Design and Implementation of Human – Computer Interfaces
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Module No # 03
Lecture No # 09
Case Study (Usability Requirement Gathering)

Hello and welcome to NPTEL MOOCS course on design and implementation of human computer interfaces this is lecture number 8. In this lecture we are going to talk about a case study on usability requirement gathering practices. So we are concerned about the design as well as implementation of interactive systems.

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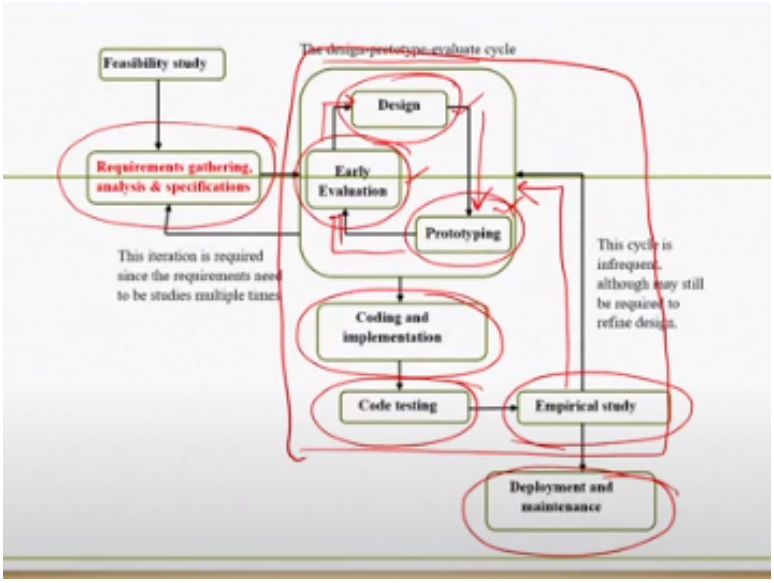

In other words of human computer interfaces as we have seen in the earlier lectures human computer interfaces or the interactive systems are distinct from other software systems. In interactive systems primary concern is to make it quote unquote easy to use to laymen persons. Now easy to use has a more formal notion which we are calling usability which is more standardized way of saying the same thing easy to use.

So the objective in the design and implementation of human computer interfaces is to design and usable system. And usable system design requires us to take users into account while designing the system due to the necessity of taking user input into account lots of additional activities we

have to do. To systematically represent the whole design and development process we take recourse to what is called software development life cycle?

Which is a stage wise representation of the entire development process? For interactive systems we are discussing one such development life cycle having several stages and sub stages. So before we start let us have a quick look at this, life cycles and its stages. So we have requirement gathering analysis and specification stage we have design stage, we have prototyping stage, we have early evaluation stage.

And these 3 stages design prototyping and early evaluation these together constitute a cycle. So from design we go to prototype it then go to evaluate it based on evaluation result we refine our design and this goes on till we come to a design where further refinements may not be required or necessary. This cycle is generally called design prototype evaluate, cycle we can refer to this cycle as design prototype evaluate cycle.

One thing to note here is the design refers to both design of the system and design of the interface and interaction. So there are 2 distinct things that we wish to specify here or we wish to refer to here. One is the interfaces and interactions which is the way in which a user views the system. The other is the actual system which is the way a developer or programmer views the system.

So; design refers to both types of views so from the users point of view design of the interface and interaction and from the developers or programmers point of view design of the system. In this cycle we refer to both the design first we will finalize design of the interfaces and interactions and afterwards we finalize the system design. Now once the system design is finalized it may be noted here that system design may not require prototyping but interface design requires prototype and evaluation all these other sub stages in this cycle.

Now once we finalize the system design we go for implementing the design in the coding and implementation stage. Then the code is tested for bugs so code testing is another major stage in the interactive software development lifecycle. So after code testing we may get a system that is bug free and executes properly. However we still do not know with code testing only whether the

end product is usable. Code testing will not tell us about the usability of the system it will only tell us about the execution efficiency of the system.

So in order to know the usability we need to carry out another type of test which is called empirical test also known as empirical study or empirical research. Here we get our system tested with end users through a systematic and scientific process. Now result of this test may reveal certain issues of the system vis-a-vis usability. So in order to take care of those issues we may need to refine our design in other words we may have to go back to this cycle.

But ideally it should not be frequent because usability study or empirical study is a costly affair. So if we need to frequently revise our design and go for empirical study then it will lead to cost and time over run. So ideally we should aim to identify major number of problems within the cycle itself initially in the initial stages and maybe once or twice we may enter this other cycle this bigger cycle.

Once this usability issues are taken care of and we are ready with the final executable and usable product we go for deployment and maintenance. That is ideally what should happen when we are going to develop an interactive system. Now we are discussing different stages of the system so we started with the requirement gathering stage. So earlier we discussed how to gather requirements?

