many option technologies are available.

Now, I will try to work on it and come up with a solution where the cable can be removed, then I am getting a new product. So, I am solving a problem by overcoming the issues in having my goal state achieved. That is the problem solver. So, every designer is a problem solver. So, if you are ready to solve problems then only you can become a good designer. But what are the good characteristics of a problem solver?

What qualities should you have in order to become a good problem solver? What are the qualities? Pardon? Persistence yeah. Good, persistence, what is persistence? I will not stop right whatever happens I will keep on working on it till I reach my goal. What else, failures? Patience, ok, yeah, sometimes patience, will get correct next. What else, ok this I will come back? Of course.

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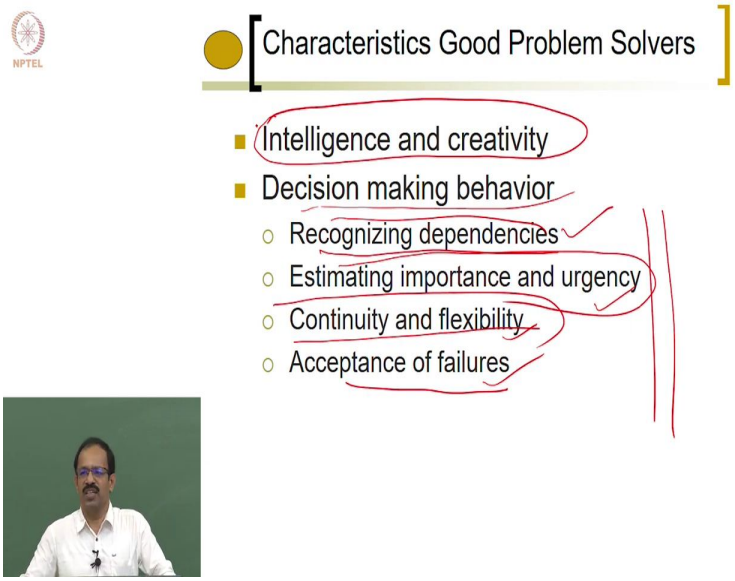

So, acceptance of failures. That is one thing, then there is continuity and flexibility, which is basically the persistence, separations everything comes under this. You have to continue to work on it and then estimate; the other things are basically recognizing the dependencies, you should be in a position to understand what depends on others. So, what is the dependency between 2 factors, there may be multiple factors, how they are interrelated, how these interrelationships can actually lead to better design.

So, these are basically recognizing the dependencies, estimating importance and urgency, what is most important what is to be sought solved first, that is that estimating importance, urgency, urgency, and of course, the decision-making behavior which actually follows all these things. And how do you make a good decision about something good, there may be multiple options you do not know which one is good.

So, you should be able to recognize the dependencies. You should understand the importance and urgency, continuity and flexibility, acceptance of failures and of course, this becomes very critical in solving the problem creatively. So, you need to be intelligent and creative in order to

solve the problem. So, as a designer you try to see whether something good can be solved. Look around you and see what are the simple problems you can solve, ok.

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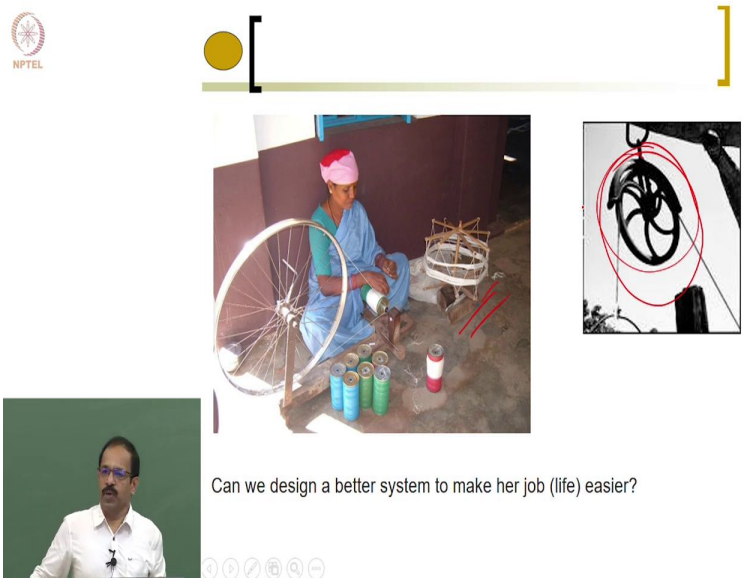

You may be working on it. So, for example, very simple problems. So, this lady who is working on this device, you know what is this? Pardon? Hand. Yeah, ok. Hand spinning machine. Yeah. So, now is there any problem with this machine? Do you think there is an undesirable initial state in this and you know, what is this?

