

Interaction of Design
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Lecture – 15
Design Evaluation and Testing

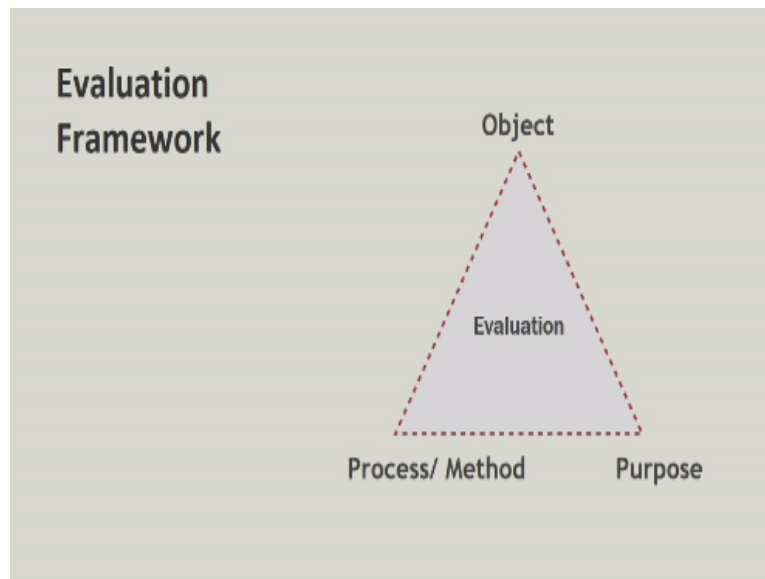
Welcome to week 4 and we are in the last session, so today's session you can assume that it is a kind of a summary session for all the sessions that we have done till now and also as the choice of the topic is concerned, it is also one of the last topics to encounter when you are into the interaction design process but when we mean it to be the last topic, does not suggest that it is a topic that we can neglect or can pay less attention.

In fact, it is one of the most important topics that we should be considered with respects to design of interactive product. If you remember I have said earlier that it is always good to evaluate your desires because when you do evaluation, you get a confidence as an interaction designer and not just a personal confidence that you gain as a designer, the design itself becomes much better out of the evaluation.

Because out of these evaluations, you get to know a lot of things which would be difficult to know otherwise okay, so let us see what do we mean by an evaluation, have you all been to different markets and I am sure at times when you are having some a snacks at a refreshment counter or some mithaiwala shop, you may find some of those to be tastier while some of those not to be that tastier.

So that aspect of taste is an aspect of evaluation and you may end up saying that I like this Gulab Jamun or I like this chocolate and it is somewhat sweeter or it is somewhat of less sweeter that is the variation in the evaluation okay, so as human beings we are always in fact at most of the times, we are evaluating, we are constantly evaluating inputs through our sensory systems and evaluation in that sense, if you think of it as a framework and if you look at your screen, it will require at least 3 things to begin with.

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The first one would be the object that you are interested in evaluating and the second one would be the process or the method that you use to evaluate the object but even when you have these 2 things in mind, you must have a motive to evaluate that is the purpose behind the evaluation, so this purpose defines the kind of method we are going to be using for conducting the evaluation. If you have a purpose of a certain kind, you would use a method that gives you readings that fulfil that purpose.

While if you may have a purpose of a different kind, you may altogether be using a different method for the evaluation. So, to begin with keep in mind that for any evaluation to happen, we need 3 things; first one being the object, second one being the process or the method which is deployed to evaluate the object and the third one is the purpose behind the evaluation.

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Evaluation

- Subjective evaluations - Results from one's experience
 - e.g. Did you like the taste of curry last night?
 - e.g. How was your experience with this pen?
 - e.g. Did you like the manner in which the hotel staff greeted you?
 - e.g. Did you like the sound of these speakers?
 - e.g. Would you like to come back to visit the waterpark?

And if you can imagine, there would be 2 different ways you can evaluate, you can do subjective evaluation or you can do objective evaluation. Subjective evaluation; if you look at your screens are with respect to one's experience, so an experience of a taste and whether something is saltier or sweeter is an expression of a subjective evaluation, it is closely tied with once experience and if you can imagine our experience with interactive product is also one of those kinds where we either are satisfied with the experience or a sometimes dissatisfied with the experience.