Here by requirements what we are referring to are 2 types of requirements one is usability requirements other one is functional requirement so both the requirements are important.

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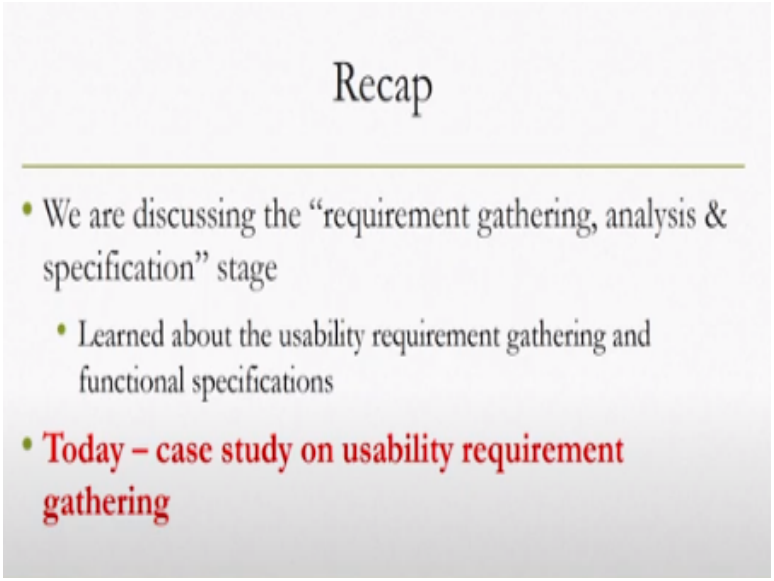

Now we have learned about what are these different types of requirements and how to gather those? In this lecture we are going to reinforce our learning with one case study of gathering usability requirements for a practical system.

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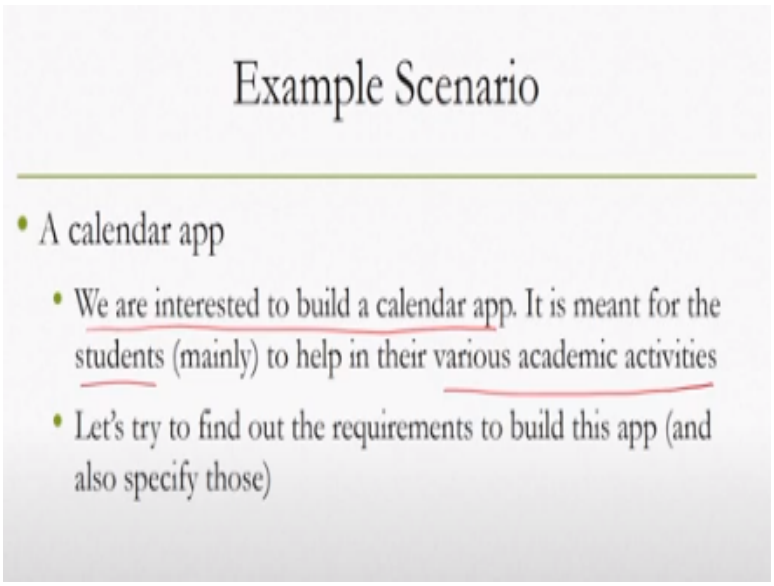

So what is our example system that we are going to discuss that is a calendar app which we have mentioned in the earlier lectures. Now here we are specifying it in a little bit more details. So our objective is to build a calendar app which is primarily meant to be used by students with the objective of helping them in their various academic activities. So that is the broad purpose of the

app so user group is defined which are, students and purpose is to help them in their academic activities.

So in this case study we will try to find out how gather usability requirements for this particular app along with that we need to specify those requirements so we will also see in this case study how to specify those requirements.

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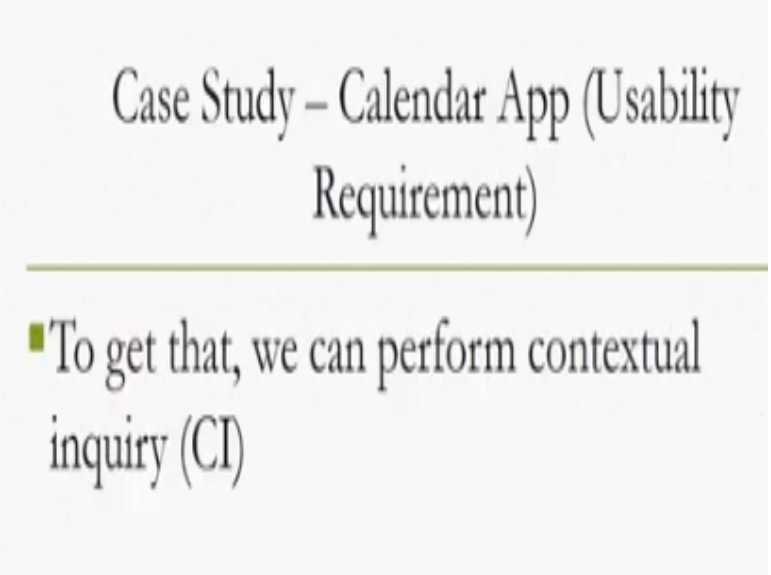

