Design and Implementation of Human – Computer Interfaces
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Module No # 02
Lecture No # 06
Contextual Inquiry

Hello and welcome to the NPTEL MOOC'S course on design and implementation of human computer interfaces lecture 6 on usability requirement gathering. So we are currently discussing on the starting stage of interactive system development life cycle namely requirement gathering stage where our emphasis is on gathering usability requirements. Note that we skip the first stage feasibility study and we started with the second stage of life cycle namely requirement gathering analysis and specification stage.

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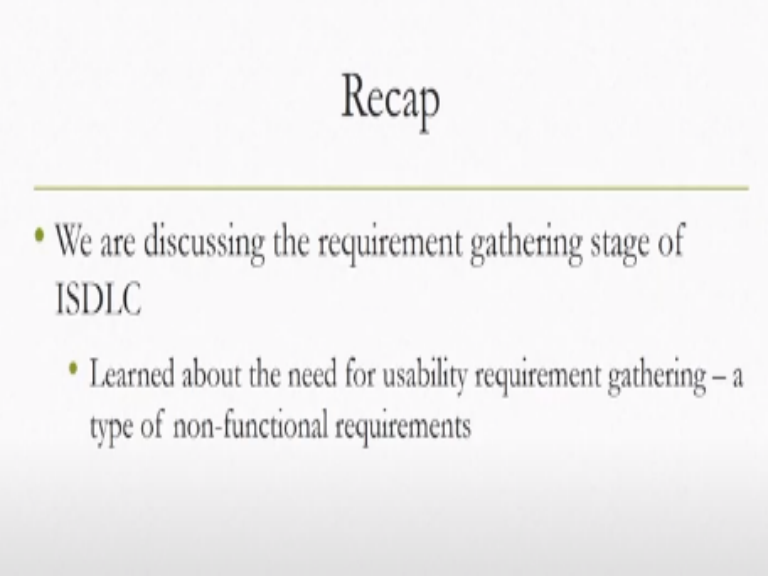

So we already learned about the idea of usability and its importance in interactive system development life cycle. In this lecture we are going to learn about one approach through which we can gather usability requirements for building and interactive system.

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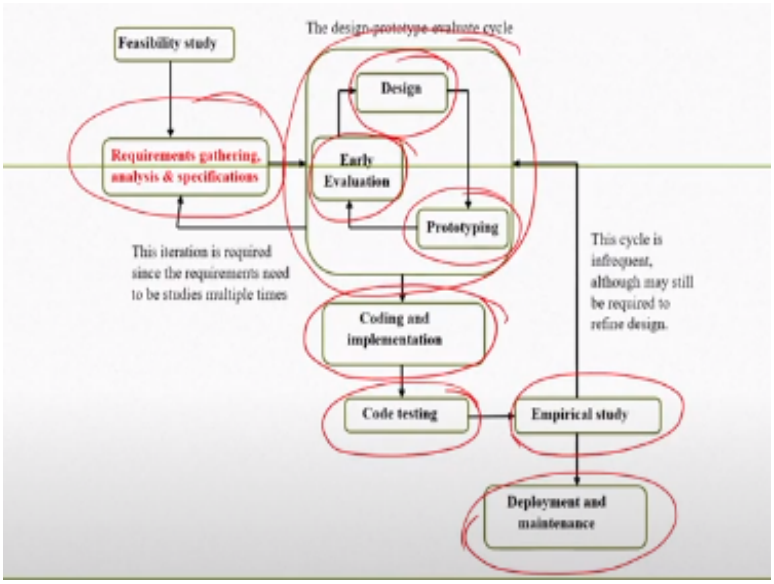

Just to recap we are currently in the requirement gathering stage we are currently discussing topics related to this stage. And in this course in subsequent lectures we will cover the other stages as well. So there are many stages in the interactive system development life cycle first stage is feasibility study which we are not covering in details here. We are currently in the requirement gathering stage then we have this design prototype evaluate cycle.

Involving the design stage prototyping stage, evaluation stage and design involves both interface design as well as code design. Then we have this coding and implementation stage testing of the code. A final stage to again ascertain the usability of the overall system through empirical study and then, finally deployment and maintenance. So other stages will come in subsequent part of the lecture currently we are focusing on requirement gathering stage.

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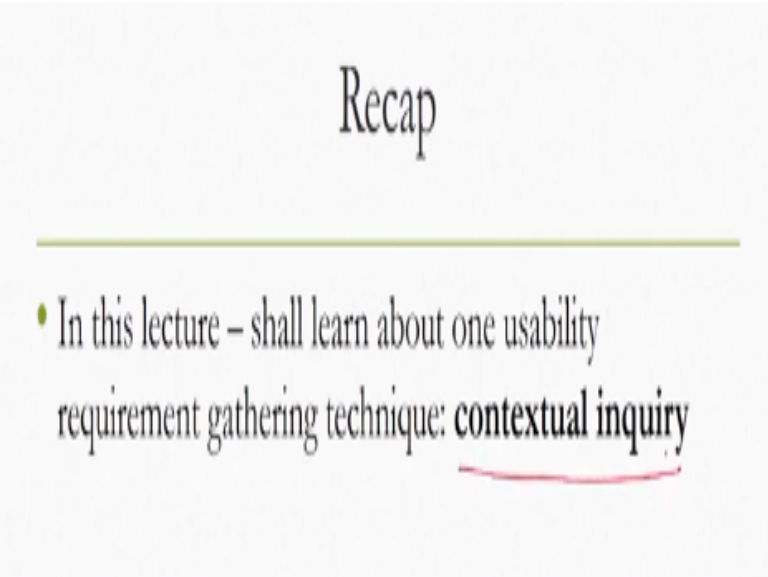

So in this lecture we are going to learn about one specific approach to gather usability requirements from end user which is called contextual inquiry.

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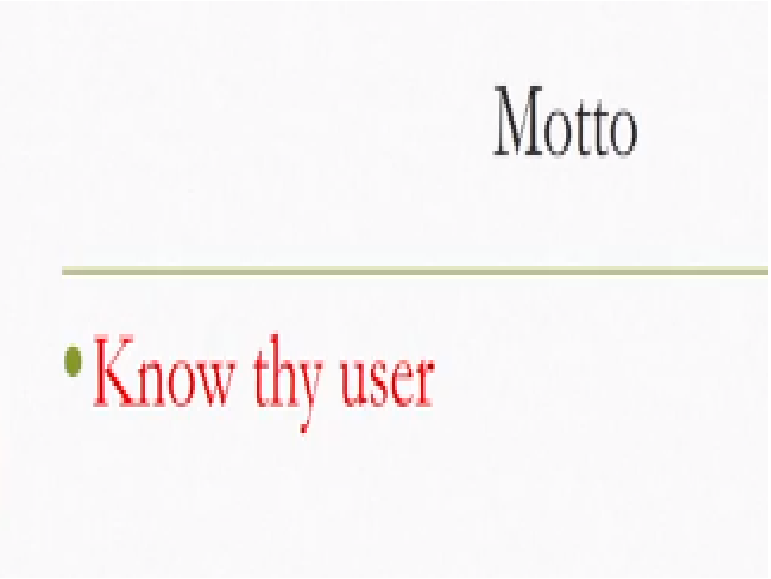

So before we go into the details let us recall that in the conceptualization to implementation of interactive system one very important aspect is knowledge about the user. So we should have the motto of know thy user or know the user here by the term user we mean end users or laymen users.

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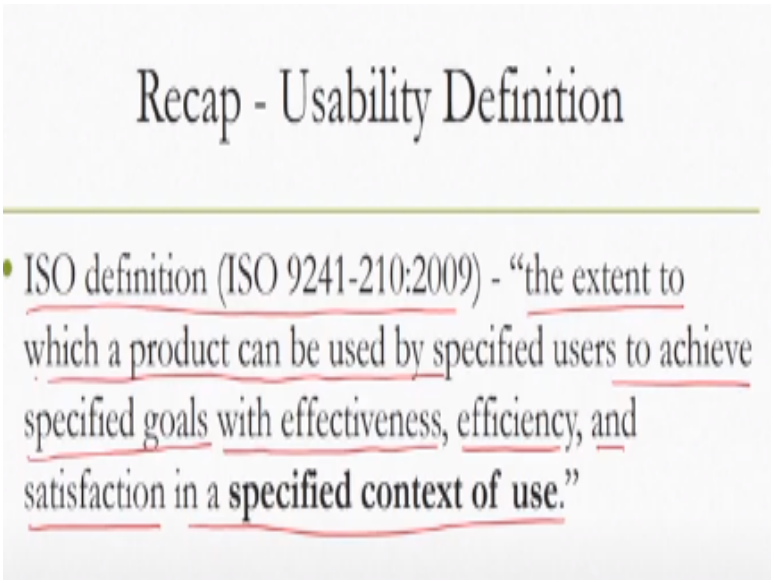

And again there is a definition for usability which would like to recall at this stage before going further into the discussion on contextual inquiry. That is the ISO definition of usability which is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. So the standard definition categorically talks about specific group of users who wish to achieve specific goal in a specified context of use that is the definition of usability.