Pulley, for getting water from the well, people use it in villages. Do you think there is any problem with these kinds of devices in rural places, and most of you must have seen this? So, this problem is that she has to stretch her hand to both sides. So, this has to be controlled and this has to be controlled, she has to spin this and then control this side. So, there is a lot of effort needed in doing this work.

Can you make it a simple one? We can make her effort actually come down. So, the desired initial state is that you do not have to stretch your body or put much effort when doing this. Similarly, here also you have a lot of effort needed to get the water. Is there a way to modify this

to make a better design? And these are the things which you can see in everyday life where we can actually solve problems.

So, whenever you see such problems, see whether as a designer, you are able to contribute this in a better way or you can actually contribute in improving the design as a designer, so now, you here after you all whenever you see these kind of things, think about what where you can actually solve the problem. So, take everything as a problem and as a designer, you are solving the design, ok.

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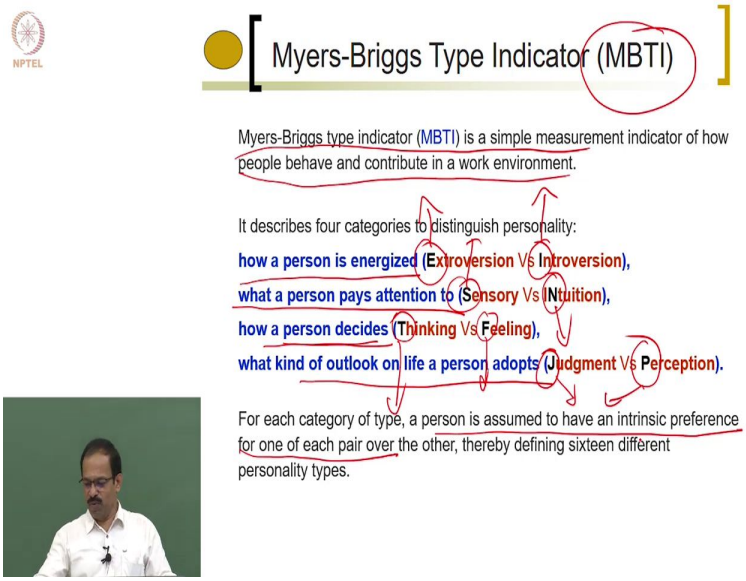

So, to understand this, let us look at what are your individual characteristics as a designer or as an individual because all of you will be having some special characteristics or special capabilities, ok. So, we can actually classify people based on few characteristics and then see how they behave in a particular situation. So, if you give me a problem, what will be the way in which he tried to solve the problem?

Suppose somebody asks you, go to T Nagar. What will you do? Somebody says, ok can you go to T Nagar? You know, T Nagar, all of you. Oh you do not know, sorry ok. So, somebody says

ok, go to the airport. What will you do? We need to start from home, to do that or you tried to find out where the airport is, what are the ways in which you can reach the airport? Is it a bus or is there a taxi or what is the best way to reach and what time is the best time to go there?

What time is the best time to go there? So, there are many things somebody will immediately start, Oh, you want me to go to the airport? Let me start. And then he leaves the gate and then thinks about ok, well, now I reached the gate. Should I take a bus or a taxi? Then he will start thinking about it. And then he will go take a bus and he does not know where to get down. So, he will call his friend, Oh, why should I get down.

Then he got down that place, then you saw how from there how to go to the airports. So, there are people who think in different ways and work in different styles. So, when you work as a group or as a team, you will see that people do not work in the same way as you wish. So, it is good to know, what is your personal working style? Are you a person who goes into the details and plans everything and then goes?