So usability requirement is one sort of non-functional requirement along with many other non-functional requirements. However our main focus here is only usability requirements so we are not going to discuss about other non-functional requirements for the app. Now in order to gather these requirements we need to perform certain activities. So there are different ways to gather these requirements as we have learned earlier we have seen earlier.

One of those which we have discussed in details in earlier lecture is contextual inquiry. So for our example system let us assume that we are going to perform a contextual inquiry and based on some hypothetical data let us see how we can get the usability requirements.

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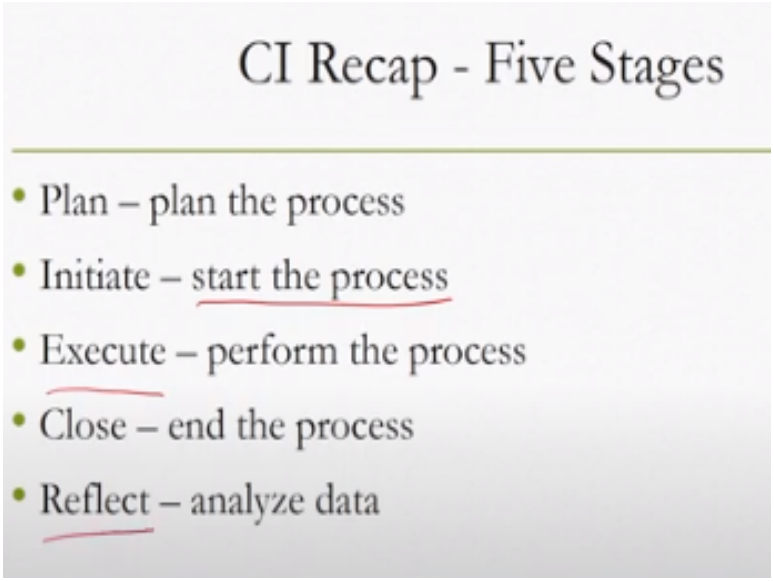

So before we proceed further let us quickly recap what we mean by contextual inquiry? So contextual inquiry is a process which involves 5 steps now this process is observation based primary objective is to observe the users in their work setting or context of use. To aid the observations the observer may occasionally take recourse to interviews to get clarifications on certain behavioral aspects of the user system interaction in the work context.

Now there are 5 stages to carry out the observations to make the observations more systematic and less prone to errors first stage is plan. So before we start any contextual inquiry process we should plan what we are going to do in the process preferably in the form of a script. Where we note down the step by step sequence in which we are going to perform the inquiry so that is the first planning stage.

Then initiate in this stage what we do we start the process but not the process of data collection rather. We start the process in the form of communicating with the potential users for their time and to explain to them the purpose so that they are less anxious and willing to let us observe their behavior. After these 2 initial stages come, the actual data collection stage or the observation stage. This is called the execution stage or execute stage here we actually observe and record our observations.

If you may recollect these, observations can be performed in either of the 2 ways either in active mode or in passive mode. In active mode the observer is physically present in the work setting

and observes in passive mode the observer is not present somehow the observations are recorded and the recordings are viewed later for gathering requirements. After execute stage comes the closed stage.

So in this stage some thank you notes are sent to the participants so that they are formally notified about the closure of the process as well as they are given some incentives so that in future if required their services can be availed. And finally whatever data we have collected during observations are analyzed and results obtained in the reflect stage that is the final stage of the contextual inquiry.