So here note the term specified context of use so we have to somehow capture the use context before we can think of building a usable product. So which will be the context of use of the product along with who are the users and what are their goals. All these considerations we need to address or we need to keep in mind before we aim to build a usable product.

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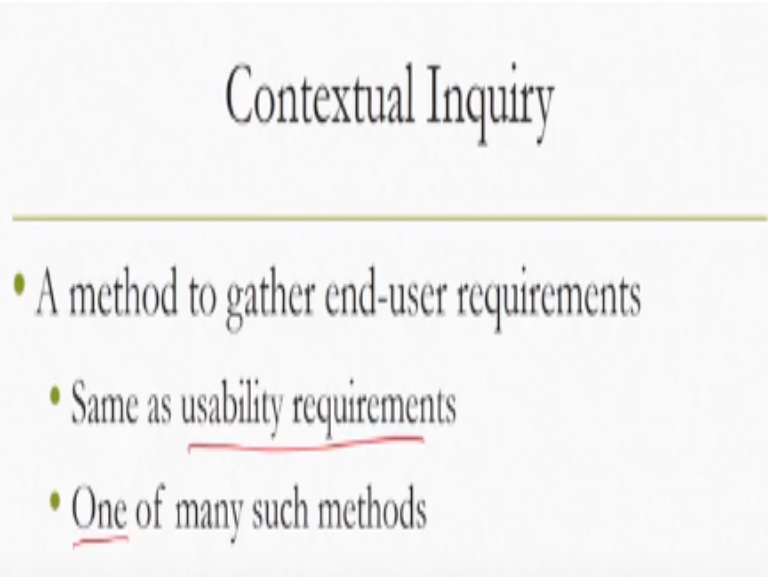

Now let us come to the main topic of this lecture that is contextual inquiry so this is one of many methods available to gather end user requirements for usable product development. So this whatever outcome we get after the inquiry process is over after the contextual inquiry process is over those outcomes can be equate it to usability requirements. And this is not the only method but one of many such methods available together usability requirements.

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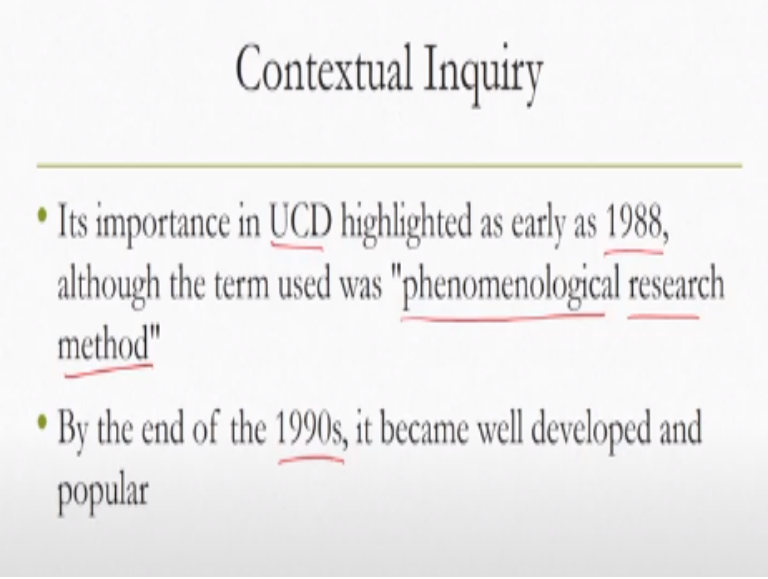

Now the method as such is not very new so its importance in user center design was highlighted way back in 1988 about more than 30 years ago. When the graphical user interfaces, and the personal computers were dominating the same. At that time this technique used to be referred to

as phenomenological research method and by the end of the nineteen nineties it became well developed and quite popular together end user requirements.

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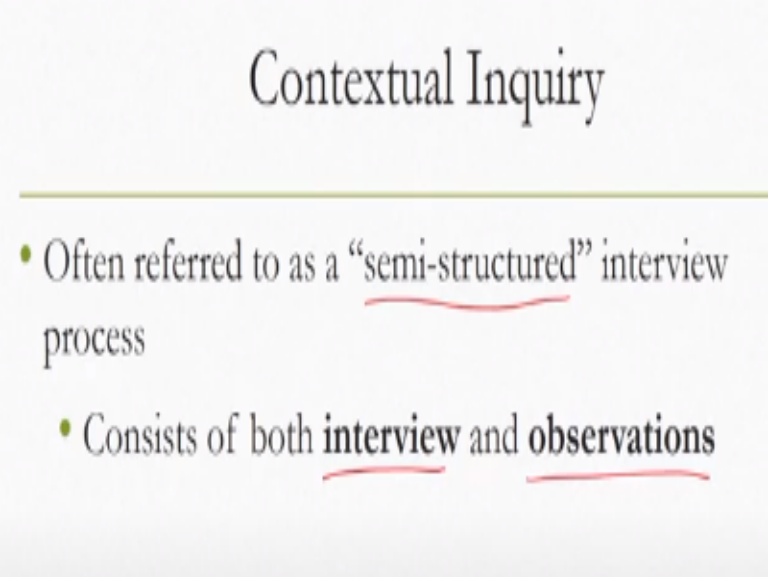

Now the same method is often referred to as a form of semi-structured interview or semi-structured interview process. However it may be somewhat misleading because contextual inquiry is not only an interview instead in contextual inquiry we have 2 things involved one is interview and the other one is observations. Observations are the primary method used here along with that interviews are used as a supporting mechanism of observations. So if we are simply referring to it as an interview then that may be misleading.

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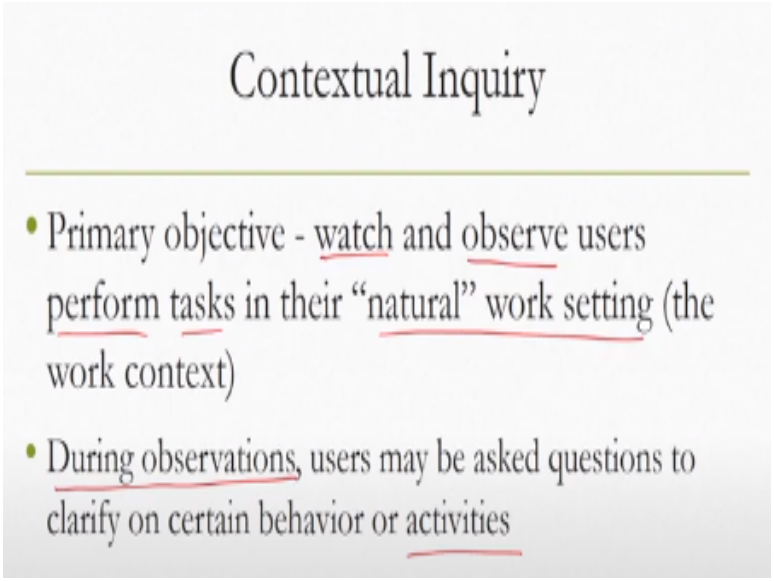

So in contextual inquiry process the primary objective is to watch and observe the users while they are performing tasks in their natural work setting or in other words the work context. So in contextual inquiry what typically is done is that users are asked to perform their regular activities in their natural work settings and their behaviour; are closely observed during their regular activities.

Now during observations the observer may ask users queries or questions to clarify certain behavioral issues or certain activities. So during observations the observer may note some behavior or activities; which is not very clear and at that point of time the observer or in a later time the observer can ask the user about more clarification of the particular behavior or the activities. So in that sense interview acts as a supporting tool in the overall observation process.