Or are you a person who just jumps into it and then sees, let me see what happened. So to do that, let us just do a simple exercise. I think last time I gave you a form, how many of you have that form with you, please take out that form. And if you do not have the form, also do not worry, no worries. I will tell you what to do, ok. So, in that form, some instructions are given.

I will use the same instruction here also. So, you do not need to worry even if you do not have it. So, I will try to view your personality type in 4 letters. So, you can actually identify 4 letters based on your type of character. So, let me see the first 1, here, let me finish it. So, this is known as Myers Briggs Type Indicator or MBTI . What type of a person are you? That is the Type Indicator.

Are you a person with very detailed planning? Or you are a good person as a marketing expert or you are good at making something hands on. These are other things which you can actually identify. This is known as Myers Briggs Type Indicator, a measurement indicator of how people behave and contribute in work environments. So, as a designer, how will you be contributing? So, please go through this.

You can actually be a person by E or I based on how you are energized, what gives you energy? For some people energy gets when they talk to their friends. When they are in a group, they are very energetic, and you leave them alone, they are very depressed, they cannot work. For some people living alone is the best way to energize them. In a group, they feel very uncomfortable. They cannot do things when they are in a big group that kind of people are there.

That is basically how a person is energized. Extroversion versus introversion. What a person pays attention to, his sensory feelings, or he is on intuition. Sensory feelings are what you see, what you hear, that becomes important for him. For others, what you hear is not important, but what you think, what you know about that is more important than sensory, that is basically sensory versus intuition S versus N.

And how a person decides, what way you decide things based on your thinking or based on your feeling. I will explain these later what actually you mean by these things and what kind of outlook on life a person adopts, judgment versus perception, ok. So, the point is that you cannot be E or I for each category type a person is assumed to have an intrinsic preference for 1 of each pair over the other, that is, you can be a E or I you cannot be in between, though you may say that I am half this half this, but there is a clear difference that you can be either E or I.

Similarly, you can be S or N, or T or F, J or P. So, you choose 1 letter from each 1 of these that gives you a personality type or your character type, do not choose now, I will tell you when to choose. So, let us move to that one.

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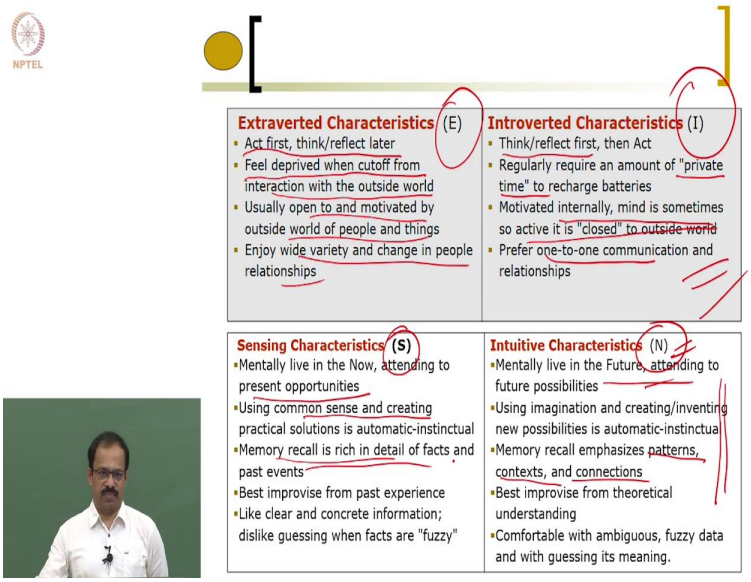

Just do this extrovert versus introvert person. Extroverted person will act first, think later, go to airports, he will start at airports, he will not ask, why are you going? Where or when should I go? Starts and then only he will start thinking about it. Feeling deprived when cut off from the interaction with the outside world he always wants people around him, he wants always to be with people and does not like to be alone. He cannot work alone. That kind of people are E. Usually open and motivated by the outside world of people, enjoy a wide variety and change in people relationships.