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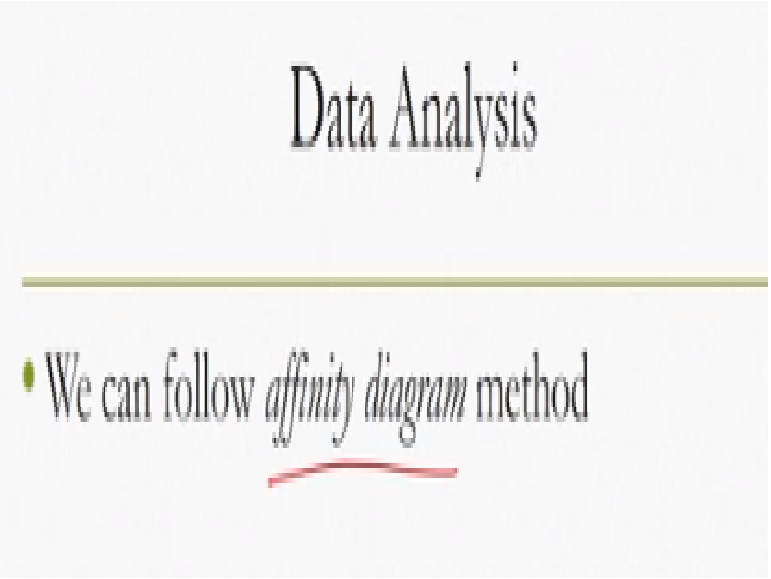

How do we analyze the data? So as again we have learned in one earlier lecture that we can follow different methods but one method we have learnt in some details that is the affinity diagram method. So in this method what we do again let us quickly recollect the procedure for affinity diagram method.

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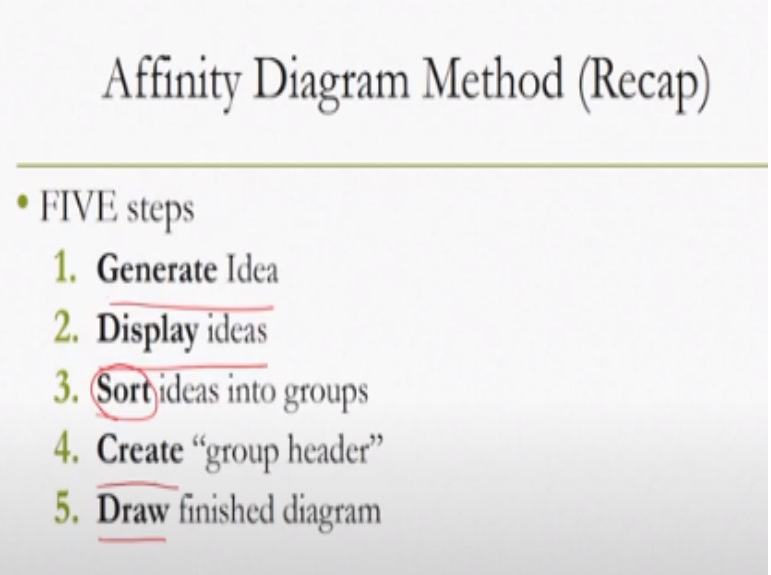

So this method involves 5 steps first is generate idea that means after observations whatever you observe from there take note or generate ideas. Then display those ideas in some manner it can be as simple as noting down the observational behavior in some simple textual format on a sticky pad or sticky notes and then paste or attach those notes on a simple white wall or white board for later brainstorming.

Third stage is brainstorming stage where the ideas which are displayed needed to be sorted into groups then once the groups are identified we need to create the group headers. And finally we need to draw the finished or final affinity diagram where we have ideas sorted into groups with headers and arranged in some sequence. So these are the 5 steps through which we can analyze the observational data as we have discussed in one of the earlier lectures.

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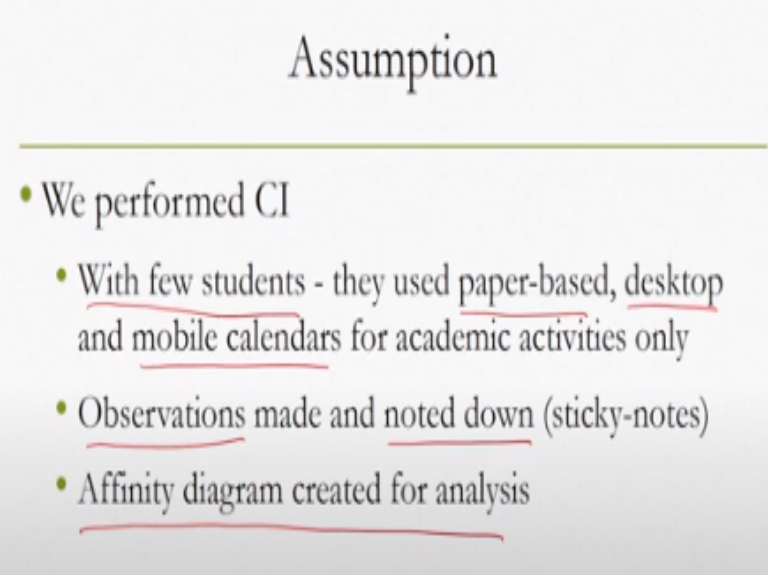

Now let us come back to our example problem so we are required to build a calendar app for use by students to help them in their academic activities. So for this app we need to identify what is the usability requirements for that let us assume that we have performed one contextual inquiry. Now in this inquiry we have observed some students during their activity hours maybe inside class or outside class in their group discussions or some such other settings we can observe them.