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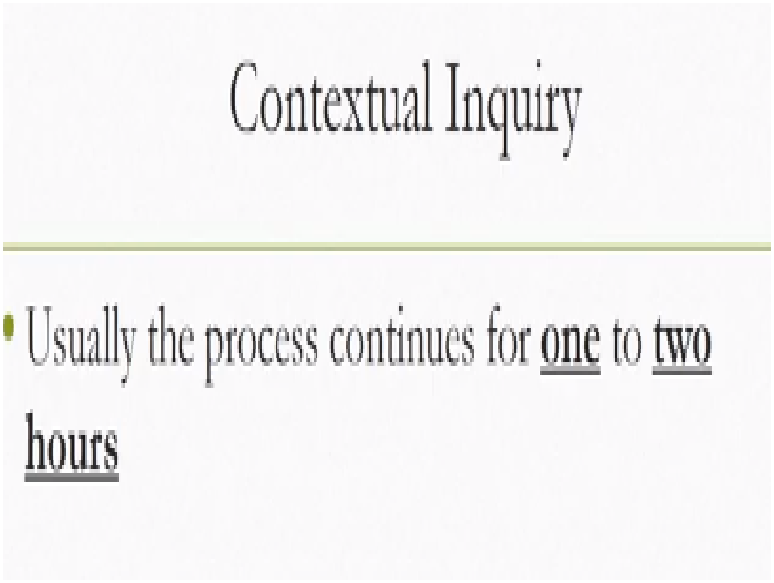

Generally the contextual inquiry process continues for 1 to 2 hours along the duration may be not very desirable because the users may not like to participate in the process for more than 1 to 2 hours. And also for a longer duration observations the observations may reveal similar things without much gain in behavioural knowledge.

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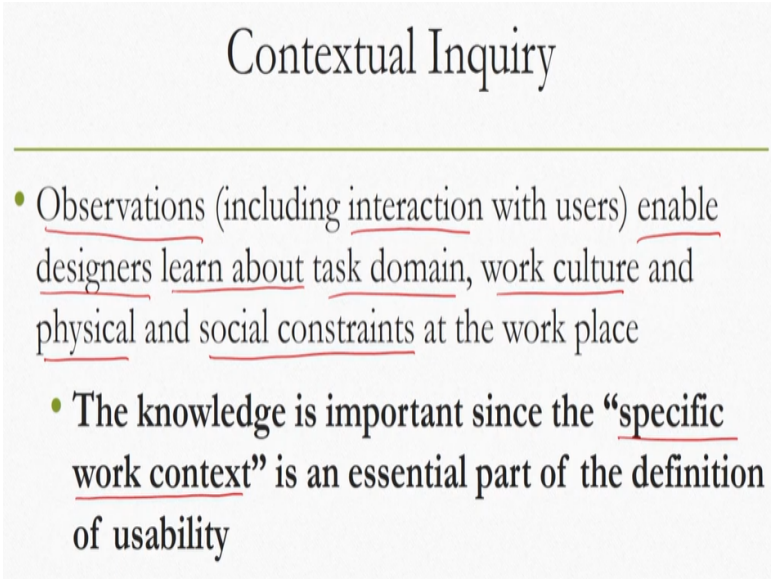

So what is the purpose now these observations that are made during the inquiry process which include interactions with the users in form of interviews. Enable the designers of the interactive system to learn about the task domain, work culture and physical and social constraints that are

prevalent at the workplace. So various idiosyncratic attributes of the workplace with respect; to the user behavior and participation can be learned through these observations.

Now this knowledge is very important because the designer should be aware of the specific work context which is part of the definition of usability. So by these observations the designer can become knowledgeable about the specific work context and accordingly will be able to design usable product.

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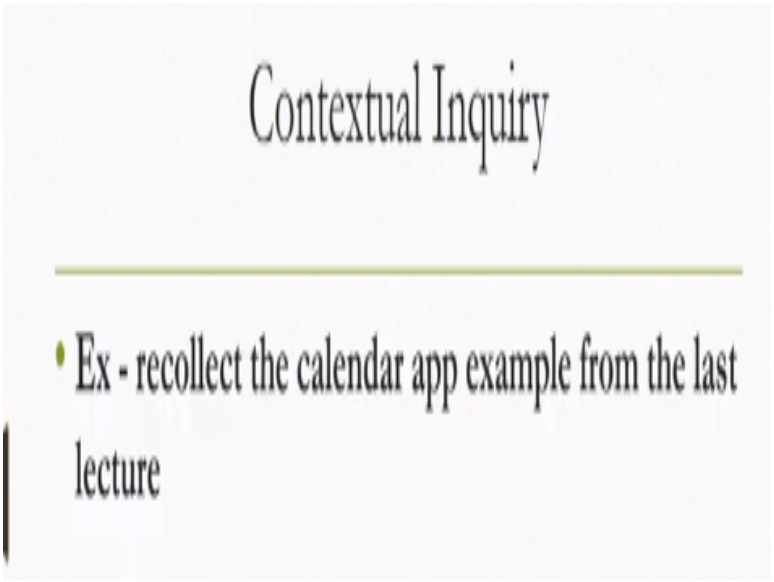

In; order to understand the importance of observations in the development of usable product. Let us recollect our calendar app example that we mentioned in our earlier lectures.

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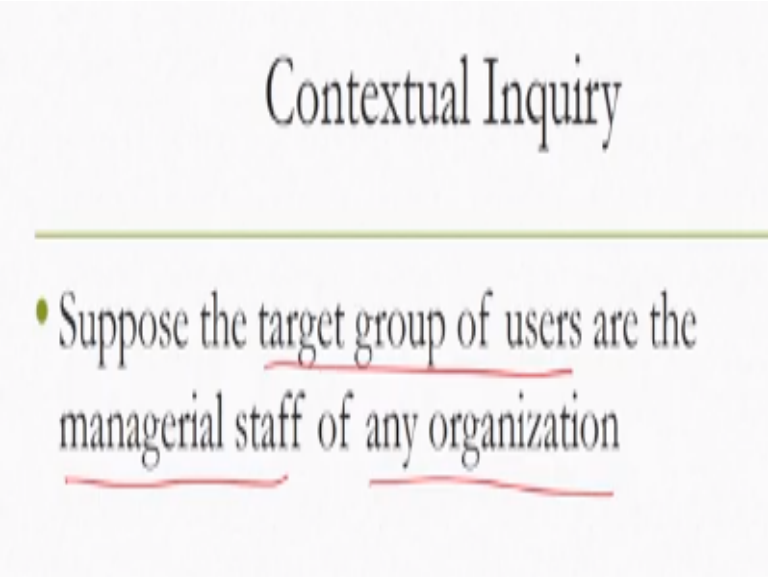

Now suppose the target group of users, are identified as the managerial staff of some organization. So we have pinpointed the user group they are the managerial staff of some organization and we made some observations about their behavior during their working hours.

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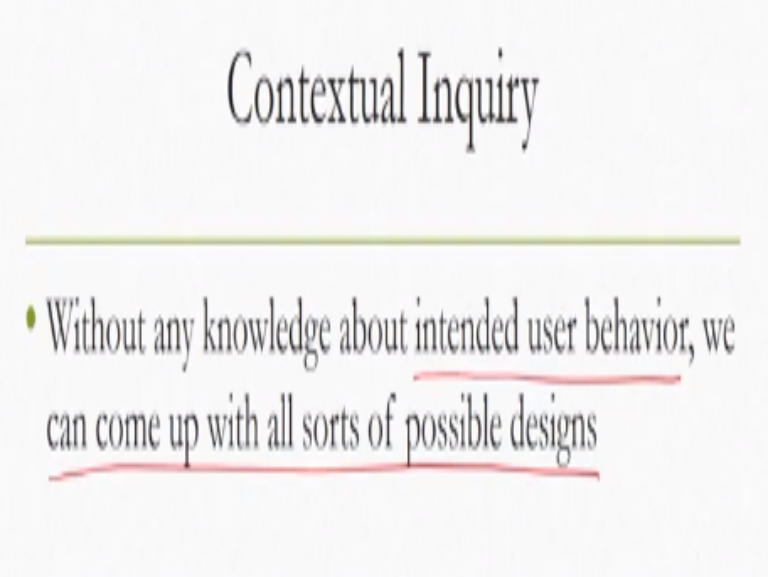

Without any knowledge about the intended user behavior particularly in their work settings we can come up with all sorts of possible calendar designs as we have already discussed earlier. So earlier we discussed couple of alternatives for the design of the calendar app but their; these were done based on our intuition rather than any specific knowledge about the target user behavior. So

that is likely to be the case if we do not have any specific knowledge we will end up with many alternatives.

