Usability Engineering
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Module - 05
Lecture - 16
Requirement Analysis - II

Welcome to module 5, lecture number 16. Today we are going to discuss about task Analysis which is an essential part of user study and we are going to talk about the variations of different task analysis that are being used in the industry and that are being used in a way to understand the various work practices of your users.

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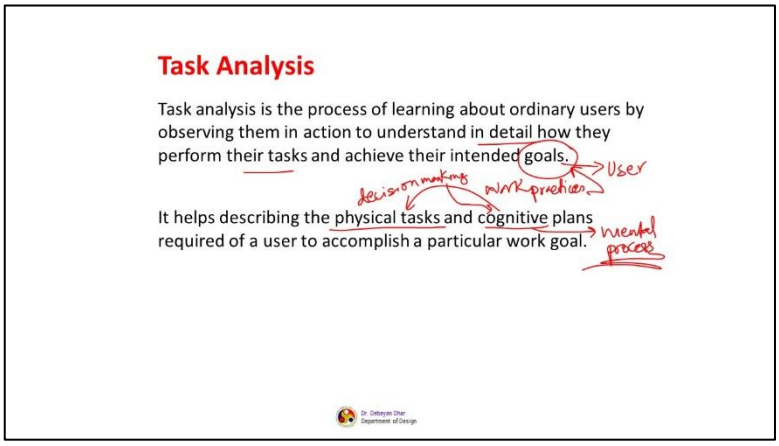

So, task analysis is the process of learning about ordinary users; that means, you want to understand your representative users or your actual users by observing them and you observe them while they are doing an activity, while they are in action and you do that in order to understand how the details of the work practices are and how they perform their tasks and achieve their intended goals.

So, the focus is on to understand the detail of the work practices and to understand the goals that are being set by the user. So, what are the user goals and what are the work practices that are used in order to reach the goal that is the core objective of any task analysis. So, it helps describing the physical tasks and cognitive plans.

So, each physical tasks is defined or is preceded by some plans or decision making which we primarily say and these are something which are enshrined or is consequence of the

mental processes; mental processes that a user performs right. So, when we conduct a task analysis it provides us with the detailed idea of the observable task that we see the activities, that they perform.

And it also let us know about the mental processes, about the various decisions that our users generally take in order to complete their activities in order to complete their tasks and reach the goals.

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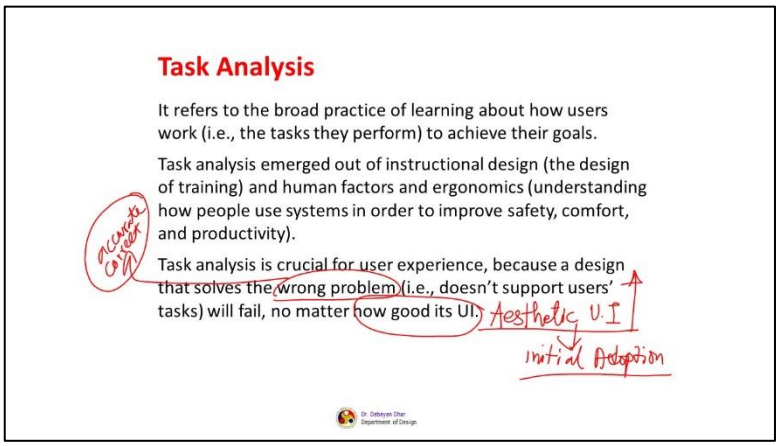

So, task analysis refers to the broad practice of learning about how users work and who is learning, it is the design team it is the designers who wants to learn about the task performed by the users right. And the objective to observe the task is also to understand the goal what is the goal they are reaching to and how they have planned their task in order to reach their goal.

So, task analysis emerged out of instructional design, instructional design means the design of training. So, its a field of science where how training is to be given to a group of students or a group of skilled people or a group of practitioners, how the entire pedagogic activities play out during this session all the focus primarily revolves around that.

So, this activity this task analysis actually came from this field of science which we call as instructional design and we can also see initial explorations experiment from various papers that have been published in the areas of human factors and ergonomics. Now, in human factors and ergonomics the focus of this field of science or the branch of science is to understand how people use systems in order to improve safety comfort and productivity of the users of the representative user or the actual users.

So, task analysis is crucial for user experience because a design that solves the wrong problem will fail no matter how good its UI is. So, what you understand from here is even though you say you know we see that the aesthetic appeal of the UI, of the UI is really high, but still it will only ensure that initial adoption of the product by your user right.

It will only ensure initial adoption, but after this initial adoption when your user will start going deep into the mental model or the conceptual model of the product and would start focusing on the goal, how to achieve his goal and starts adopting the task it is there this break in engagement will happen. Because your product will never be able to support the users in order to reach their goal because it has not been planned correctly accurately.