And let us assume that they have used paper based calendars as one mode of calendar then desktop based calendar and also mobile calendars. And we have observed them using these calendars only for academic activities not for any other activities because we are interested only for such work settings. So this is actually very important that the work setting that you have in mind while building the app should be replicated during this observation process.

So ideally if your work setting is one specific scenario and you are collecting data for another scenario then that data may not be relevant for the particular work setting that you wish to have while the system is used. So replicating work setting is very important in contextual inquiry method. And here accordingly we can assume that we have observed students use calendars either paper based or desktop based or mobile based during academic activities only.

So we have made some observations and noted down those observations may be on a sticky pad and then we use the affinity diagram method to analyze those observations. So let us assume that some hypothetical observations are made.

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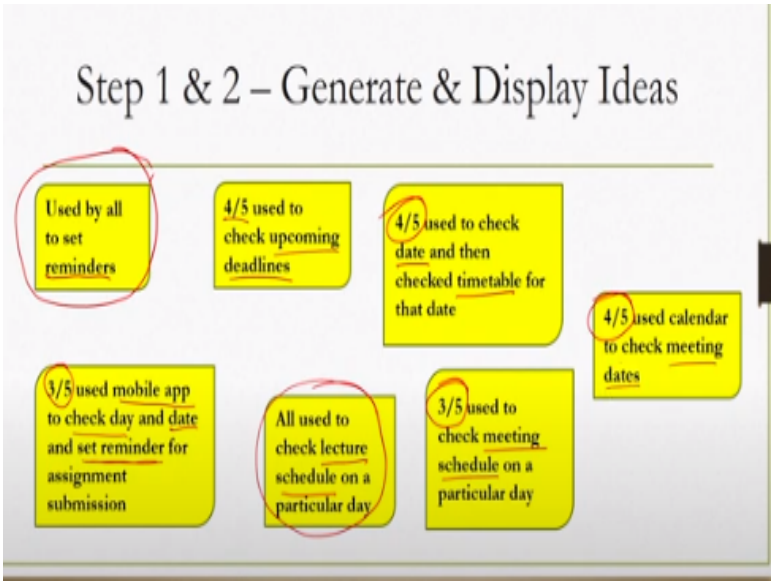

So then let us go through the let us go through the stages of the affinity diagram method. First we will discuss the observations that we have noted on sticky pad one observation is something like this that the calendar is used by all the users to set reminders. Be it paper based or desktop based or mobile based everybody used it in some way to set reminders for various academic activities. Suppose we have performed the study with 5 users so one observation that can be made is 4 out of 5 users used the calendar to check upcoming deadlines.

So that is another use usage behavior that we have observed and noted down duly on a sticky note. We can have yet more observations for example 3 out of 5 users used mobile calendar app to check day and date and set reminder for assignment submission. So majority of the users who participated in the contextual inquiry process actually made use of mobile apps because that probably is convenient to use.

However contextual inquiry has nothing to do with the explanation of the behavior rather only observing the behavior. So we will not go into the explanation of why this particular observation has been made we will just observe and note down. So the observation is a majority of the users preferred to use mobile apps for checking what day it is and what date it is and accordingly set reminder for assignment submissions.

We probably could have made another observation which is all users use the calendars in whatever form either paper-based desktop or mobile to check lecture schedule on a particular day. So that is another observation that probably could have been made with calendars. A fifth observation that possibly could have been made is that again a majority of the users 3 out of 5 used the calendar to check meeting schedule on a particular day.

So the academic activities also include several meetings maybe with peers with supervisors so on and so forth. And it is observed that majority of the students or users checked meeting schedules with calendars for a particular day. 4 out of 5 users used calendars to check date and then checked timetable for that date so 4 out of 5 users wanted to know the timetable.

So they checked it from the calendar and checked timetables for that particular day to get information about the classes on that day. Again 4 out of 5 users were found to use the calendar whichever calendars they have access to check meeting dates. So that is another observation that 4 out of 5 users used calendars to check meeting dates. So these are some of the observations that hypothetically can be made with a contextual inquiry method for our calendar app.

Now there are 7 observations or 7 notes which are generated and displayed. So from observations so note here the terms idea generation and display idea so idea generation means from observations generate those ideas that are just that have been discussed in the previous part of the lecture. So converting observations to such short descriptions is what is being referred to as generate ideas.

And then putting up those ideas in some form so that they are easy to visualize is what is being referred to as display those ideas so here to display we probably can use one wall on which we can paste those sticky notes.