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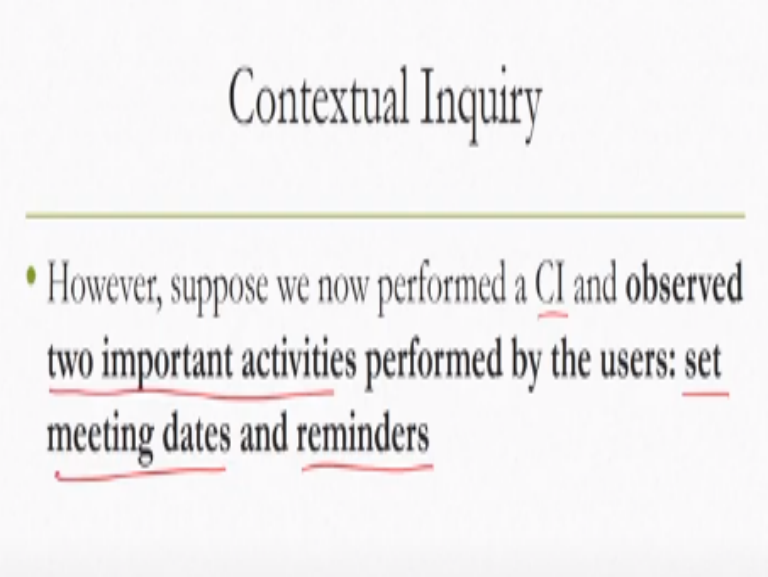

However in contrast to that suppose we now performed a contextual inquiry and observed that the intended users perform 2 important activities during their working hours set meeting dates and set reminders. Suppose we have observed this that they quite frequently perform these activities then with this knowledge when we are going to develop the calendar app we know what features to be kept in the app. So that it becomes usable to the target group of users namely the managerial stuff.

So if we do not keep these features then the calendar app will not be very much usable to the intended users because they anyway perform these activities and they have to take request to other tools at their disposal to perform these activities. But if we keep the same as features in our calendar app then they do not need to use other tools they can directly use the app and using those features they can perform their activities.

So it will make the product more usable to that particular user group and the idea of this feature comes from observing their behaviour in their work settings.

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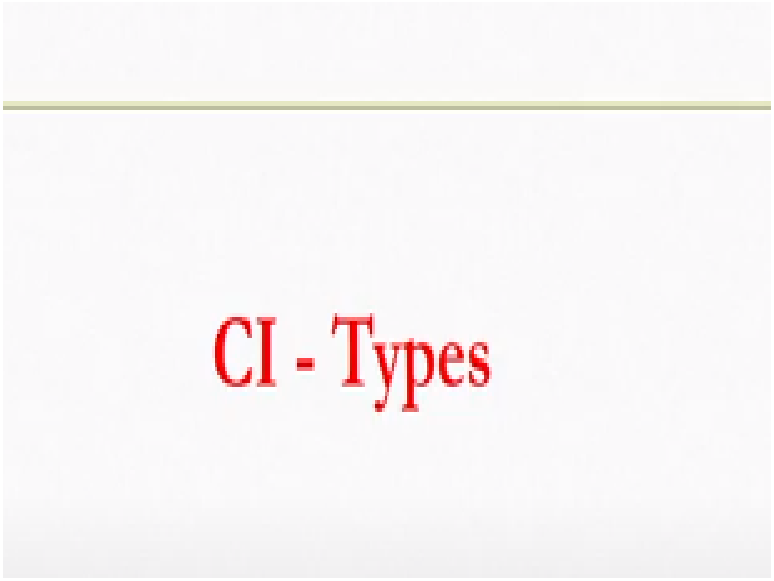

So that is the importance of having performed contextual inquiry before embarking on the design of the system. So with that we got some idea of what is contextual inquiry? To repeat this is an observation based approach to gather end user requirements where we observe the users in their natural work setting. And observation can be supported by unstructured interview. The observers can ask queries or questions to the users to get more clarification on certain behaviour or activities that they might have observed during the contextual inquiry process.

Now the contextual inquiry can be performed in different ways so broadly there are 2 ways to perform contextual inquiry.

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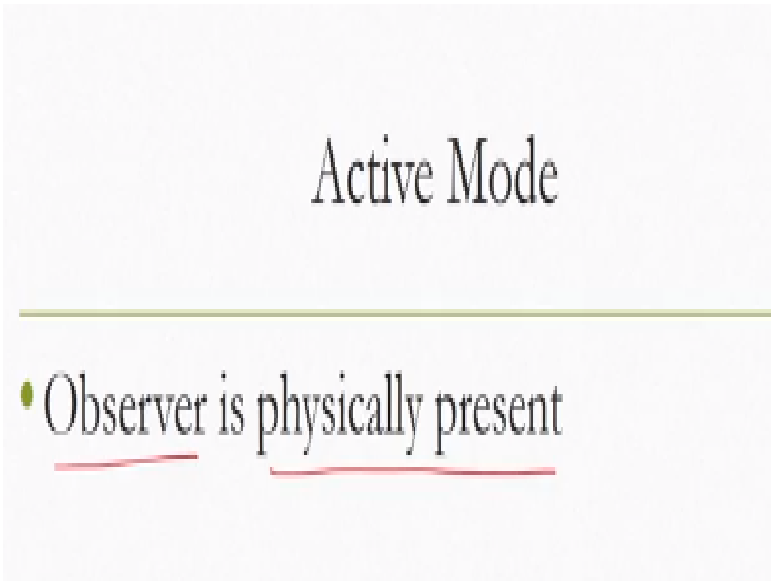

The active mode and the passive mode in the active mode the observer is physically present in the work setting where the users are being observed. So observer is physically present and captures the observation in some form either handwritten notes or videography or something whichever the observer feels comfortable with he or she captures the observations.

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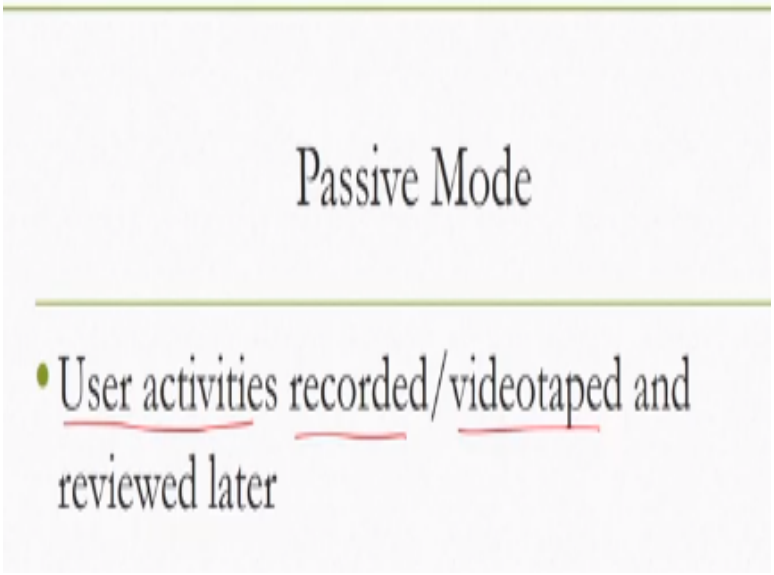

In passive mode the observer is not physically present instead the user activities are recorded or videotaped and the observer reviews those videos or recordings at a later time. So in active mode observers, are physically preset and observes in passive mode some setup is used to record user activities and those recordings are observed later by the observer.