And therefore, it is very crucial that the experiential part, remember what we discussed in the self theory; we discussed about the idea of the remembering self and the experiencing self and it is the experiencing self that actually evaluates or provides the experiential state of the current practice or the work practice to its user.

Now, if that experience does not work out well or if that experience is not what the experience the user is looking for then immediate disengagement will happen. So, it is very important that or crucial rather that we identify not the wrong problem, but the accurate and correct problem ok. So, we identify the problem accurately, correctly so that the experiential part of our user, while he is performing the task is supported, he gets satisfied, he does not need to learn too much I mean the learning curve need not be too high so that adoption and engagement happens.

So, therefore, to ensure that all these things are addressed we go for a task analysis or we conduct task analysis.

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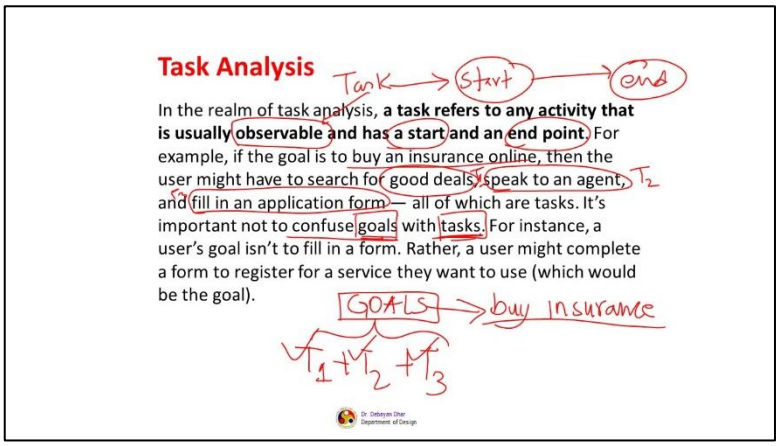

So, in the realm of task analysis, a task is referred to any action that is usually observable and has a start and an end point. So, what is a task? A task means something that you can observe. So, it needs to be observable and similarly it needs to have a start point and an end point. So, this task has characteristics like it will start somewhere and then it will end somewhere right, these are the essential criteria or the characteristics of a task that defines a task.

Now, take an example; now if the goal by user is to buy an insurance online then the user might have to search for good deals; that means, he would search the web identify which deal is better, which the wherein he is able to save money also he can get lot of features and supports, he would probably like to speak to an agent and also he would like to fill in an application form.

All of these are tasks, while the goal is to buy an insurance remember this. While the goal is to buy an insurance, these are individual tasks that your user performs in order to reach the goal. So, it is important for us not to confuse between goals and tasks. So, this is very important that we should not confuse between goals, between the goals and the tasks. Because see, ideally what happens there is only say we can have a goal and to reach this goal, you will have you he will see that there is task 1 task 2 and task 3, likewise what you see here.

You see to buy an insurance online he has to conduct three specific tasks, what he needs to do? He needs to search for good deals that is task 1. So, he need to search for good deals

that is task 1, he needs to speak to an agent that is task 2 and he needs to fill in an application form right that is task 3. So, these are individual tasks that we are referring to.

So, task 1 plus task 2 plus task 3 when this is this process is followed and these all these tasks are completed then you reach the goal. And the goal is what? To buy insurance right. So, we need to ensure that we understand the definition or the goal of the users are clearly defined, it should not get confused with the individual task because tasks helps you to reach the goal, it is not the vice versa the goal does not help you to reach the task it is the other way around.

The tasks helps you in reaching the goal and there are individual tasks. So, a goal can be comprised of many tasks when these tasks get completed then the goal is reached right. Similarly, you can take the example of buying an air flight ticket right. So, what do we do, what is the process? The first stage is to fill in the details on the day of the day which we would like to book ticket for.

We then go and search the page and it provide us with the various details of the prices. So, we might check for the prices that are lower in comparison to the one that are higher, there are other various important parameter that influence our decision to buy a particular product. Now, when from the first step if you focus on it is about filling the details, the second step is looking at these information and taking a decision whether we want to select this or that in terms of some characteristics or some parameters such as price, schedule, flight time duration or number of stops right.

Now, these are smaller tasks while it might see, it might look at like it is a continued task, but these are smaller subtasks of a major tasks and these helps them the person to reach the goal. Now, once you select the flight ticket what you do is the next part is you need to fill in the details and once that is done you proceed for payment.