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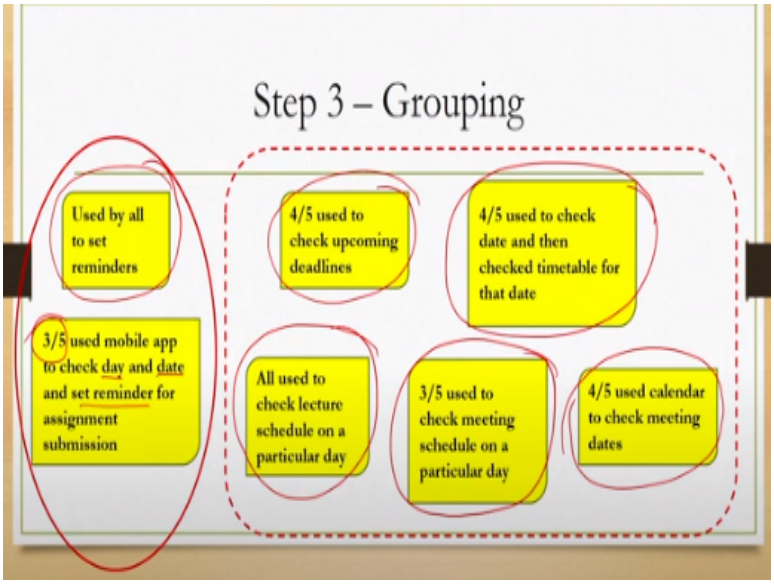

The step 3 of the affinity diagram is grouping so in this step we are expected to perform brainstorming and sort similar ideas into groups or cluster similar ideas into groups. So; let us see with this seven notes or observational ideas whether we can form group or not. So 2 observations are one is the calendars were used by all the users to set reminders and we have also observed that majority of the users 3 out of 5 used mobile apps to check day and date and set reminder for assignment submission.

So everybody used calendar majority used mobile calendars so these are for setting reminders these appear to be similar ideas so we can combine them into a group as shown here with the red circle. The remaining observations can be combined together to form another group so you will have only 2 groups because number of observations are less. What are the remaining observations 4 out of 5 users used calendars to check upcoming deadlines.

4 out of 5 users used calendars to check date and then check timetable for the date 4 out of 5 used calendars to check meeting dates 3 out of 5 used calendars to check meeting schedule on a particular day. All users used calendars to check lecture schedule on a particular day again apparently all these seems to be pointing towards similar concepts so we can group them together so total seven observations can be divided into 2 groups, groups of observations.

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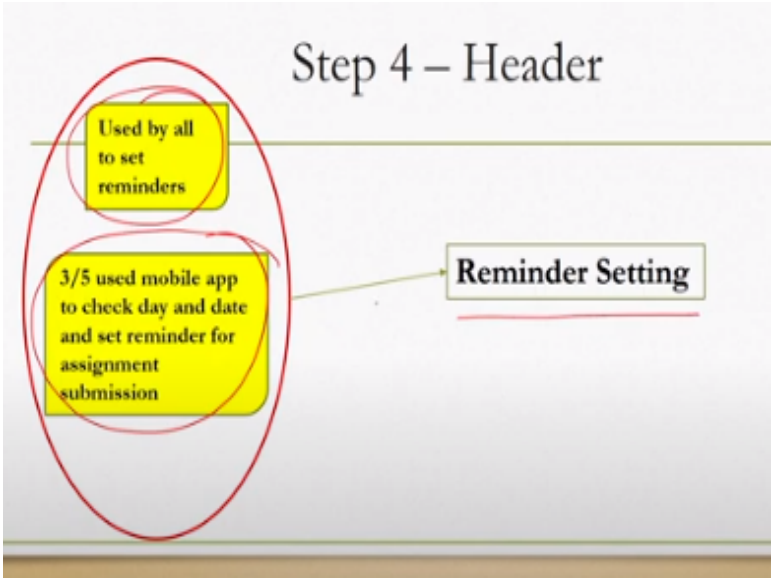

The next stage is assigning some headers which convey the broad message in a group of observations. So we have these 2 observations one is all users used calendars to set reminders and 3 out of 5 users used mobile apps to set reminders these 2 we already grouped together now let us try to assign a header to this group. So broadly what these notes or the observations that we have noted refers to broadly they refer to the activity of setting reminders or reminder setting activity.

So we can actually assign this particular header to this group the header can be reminder setting under which these 2 observations will fall.