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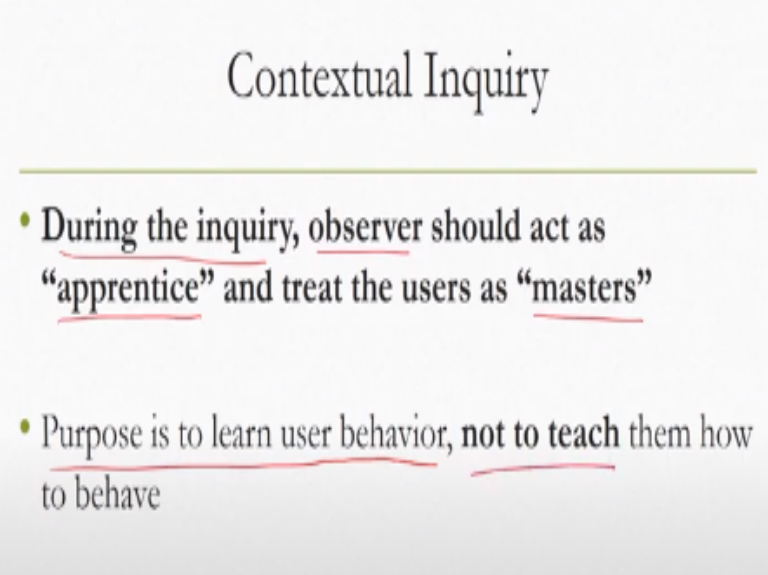

One crucial thing to note here is that contextual inquiry is not about lecturing the user what to do and what not to do? Here during the inquiry observers should act as apprentice or trainees and treat the users as masters. So this master apprentice model is a quite popular model to perform contextual inquiry here it is assumed that the users are masters and the observers need to learn from the users.

So they should act as apprentice for the purpose of learning from the users learning their behavior. So purpose is to learn from users their behavior rather than to teach them how to behave in a work setting. So occasionally there may be a tendency in the observers to teach or lecture the users about how to do things while they are observing user behaviour so this should be strictly avoided.

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Now let us learn about different stages so contextual inquiry can be thought of as consisting of multiple stages of activities there are broadly 5 stages.

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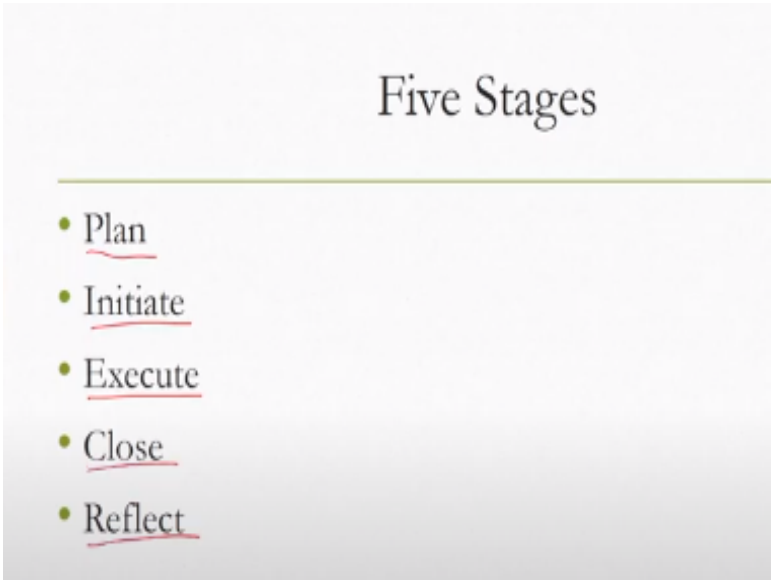

What are those 5 stages? First stage is plan then the second stage is initiate then we have execute, then close and finally reflect so there are 5 stages plan, initiate, execute, close and reflect.

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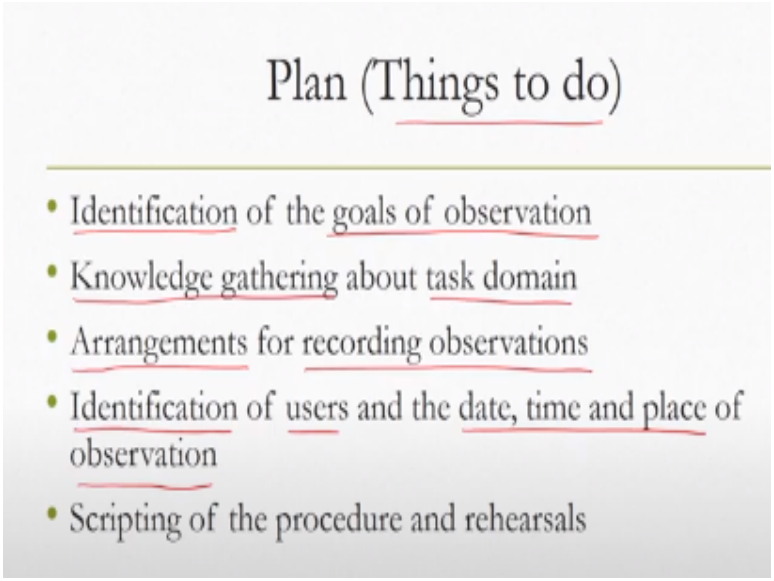

So what is the plan stage? So here we generally create a plan on what to do or what are the things that we need to do? So it involves identification of the goals of observation so what we want to observe? Knowledge gathering about task domain some prior knowledge also arrangements for recording the, observations how to record the behavior? Identification of users and the date time and place of observation so identification of observational setup and users.

All these can be converted to a script and can be rehearsed many times before the actual observation takes place so that it is smoothly done. So, all these are part of the first stage that is planning stage planning for observation.

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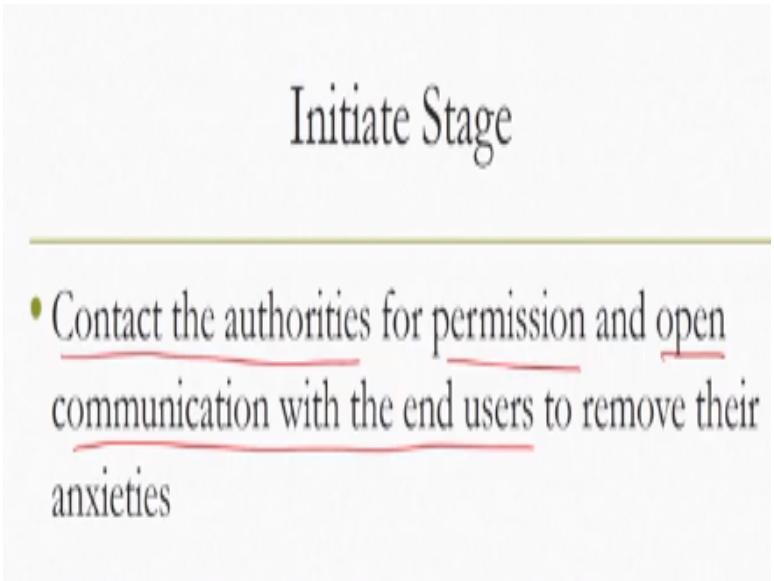

In the second stage or initiate stage although it may look simple but this is very important and crucial phase of the contextual inquiry. Here we need to contact the authorities for permission and open communication with the end users so that they willingly participate in the observation process. So occasionally if we simply drop in and asked them to let us observe then people may not agree.

So some sort of communication should be established between the end users and the observers before the observation takes place. So that the users become confident and allows the observers to observe them during their working this also requires prior permission from the management staff which needs to be obtained.

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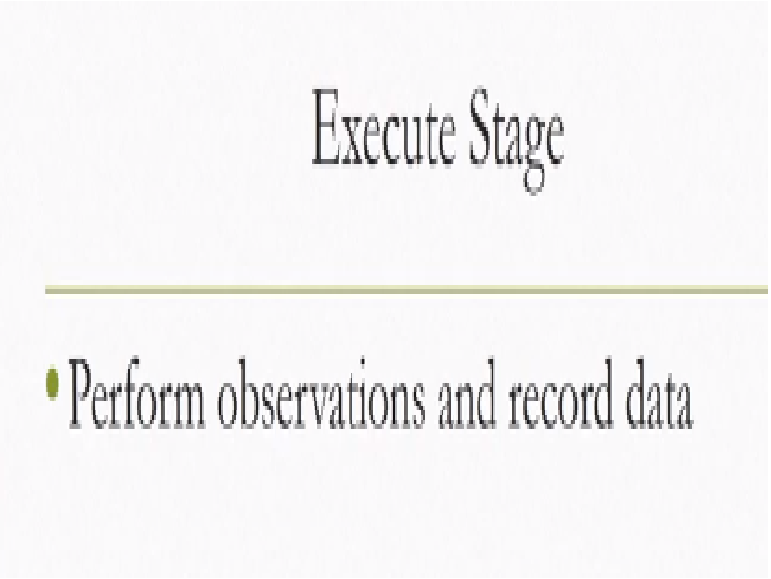

The third stage is the actual data collection stage in this stage observation takes place and data collected.