So, if you see there are smaller tasks that are associated for your user to reach the goal of booking a ticket. So, you must not confuse between your goal, users goal example here booking a flight ticket and confuse between the individual task that the user takes to complete the tasks and reach the goal. So, rather a user might complete a form to register a for a service they want to use, which that would be also a goal.

For example, if you want to register for Gmail, if you want to register for in Yahoo Mail that itself is a goal. So, goals can be different, you need to understand this from the phase of conducting a user study right. So, once you conduct user study with your interviews or contextual inquiry you realize what is the goal for my user, is it to register for a service, it is to book for a service, it is to get some products what is the goal. And based on that you define the tasks, the tasks are defined right.

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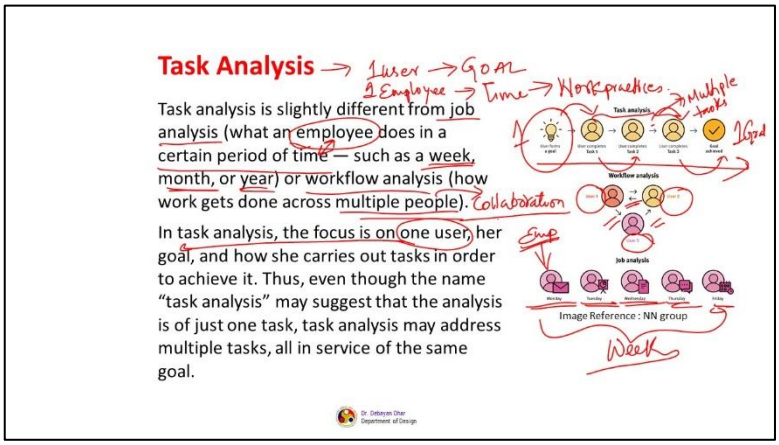

So, task analysis is slightly different from job analysis. So now, we are we are focusing on various you know different ways through which this kind of analysis work practice-based analysis are performed. One of the variations of task analysis is job analysis, we will discuss that in detail.

And, so job analysis means what an employee does in a certain period of time. So, it is related to the employee and what the employee does in a certain period of time such as week month or year. This another one which we call as workflow analysis and workflow analysis means how work gets done across multiple people, see the focus is on collaboration ok.

So, in task analysis the focus is on one user remember this. So, the idea is here the focus is in task analysis is on one user and the user's goal that is it. So, in task analysis the focus is one user and that users goal right and how he completes the tasks to in order to achieve it. Thus, even though the name task analysis may suggest that analysis is just for one task, task analysis may address multiple tasks all in the service of the same goal that is what we have explained in the last slide.

So, task analysis means that in order to reach the goal what are the tasks your user is performing, completing or needs to complete to ensure that he or she reaches the goal that is what task analysis is. But understand when we are talking about task analysis, we are talking about one user and we are talking about their goal and the task that needs to be completed to reach the goal.

While when we talk about job analysis we are focusing on an employee. Now, here the role of the person is important and the role is that he is working for an organization. So, the role here is important and the relationship is. So, it is a employee and in a certain period of time whatever he has done ok.

So, it is dependent on time and then his work practices right while, when you look at work flow analysis the focus is on collaboration. So, the right side image that you see which is from the Norman Nielsen group that I have referred to, you would see very clearly it has been defined. You see in task analysis this stage is this, you the user forms a goal and he initiates the task, he completes task 1, then he completes task 2, then he goes to task 3 and then what happens he achieves the goal.

So, you will see one user, one goal while there are multiple tasks, there are multiple tasks right. Now in case of workflow analysis you see the focus is between collaboration between user 1 and user 3 and the interaction that is happening in between them. That is the difference between task analysis and workflow analysis. While in case of job analysis if you see there is the employee this is the employee and the organization is there and what he does on Monday, what he does on Tuesday, Wednesday, Thursday and Friday.

That means, in one week what he does is the focus. So now, based on your requirement you should define which kind of analysis you want to perform do you want to go with task analysis or you want to go with workflow analysis or you want to go with the job analysis.

This is the this is based on requirements of your project based on the requirements that you find out during your initial surveys that you realize which one should you continue with in order in order to understand the work practices in a detailed and enriching way.