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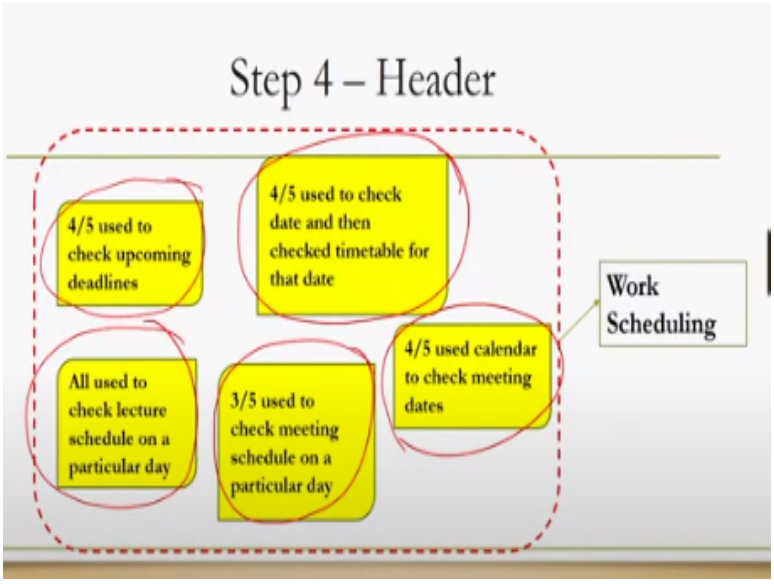

Similarly the remaining 5 observations also convey some message what is that message so what are those observations. One is 4 out of 5 use the calendars to check upcoming deadlines, 4 out of 5 use the calendars to check date and then check timetable for that date. 4 out of 5 used calendar to check meeting dates, 3 out of 5 used the calendars to check meeting schedule on a particular day and all users use the calendars to check lecture schedule on a particular day.

So these, again seems to be referring to a broader concept that is scheduling of academic work or work scheduling. So accordingly we can assign this group name to these groups group of 5 notes.

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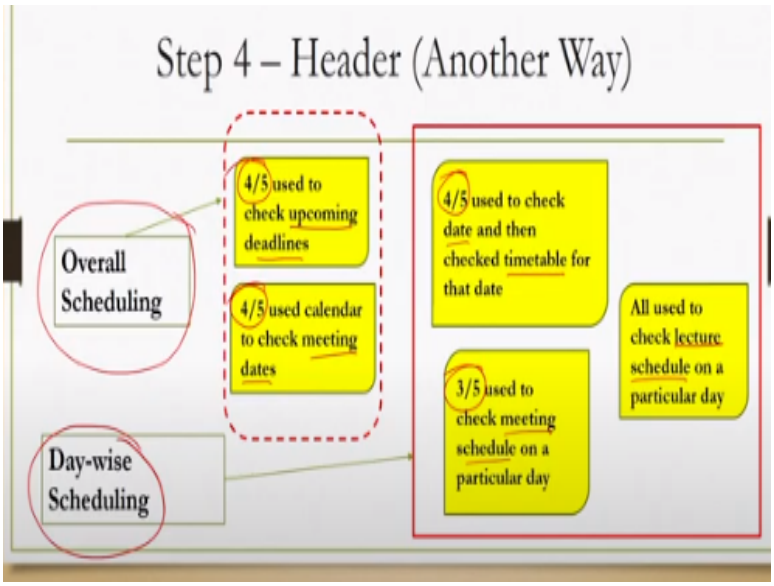

Now they can be different ways to perform the grouping of course what we have just discussed is one way. Another way can be breaking those 5 observational notes into 2 groups rather than having a single group. One group may refer to the broader concept of overall scheduling of activities under which these 2 observations fall. 4 out of 5 users used calendars to check upcoming deadline, 4 out of 5 users use the calendar to check meeting dates.

So; these 2 can be grouped together into a broader group which can be given a header like overall scheduling. Then the remaining 3 that is 4 out of 5 users use the calendar whichever calendars they have access to. To check date and time table for that date 3 out of 5 used calendars to check meeting schedule on a particular day and all used the calendars to check lecture schedule on a particular day.

These 3 may be grouped together and can be given a heading such as day wise scheduling so one is overall scheduling one is device scheduling. So we have both the options so either we can group all the 5 observations together and have a single heading or we can split them further create multiple groups out of those observations. Obviously the latter grouping is better because here we can get a better cohesion among the notes.

Whereas in the previous case, when we club together all the 5 observations the heading does not reflect everything that these observations contain.