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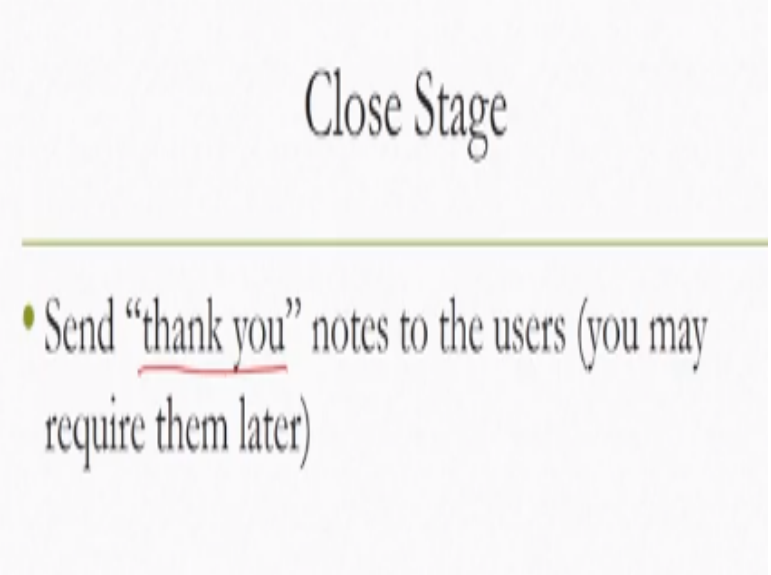

The fourth stage is the closed stage like initiate this is also a very important stage although it may look simple and trivial. Here generally the observation is ended with a thank you note sent to all the participants along with the authorities. Because if this type of initiatives are not taken then later on suppose the data turned out to be insufficient and you need to collect more data or later on during the empirical study stage you need to engage the same users for empirical study they may not agree if this closed stage is not properly done.

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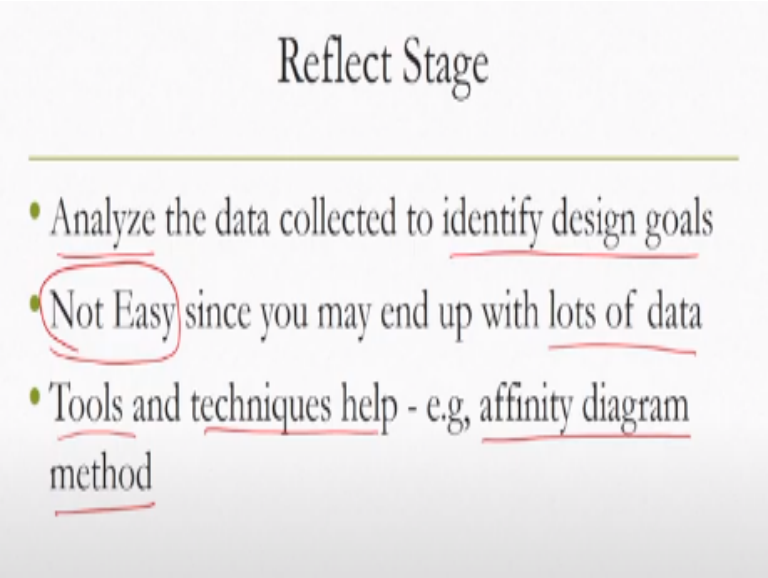

The fifth and final stage is the reflect stage in this stage the data that we have collected through observations are analyzed to identify the design goals. Now this is not easy at all as we shall

soon see with examples why? Because there may be lots of data and going through this data to identify specific design goals are generally not very trivial. We can make use of tools and techniques available to analyze the data and find out design goals one such technique is the affinity diagram method. Let us quickly have a look at the method and how it can help in analyzing the data?

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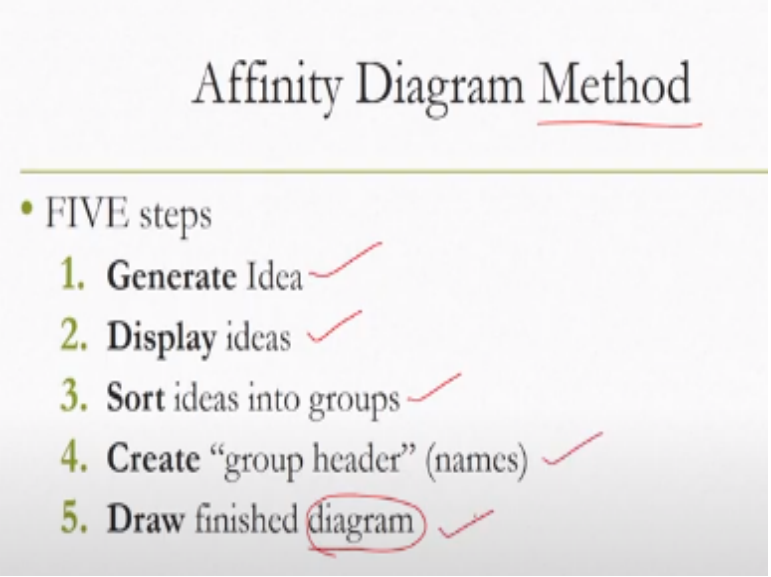

Now this method contains five steps what are those steps? Generate idea, display ideas, sort ideas into groups, create group header, by group header it means the create names for each group and finally draw the finished Affinity diagram. So the method involves these 5 stages generate idea, display idea, sort ideas into group, create group name or header and finalize the diagram.

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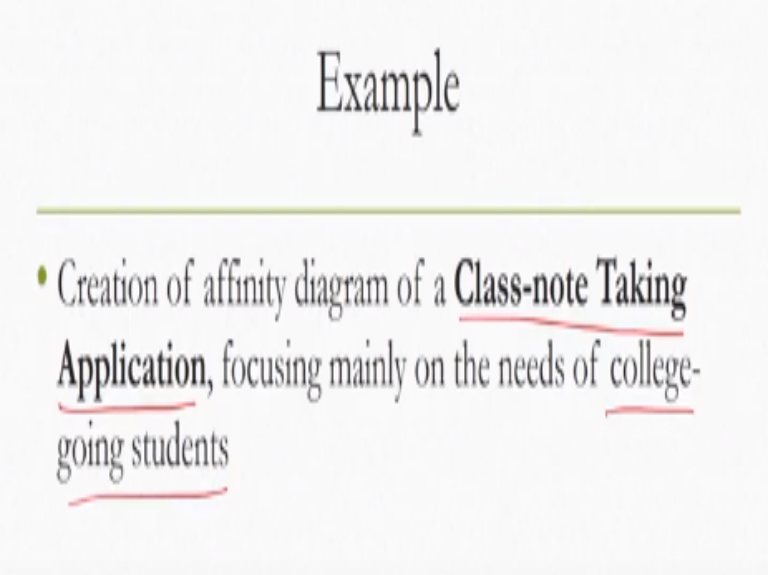

Let us try to understand these stages in the form of an example. Suppose we are trying to build a class note taking application which is primarily meant for college going students. So we have performed contextual inquiry to identify the end user requirements so that the application is usable. And we are now trying to make use of the affinity diagram method to identify the design goals for this particular application.

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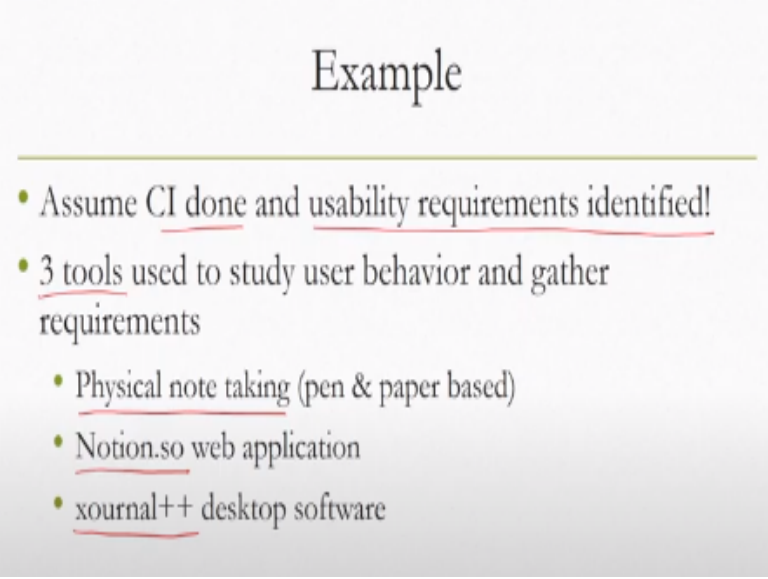

Let us assume that CI is already done and some observations are recorded now 2 record observations let us assume that three tools have been used to study the behavior, a physical pain and paper based note taking, one web application notion dot so. And xournal++ desktop software

these three tools have been used to computer based tool and one pen and paper based traditional note taking have been used to observe and record user behavior during actual classes or the actual work setting.