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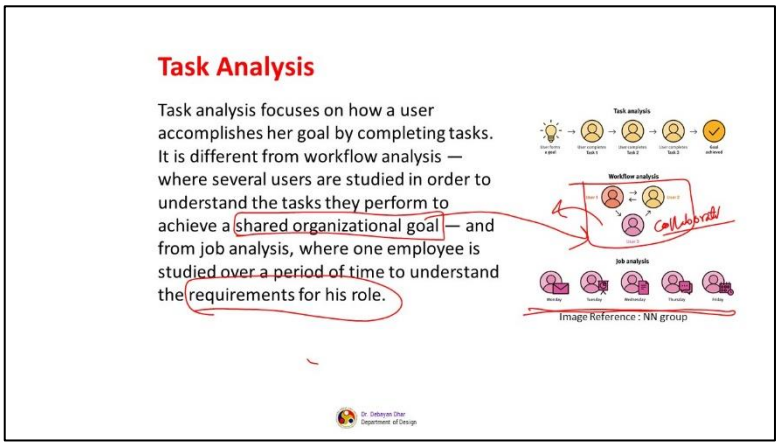

Now, task analysis focuses on how a user accomplishes her goal by completing tasks. It is different from workflow analysis where several users are studied in order to understand the task they perform to achieve a shared organization goal. So, now, see here what is happening? These three different types of users their focus is on collaboration ok, they are collaborating. In order to do what? In order to achieve this shared organizational goal.

So, instead of a personal goal, there is a shared organizational goal that is the main basis for workflow analysis. So, while you conduct workflow analysis it is important that you identify the shared organizational goal across the employees and how the employees are collaborating in order to ensure that the shared organizational goal is fulfilled and reached right.

So, and in case of job analysis where one employee is studied over a period of time to understand the requirements for his role. So, as I said you know job analysis is about an employee, about the role that he is playing in an organization. So, over a period of time if you study this group, study this user what you will end up in understanding is what are the requirements for his role, what are the goals he needs to achieve for the role that he is playing in the organization.

And for that what are the tasks that he needs to complete. So, the perspective is entirely different when we compare between task analysis, workflow analysis and job analysis and based on your requirements you of your project you would decide which kind of analysis you want to go with.

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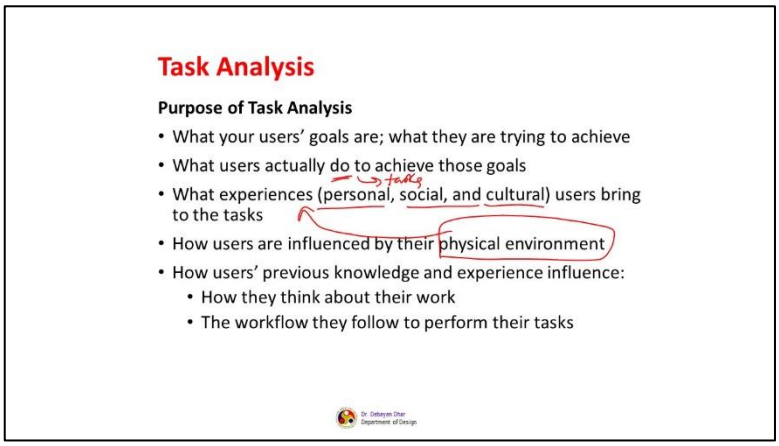

So, let us discuss about the purpose of task analysis. Why do we use task analysis? Now, task analysis is done to understand what your users goals are and what they are trying to achieve, what users actually do to achieve goal. So, the focus is on see the tasks right. What experience and these experiences can be personal, social and cultural. Users bring to the tasks, how users are influenced by their physical environment.

See the nature of your environment will also influence the work experience, is not it. So, therefore, we must understand the physical environment also. How user's previous knowledge; that means, past experience and other sort of work practices that he has done in the past influence, how the thing can work the workflow that they follow to perform the task.

These are the motivations or the questions that the team has which motivates them to conduct a task analysis. So, if at any point of time while conducting user study you also come to the point where you need to investigate about the tasks, you need to investigate about the goals, you need to investigate the rationals, the motivations, the details of the work practices you need to come back and do a task analysis in detail as possible to understand these factors that are influencing the work practices of your user.

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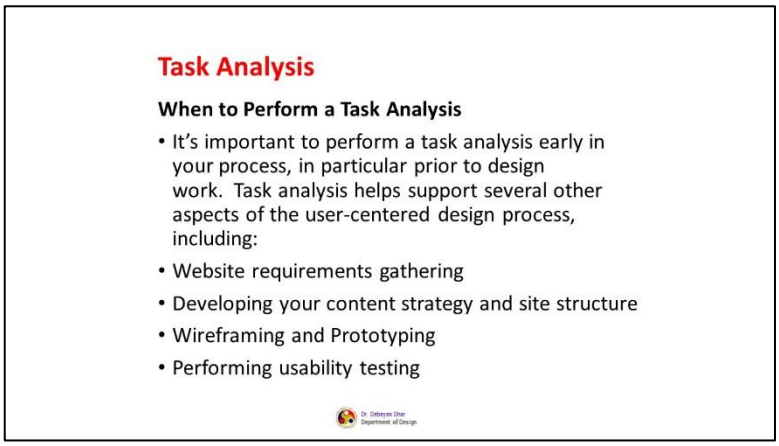

So, when to perform a task analysis? So, see it is important that you perform or conduct task analysis early in your design process, early in your design thinking process; that means, while you are trying to empathize we are in the stage phase where we are trying to empathize with the users that we would like to design for.