He wants to have a lot of changes in the relationship, variety of people, all kinds of friends will be there, from all parts of life, and he will be having friends. That kind of a person is basically an extroverted person. The other 1 is introverts; think, reflect first and then act. If you ask him to go to airports, we will say, ok, and why do you want to go? When do you want to go? What is the reason he will ask you 100 questions.

And if he is convinced then only he will start. He will not start like this person, that is I and regularly require an amount of private time, he does not like to be always in the crowd, he needs his own time to work, think that is basically private time, motivated, internally minded, sometimes so active close to outside words. So, he gets energy from himself. He wants time to think of think about himself, think about things, he does not want others to disturb him, so that he will get energy from himself that kind of and he prefer 1 to 1 communication and relationship, very specific relationship, specific communication, not like a very general communication, that is basically the 1 to 1 computation.

So now, you can write whether you are E or I. Again, you cannot be E and I, can be either E or I. In between? no, but if there is any understanding is that you have a basic characteristic, Sometimes you may be very easily out of 100 times maybe 10 times you have like an E, but 90 times you are becoming like an I then you are an I that is understanding not that I always will be like that.

So, you have a specific reference for E or I got it? Ok, please, write which one will try to finish it first. The other 1 is sensing and intuition. So, sensing mentally live in the now attending to present opportunities using common sense and creating. So, he will look at the current things and based on current things he will decide what needs to be done. Intuitive person, he will look at ok, if I do this, what will happen next time and what are the implications of it.

All these things all these are decided using and so that is S or N. So, he looks at patterns, contexts and connections. So, you look at what happened many times, what is the context in which it happens, all those things will be analyzed by an N person, intuitive person, but he will not look at that 1. He will look at what happened, what is the current thing just take a decision that is basically a sensing person and intuitive person. So, you decide whether you are S or N.

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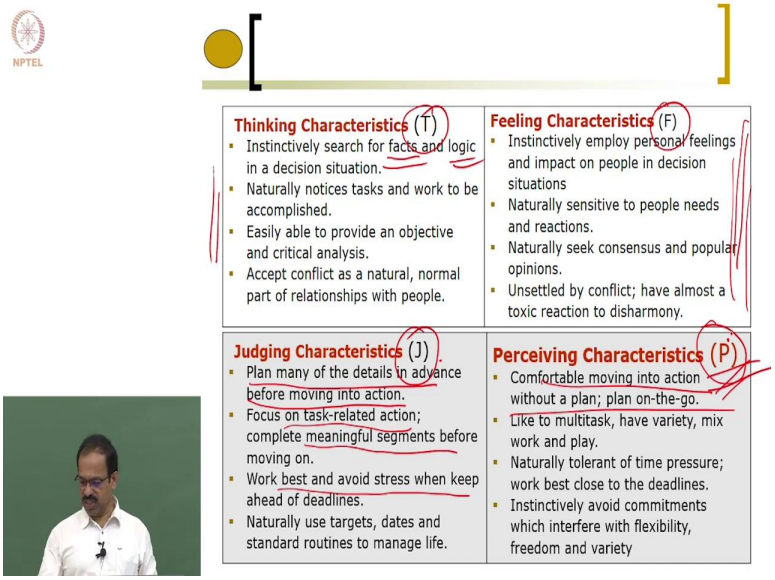

And the next one is judging versus perceiving or sorry, thinking versus feeling. So, a thinking person will look for facts and logic. You do not look by the feelings of others. He will look at if I had to say no to a person, I will say no to him whether he likes it or not. I do not care. That is the thinking person. He thinks based on his information and facts and logic if somebody is wrong, he will say you are wrong, he does not care whether he likes that kind of person is a thinking person.

This person is feeling very sensitive to people's needs or if I tell him what he will let me do not tell him that truth let me be very nice to this person. Though he knows that it is wrong he will still be very nice to people seeing that, feeling is more important than thinking. So, that is the thinking versus feeling type. And the last 1 is judging versus perceiving characteristics. So, the judging person will plan many of the details in advance before moving into action.