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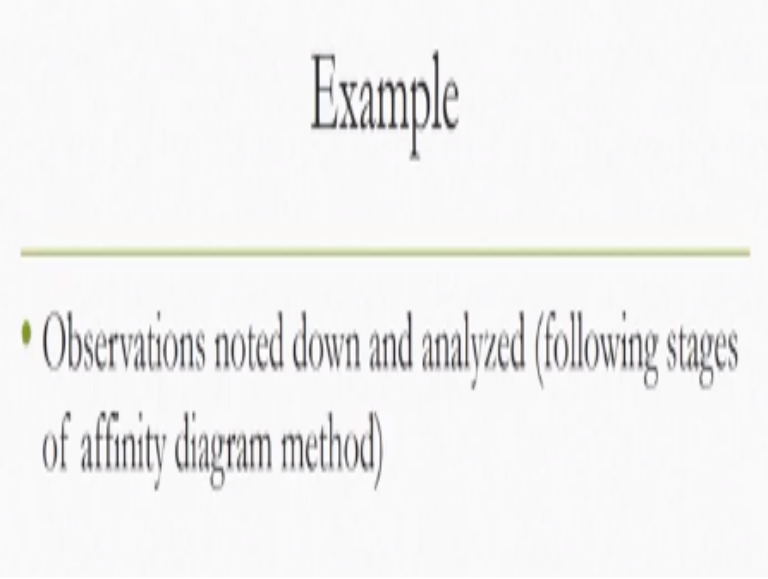

Now these observations we want to analyze using the affinity diagram method. So let us see how affinity diagram method can help us analyze the observations?

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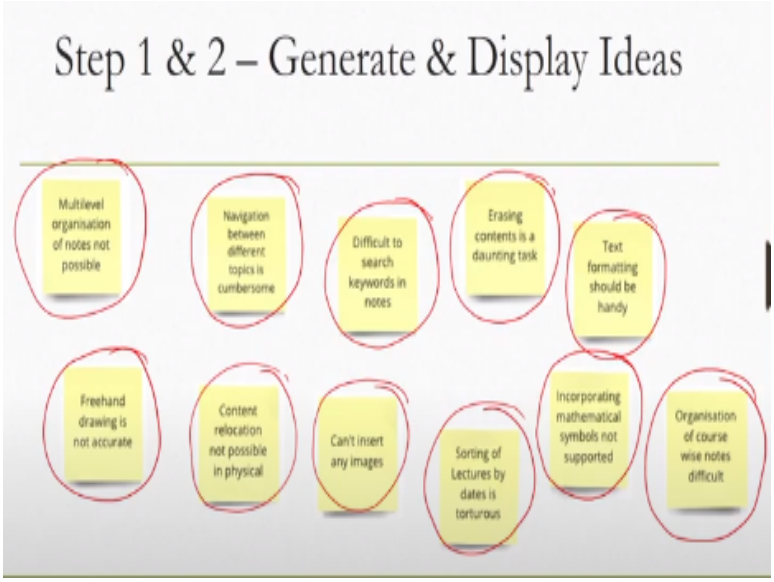

So among the 5 steps let us concentrate now on the first 2 that is generate ideas and display ideas? So suppose we have collected some notes during our observation in this form sticky note

form. So one observation is multi-level organization of notes not possible that is one observation we made during our contextual inquiry phase another observation may be free hand drawing is not accurate during not taking drawing may be part of it.

But freehand drawing generally is found to be not very accurate or of high quality a third observation that is made is navigation between different topics is cumbersome. Fourth observation content relocation not possible in physical note-taking approach of course something written somewhere is not possible to move to some other page because that is the limitation of pen and paper based approach.

A fifth observation difficult to search keywords in notes another observation cannot insert any images. All these observations are written down as notes with sticky notes and may be pasted on a wall for analysis that is a traditional approach for brainstorming with the observations. Note number 7 erasing contents is a difficult and daunting task that is another observation made by the observers. Sorting of lectures by dates is torturous yet another observation made by the observers.

One note says incorporating mathematical symbols not supported by one of the tools probably that is not specified but this is one note written down to record observation. Text formatting should be handy again with respect to probably one of the 2 computer based tools used to observe behavior. Organization of course wise notes difficult that is another observation so many observations have been made.

So this is only a subset of all possible observations that could have been met with respect to the 3 tools and user behavior. This is just to give some idea of what is meant by data collected during the observational phase. So these are the data that we collected in the form of handwritten notes it can also be in the form of video and handwritten notes after reviewing the video.

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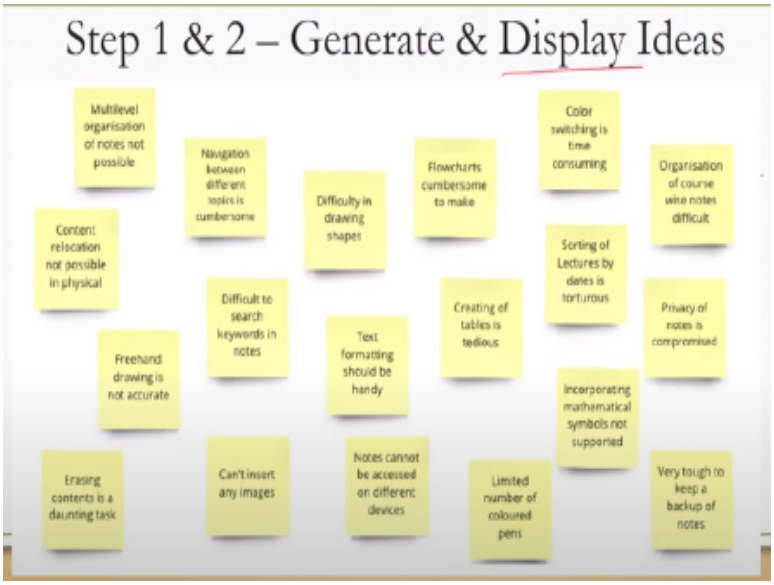

Now so many notes are or the observations are recorded so what we need to do now you need to display the ideas. So this is one way of displaying the ideas so these ideas are pasted on some surface can be wall can be whiteboard. So that other team members who are part of analysis of the data can have a look and then give in their comments or feedbacks.

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The third stage is sort the observations into groups; third stage of the affinity diagram method is sorts it into groups. That means behavioural observations that are similar in nature should be sorted into groups so among these observations that have been listed what are or which of the

observations can be considered to be similar which can be then put together into a group let us see?

So these 2 observations multi-level organization of notes not possible and sorting of lectures by dates torturous can be considered to belong to same type of behavior so that these can be put in a single group. Similarly organization of course wise notes difficult belongs to the same group now these 2 notes navigation between different topics cumbersome and difficult to search keywords in notes points to similar problem faced by users during their activities and can be considered to be pointing to same issue in the design.

Again content relocation not possible in physical pen and paper based method and erasing contents is a daunting task. Again implicitly refers to similar problems faced by users so they can be considered to belong to the same group of observations.