And so therefore, it is important that before you eventually start designing for them, before at least you start defining the issue for them you go for a task analysis in orders to apprise yourself and your team members about the nature of the task and the goal that they focus in right. So, task analysis helps support several other aspects of user centered design process which includes, you know if you are developing a software or a website so to define the requirements of your product.

It helps you in developing the content strategy, if you remember the Jesse James Garrett's model, we discussed about content strategy and the site structure. So, the strategy part is influenced based on the successful completion of task analysis by the team and understanding and defining the requirements and the business goals merging these two together.

Wireframing and prototyping, this is very essential. All your feedbacks, your notes for how the mental model of the users are is important for you to understand and this would help you to define the wireframes and the prototype of your products and finally performing usability testing these are the situations when you can perform a task analysis.

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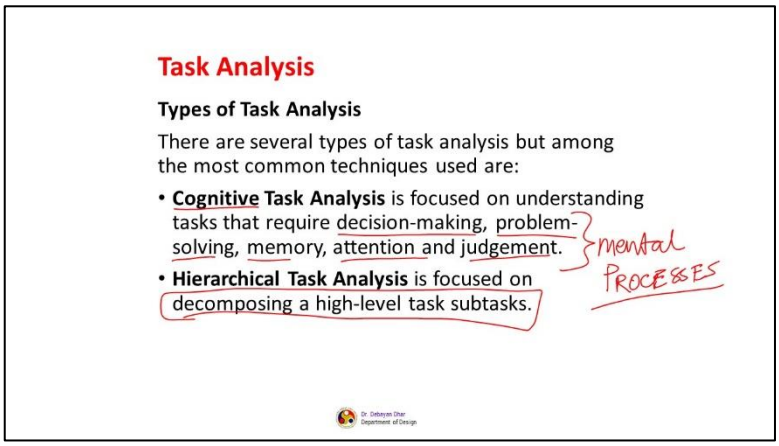

Let us now discuss about the various types of tasks analysis that can be done. So, basically there are these two types of task analysis, one is the cognitive task analysis the other one is hierarchical task analysis. Now, what is cognitive task analysis? So, cognitive task analysis is focused on understanding tasks that require decision making.

So, the word cognition you can relate now. The focus would be on decision-making, problem-solving memory attention and judgment. So, the focus is on mental processes right. So, in a cognitive task analysis, the focus the focus of the study or the analysis is on the cognitive process; that means, the mental processes and these processes include how the users take decisions, how does it solve a problem or how does it get out of the situation, if he faces a sudden he reaches a situation or a phase where he encounters an error.

And how does he process information from his memory, how does he retrieved information from his memory, how does it recognize and recall what cues in your software's or your interface attracts the attentions of your users and how do they make judgements about the experience that they are being exposed to. These are the principle factors that are being studied in cognitive task analysis.

In hierarchical task analysis the focus is different. The focus is what? The focus is on decomposing a high-level tasks and subtasks. So, in design you would see majority of the projects, majority of your scenarios will need to have task analysis which is hierarchical in nature; that means, you need to conduct a hierarchical task analysis in order to understand the goals and the tasks that are being performed by your user.

And while you do that, the focus is on to decompose the high-level tasks into subtasks so that you understand the work practices and its characteristics in a detailed way. We will discuss this in detail now.

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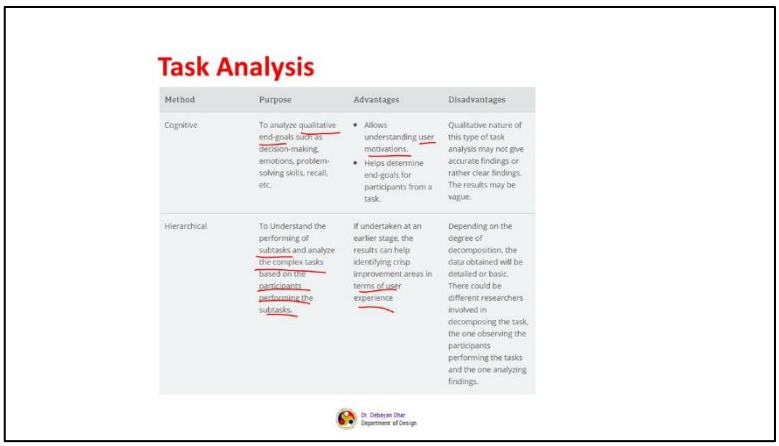

So, the difference between these two practices, the cognitive and the hierarchical task analysis is this. The purpose of a cognitive task analysis is to analyze the qualitative end goal such as decision making, emotions problem, solving skills, recall, etcetera. While the hierarchical task analysis purpose is to understand how the subtasks are being performed and how these complex tasks are being a, how this complex task can be analyzed based on the participants performing the task subtasks.