So, he will be a very detailed person. He will not jump into the solution, he will say if I had to do this, I need to understand this, this, this, then only I will go to a decision that is judging characteristics versus perceiving characteristics. Directly jump into the action. If you say that,

"ok, go to the airport" he will start with the cycle he will not ask for any questions in start into action then on the way he will start planning that is basically the perceiving characteristics. That is the main difference.

So, focus on task related action, complete meaningful segments, and work best in our stress. If you are to sign and submit an assignment tomorrow, he will complete our assignment 2 days back. Yeah, that is the kind of judging person. So, all of you will be P. Report you start on the previous night only now, or the early morning or in the previous class. Ok, so we would not be different. So, do not look at 1 instance look at as an overall. What are your characteristics, whether J or P. Completed? So, what are your 4 letter words; all the 4.

So, you have to say from the first E or I, you decide E or I, S or N, T or F, J or P. So, you will be getting like ISTJEF like that, got it? How many ISTJ's are there? ISTJ, no. What is your? Yes.

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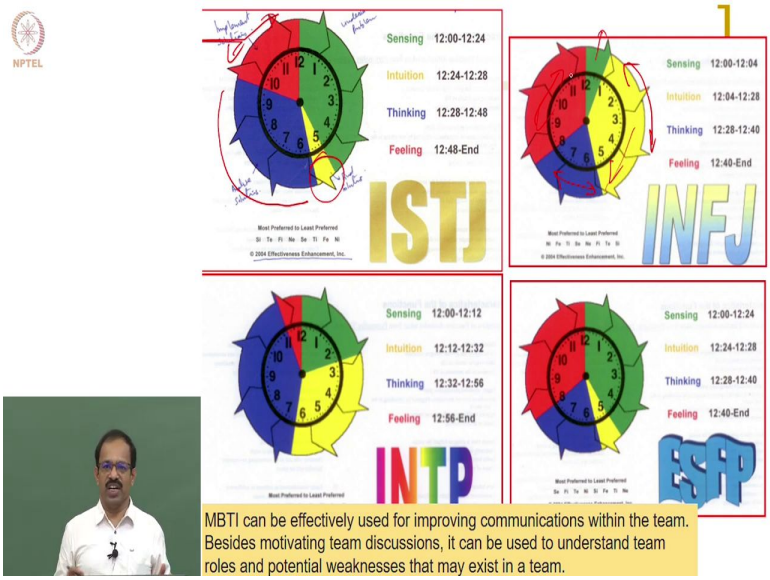

So let me see this in just 2 minutes. So, like for example if you look at, if a person is ISTJ, anybody ISTJ? Nobody! You are there, ok. So, what is the characteristic of this person? You give him a task to complete in 12 hours, ok. So, you say that it requires 12 hours to complete a

task and give the task to him. So, he will spend almost 5 hours understanding the problem. He will look into the problem with very detailed analysis he will do and then once he understands the problem he will get the solution after an hour. He can actually solve the problem within an hour, because he has spent a lot of time understanding the problem, he solves it.

And then once he has the solution he will not go to implement the solution. He will try to analyze the solution, look at all the angles of the solution to see whether there is a problem, chance of failure. He will spend a long time; he will spend a long time analyzing the solution and once he analyzes the solution he will implement the solution. That much is the distribution of how he actually does the work.

Very detailed person, very analytical, he wants to analyze everything. But once he understands he will be able to solve the problem within a very short period. That is ISTJ. And in contrast if you take INFJ. Anybody INFJ? You are INFJ, this person you give a problem, this is a problem? I got a solution. He will not think too much, he will start solving the problem. And since he has not understood the problem very well, he has not understood the problem very well, he takes a long time to solve it.

Because any solution will be wrong and then after solution he analyzes it for a long time and then implements it for a long time. So, that is the way how this person works. He will worry about the problem too much he starts solving the problem. And the same way you can actually see all these people, different ways how the people work. ESFP, INTP, etc. So, if you want to know more you can actually refer to these MBTI characteristics and you know what will be the way you will be working in a group, what will be the most feasible characteristics you have. So, I will stop here. If you have any questions you can meet me later about this, but this is just to tell you that people will be having different characteristics, different ways of working, you should understand the way how people work. Thank you.