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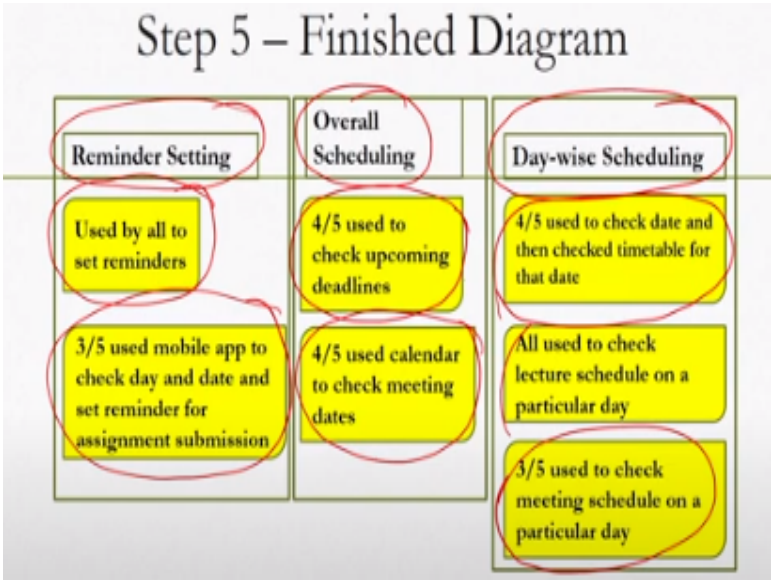

The last stage in the affinity diagram method is very simple stage that is we need to display the final diagram affinity diagram. So we have one group, group header is reminder setting and there are 2 group members which are notes pertaining to observations the 2 notes. Then we have another group overall scheduling where again we have 2 notes pertaining to observations under this group.

We can have a third group day wise scheduling where we have 3 observational notes one, 2, and 3. So this is how we can create and display an affinity diagram at the end of brainstorming session. So that is expected to give you some idea of what you need to do to gather usability requirements.

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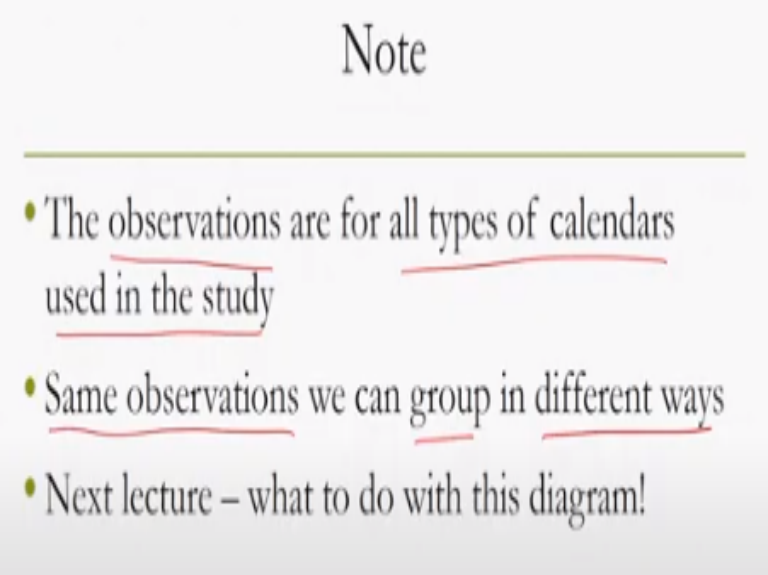

However with respect to this particular example we should keep in mind few things which are applicable whenever you are also going through the similar mechanism. First of all whatever observations we made are not universal truths that we should always keep in mind. The observations are for all types of calendars used in the study if any calendar type is left out then these observations do not apply to them.

Same observations we can group in different ways. We have already seen how to do that in one grouping we have 5 observations grouped together in another grouping scheme we have 2 groups which we have formed out of the 5 observations. So that is those are some of the things that we should keep in mind that whenever we are observing something we should only claim the validity of the observations with respect to the specific work setting.

And we should not claim that these observations hold true for any work setting. And secondly grouping is very important because once we group them then we should find out a header that aptly describe the nature of the group. Now the more precise the groups are the easier it is to find out a header. So accordingly our grouping activity needs to be very carefully thought out and we should keep always in mind that there is no unique way of grouping.

So whatever grouping scheme we think of there can always be alternative schemes. So we should always keep our thinking open and try to come up with as specific and precise grouping as possible so that we are able to assign suitable group headers. Now we have created this diagram

so that is the first stage that we have collected usability requirements remember that usability requirements are non-functional requirements.

So this affinity diagram method gave us some way to indicate the requirements in the form of groups and group headers. Next is what to do with the grouping so that we will cover in the next lecture. So that is all for today and in the next lecture we will learn about what to do with the output of the affinity diagram method. And how to specify the requirements, so that they can be converted easily to implementable ideas that is all for this lecture. Hope you have learned and enjoyed the learning looking forward to see you in the next lecture thank you and goodbye you.