So that means, the focus is on direct observation, direct observation how your users is trying to reach the goal and while he reaches the goal how the tasks are being planned, what are the subtask that are being there. And the focus is on identifying these phases so that you can clearly articulate this phase and ensure that this the mental model of the user regarding the work practice is embedded into the concept that of the product that you are going to design. Now, the advantages for cognitive task analysis is that, it allows understanding user motivations.

So, apart from cognitive task analysis also there are other ways to understand user motivations for example, conducting contextual inquiry, also conducting rich insightful interviews and surveys also allows you. But yes, cognitive task analysis also does allow you to understand user motivations it helps determine end goals for participants from a task, while a hierarchical task analysis allows you to understand an early stage, the result,

that can help identify increased improvement areas in terms of user experience. Why? Why this is so?

Because it the focus is on to understand the mental model of your user. And how do you understand the mental model? By focusing on the detailed work practices of your user, that would allow you to ensure that whatever product that you design in your ideation or conceptualization stage you can enshrine the conceptual model of the product with the mental model of the user. And therefore, the gulf of execution will be really less, I mean the effort that the user has to undertake to learn the system can be minimized.

And early adoption can be entertained some of the disadvantage for cognitive task analysis is that the qualitative nature of this type of task analysis may not give accurate findings or rather clear findings. So, the results can be really vague ok. While in case of hierarchical task analysis depending on the degree of decomposition the data obtained will be detailed or basic. So, therefore, if you are not going for a detailed decomposition the data can be very abstract, the data can be very basic.

There could be different researchers involved in decomposing the task, the one observing the participants performing the task and the one analyzing the findings. So, inter personal analysis. So that means, if you have multiple design team members involved in the tasks or in this process there can be individual differences across the analysis or the information that is being used to analyze the observations and document them. So, those are some of the issues with hierarchical and cognitive task analysis.

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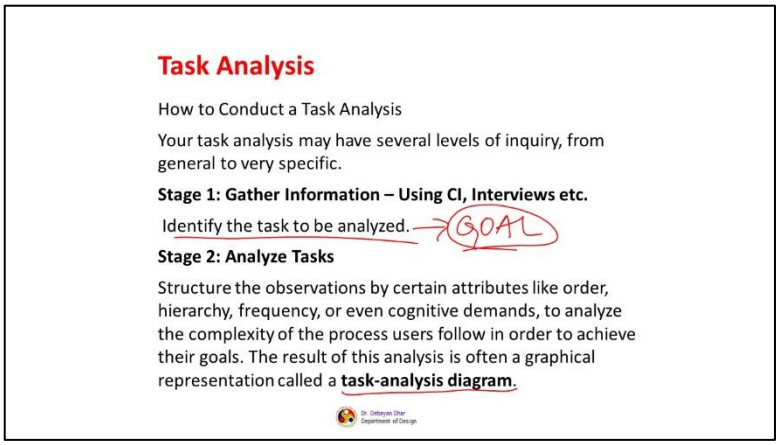

So, let us now see how to conduct a task analysis. So, your task analysis may have several levels of inquiry, from general to very specific. So, the stage 1: the first stage is you can gather information, you gather information using a contextual inquiry, interviews or any other techniques that we have discussed.

Identify the task to be analyzed, first of all you must identify the task and that you can understand if you understand the goal of your user, what is the goal of your user right. Stage 2: is analyze task, structure the observations by certain attributes like order hierarchy frequency or even cognitive demands to analyze the complexity of this process users follow in order to achieve their goals. The result of this analysis is often a graphical representation called the task analysis diagram. We will discuss about this.