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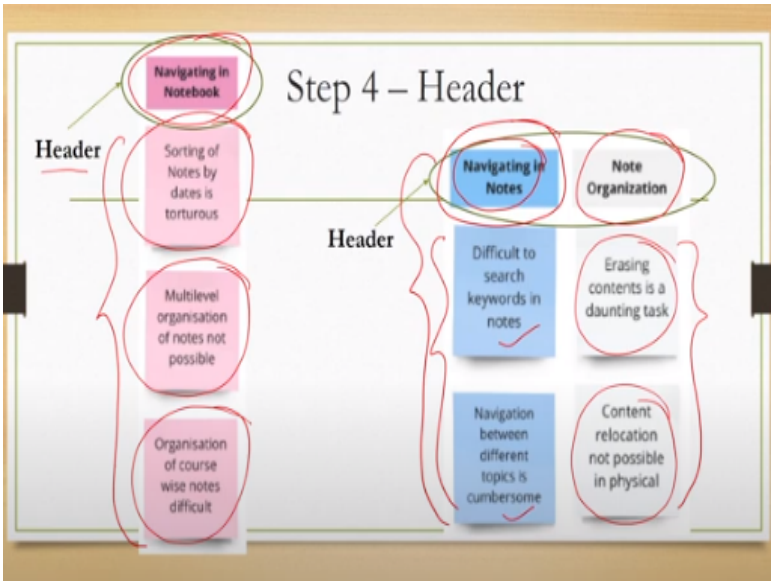

So in this way from the display of the ideas we can try to correlate the observations and then put them into some group. In step 4 these groups are assigned some names or some headers for example these 3 observations sorting of notes by dates is structure as multi-level organization of notes not possible. Organization of course wise notes difficult these three observations can be clapped together into a single group with a, header navigation in notebook or notebook application.

So in step 4 we assign the header to this group of observations and the header actually gives us some idea of the issues the design issues or the usability issues that need to be addressed to make the product usable. 2 more groups that we have seen earlier; comprising of one group comprising of these 2 observations and this is the header. The observations are difficult to search keywords in notes and navigation between different topics is cumbersome.

So these 2 observations are combined together into a group with header navigation in notes. Similarly erasing contents is a daunting task and content relocation not possible in physical or pen and paper based note taking approach. These 2 observations can be considered to belong to the same group and a header is assigned to it namely not organization. So in this way we group different observations together and assign them headers so that is the fourth step in the affinity diagram method.

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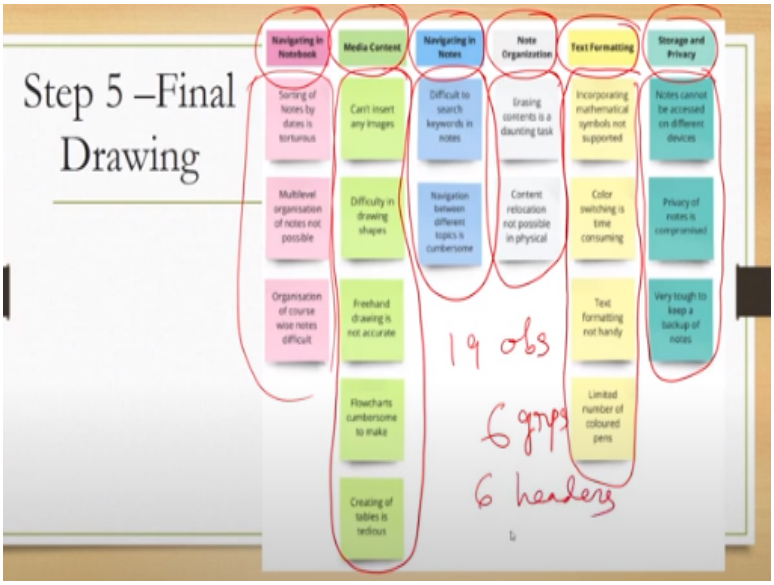

The fifth step is once the headers are assigned and the observations are grouped we again display or draw the final drawing. So all these notes are now grouped say for example these 3 are grouped together with this header these 5 are grouped together with this header. These 2 are grouped together with header another group with header there are 4 observations in this group with header and 3 observations in another group with header.

So there are total 19 observations made after the contextual inquiry of course this is a small number in practice it can be 100 and then these observations are put into 6 groups. So 19

observations 6 groups and for each group one header is assigned so 6 headers so that is the outcome of the analysis method. So to repeat we first generate ideas after observations or during observations.

If it is active mode then during observations we generate ideas if it is passive mode then after observation during reviewing of the recordings we generate those ideas. Then we display them in some manner maybe on some surface then brainstorm in a team to sort similar observations into groups and then assign some headers to those groups. So this groups with headers the set of all these groups with headers is the outcome of the method. So what to do with this outcome?

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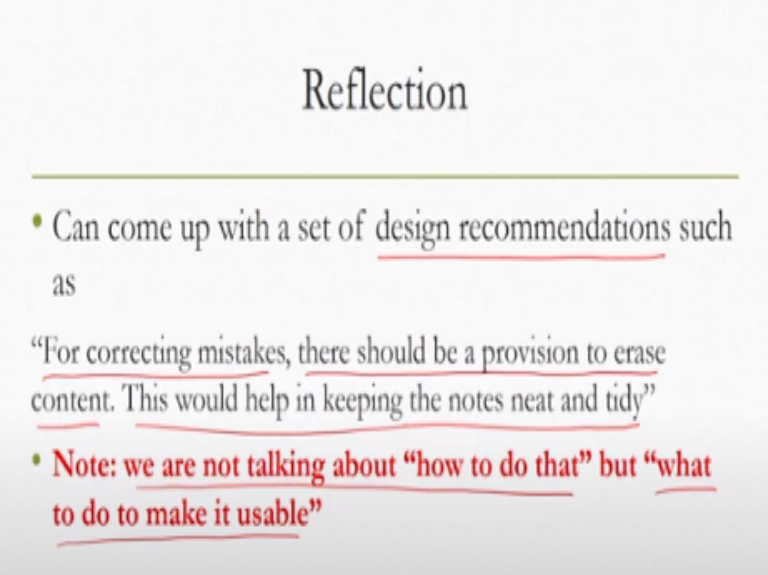

We can come up with a set of design recommendations. For example in this case in the note taking application case based on the observations that we have made. We can come up with the recommendations such as for correcting mistakes there should be a provision to erase the content this would help in keeping the notes neat and tidy. This can be one design guideline provided to the designer which is likely to take into account users concerns and make it usable how we can say that?

We can say because we have collected these requirements through user observations in a contextual inquiry method which is a usability requirement gathering technique. We can actually also come up with some functional requirements by converting this type of design resonance. As

we shall see in later lectures one thing to be noted here is that here we are not talking about how to take into account this design recommendation how to implement it?

Rather what we are talking about here is what we need? So our objective is what we need to make the design usable rather than how to implement the particular thing that we need? So the outcome of affinity diagram method is set of design rationales or it may lead to set of functional requirements. So in our subsequent lectures we will see what, is functional requirement and how it is important in system design? So affinity diagram output can be used to come up with functional requirements which will take care of usability requirements implicitly.

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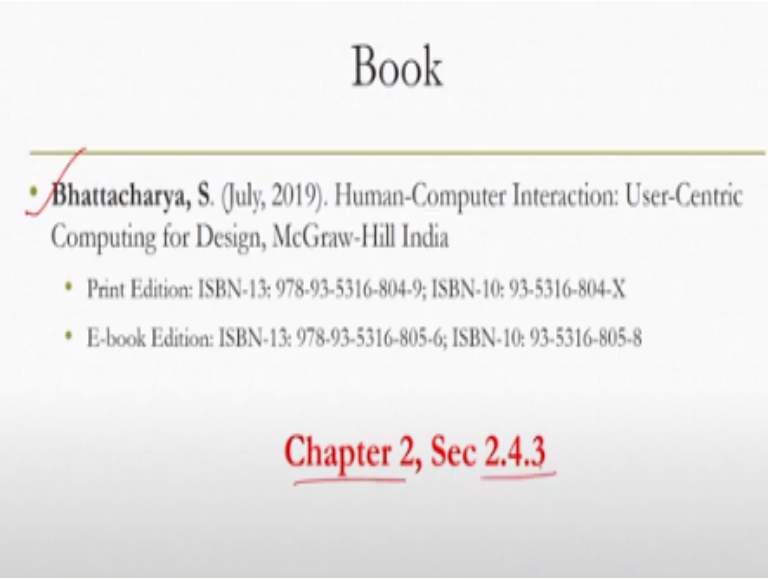

So that is all for today is topic so what we learned? We learned about contextual inquiry what it is and how it is done? We also learned about how to analyze the data that we have collected or we collect during contextual inquiry. I would like to repeat again so contextual inquiry is not an interview only it is primarily an observation to observe user behavior in their work setting. And semi-structured interview can be used as a supporting tool to get clarifications on certain user behaviors or activities that is noted during observation.

We have also got some idea of how to analyze the data through the affinity diagram method? Whatever we have covered can be found in this book you are requested to refer to chapter 2 section 2.4.3 of this book. That is all for this lecture hope you have learned the topic and enjoyed it thank you and goodbye see you in the next lecture.