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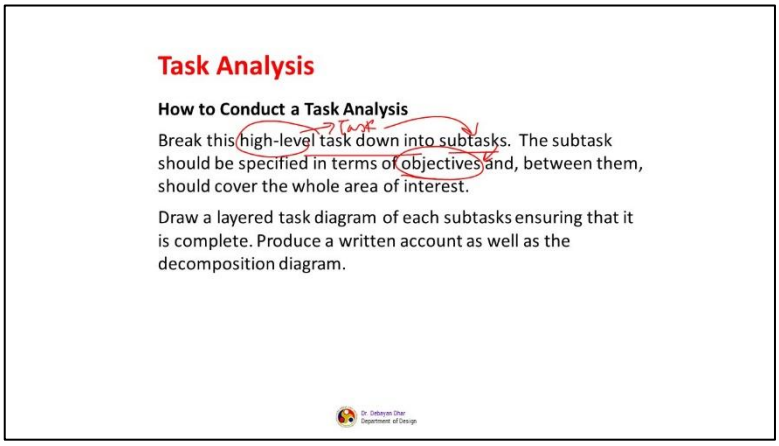

Now, break this high-level task into subtasks. See every time when we are doing a hierarchical task analysis we need to keep in mind that we need to break down the high level tasks the high-level tasks into subtasks, that will ensure that the detailed work practices are identified and studied well. So, the subtask should be specified in terms of objectives and between them should cover the whole area of interest. So, for each subtask there should be objectives and this is how you ensure that the work practices and their characteristics are identified in full detail ok.

You can draw a layered task diagram for each subtask ensuring that it is complete, you produce a written account as well as the decomposition diagram. We will just look at the decomposition diagram.

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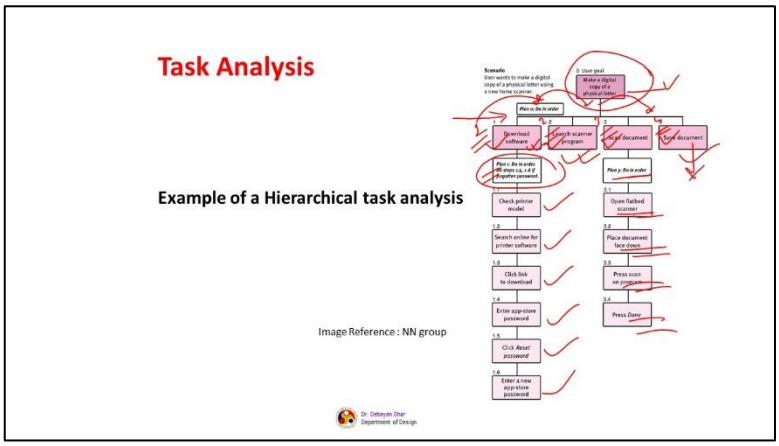

You can see here it is a very nice diagram that has been listed and I have taken it from reference from the Norman Nielsen group. The it is an example of the hierarchical task analysis, what you see here in this slide is this is the user goal. So, the user goal is to make a digital copy of the physical letter. So, he has a physical letter he wants to make a digital copy of the physical letter. Now this is what he has to do in order. So, this is the first thing, second thing, third and fourth, it has to be done in this way only right.

In order to ensure that the goal is reach. The first thing is he needs to download a software, he needs to launch the scanner program, he needs to scan document and then save the document. For the first tasks subtasks you know these are all subtasks. So, 1 is a subtask, 2 is a subtask, 3 is a subtask, 4 is a subtask.

For each of these subtasks, you will see how the decomposition has happened. So, in order to download the software what is the plan? Do in order steps 1.5, 1.6 if forgotten password. So, these are detailed steps that are required. So, first of all check the printer model, search for online printer software, check link to download, enter app store password, click reset password, enter a new app store password ok. This is only plan number 1.

So, because the it shows that if he has forgotten the password what he needs to be done, this is the decomposition of one subtask. The second one is once you have downloaded everything, now you launch the scanner program. After you launch the scanner program the third is you scan the document and the plan is do in order. Open the flatbed scanner, place document face down, press scan on program, press done right. And the final one is

save the document, you can also make a detailed decomposition of that process right this is an example of hierarchical task analysis.

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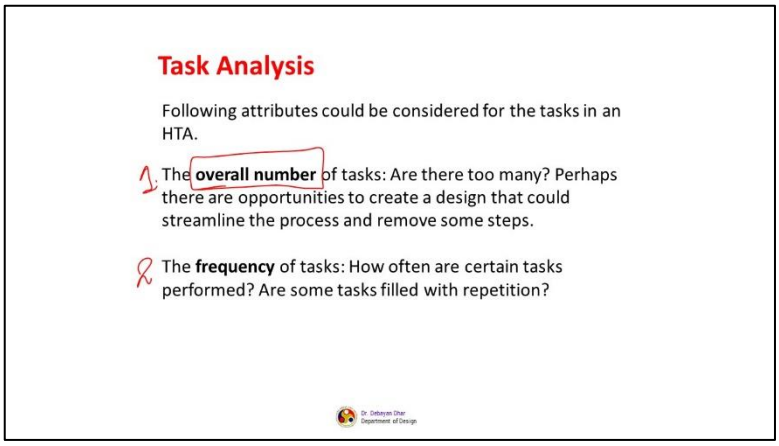

Now, remember some important attributes. The following attributes could be considered for the tasks in a hierarchical task analysis. The overall number of tasks. So, while you are doing task analysis the focus should be on the overall number of tasks: Are there too many tasks? Perhaps there are opportunities to create a design that could streamline the process and remove some of the steps right. That is the focus objective should be as a designer for us.

And the frequency of the task. So, the first one is the overall number of tasks, the second one is the frequency of tasks. How often are certain tasks performed or some tasks filled with repetition that is what the focus of a hierarchical task analysis should be, as a design team you must ensure that you can record or identify the overall number of tasks and the frequency of these tasks?

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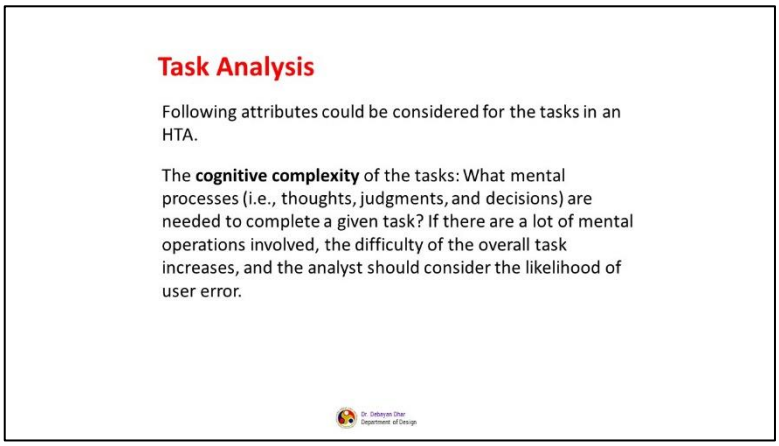

The cognitive complexity of the tasks: What mental processes like thoughts, judgments and decisions are needed to complete a given task? If there are a lot of mental operators involved, the difficulty of the overall task increases and the analyst should consider the likelihood of user error. While it might be little difficult for you to understand mental operators, I think we will take up this topic of cognitive complexity when we discuss the cognitive models in detail like KLM and GOMS and that would allow you to for a deeper understanding of this cognitive complexity issue regarding tasks.

But at this point it is important for you to understand that we must be in a position to understand the influences, the decisions the judgments and the thought mental processes of our users so that we understand which are the situations during these tasks that they are referring to their mental processes, their mental demand is higher and they have to fall back to their mental processes in order to retrieve some information and conduct the tasks successfully, that is important for us to know.

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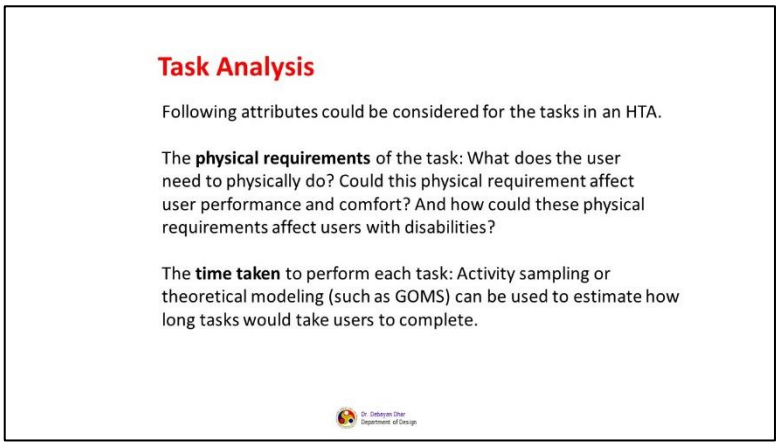

The physical requirements of the tasks: that means, what does the user need to physically do? Could this physical requirement affect user performance and comfort? And how could this physical requirement affect users with disabilities? Right. The time taken to perform each task: these are important attributes that you must come record, activity sampling or theoretical modeling such as GOMS that I have I just have said that in the cognitive modeling we will discuss about this, can be used to estimate how long tasks would take users to complete.

So, essentially what we are trying to understand is the characteristics or the features of the tasks in terms of how they are planned, what are the sequences do they have what are the different methods through which they can be completed so on and so forth right. So, the this completes our focus on task analysis.

And remember that in a design project while you are focusing on a users requirement it is important that the focus is on identifying the goal correctly and identifying these tasks that helps you helps your user to reach the goal and to look out for detailed decomposition of the subtasks. And while you focus on the detailed decomposition of the subtasks these attributes should be remembered, these attributes should be concerned, should be taken a note of so that this helps you in designing a product for this kind of users.