So, our experience also can be subjective with respect to the interactive product and if you look at several examples which are placed on the screen, you would find that in all subjective evaluation is fairly applicable across different domains and in a variety of ways. So, just to begin with; how was your experience with this pen, okay that is something, let us say that you have an interactive pen and you want to evaluate how is the experience of the user who is using this pen to write on the tablet.

So, you could pose a statement or pose a question like, how was your experience with this pen and then in response to that question, the user may be saying yes, it was satisfactory or it was satisfactory up to a certain extent or I was dissatisfied, so these are different variations of responses that you may have as an answer to a question like that and then there are different other questions which are directed towards giving you a subjective evaluation.

For example, did you like the sound of these speakers? Remember the time when you are purchasing these speakers for your music system, I think people are very subjective there and

would like to come back to visit in this water park, you may have had a visit to recreational park or a water park and then when you are exiting or when you are done with your visit, you usually get a feedback document.

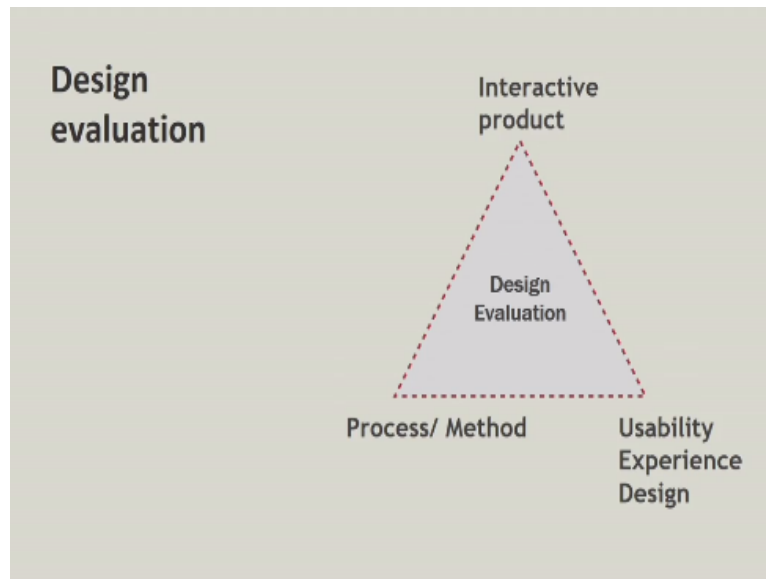
And most of the time, what it says is; would you like to come back, so that is also one of the subjective evaluation portion. Objective evaluation, unlike subjective evaluation is independent of one's experience, so for example, results from a chemistry lab, just like a titration you note down the reading and may be the performance of a vehicle over a period of 6 months or a year, you note down different parameters of that performance.

Performance of the computer's processor that is also an objective evaluation, Internet's speed how much upload and download speed is the processor or the computer able to achieve, all let us say a number of visitors to a particular site, all these are independent of one's experience and can be objectively collected, so you can also imagine that if you have a subjective evaluation and if you wanted to have an object evaluation, you would use fairly different kind of methods.

So, you have methods which are just suited for objective evaluation, while you have methods which are just suited for subjective evaluation. Once again, since evaluation is something that we find always little difficult, so I am going to retreat that for you, evaluation, the triangle that you have seen requires object process and method to evaluate the object and the purpose of the evaluation.

And then, in the next 2 slides what you have seen, that evolution is of 2 types; subjective which is dependent on one's experience and then the objective which is independent of one's experience, so subjective and objective evaluation and once again if you were to do subjective evaluation, you would use a different method, then if you were to do an objective evaluation, you would use a different method.

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I think with this understanding, let us move on to the next slides, so if you want to transform that understanding of evaluation framework into design evaluations, this is what we come across, we can replace object by interactive artefact or interactive product and then we can replace purpose by let us if you characteristics that we are very much interested in, like usability, experience or design in general.

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The slide is titled 'Design evaluation' and contains a list of focus points. The list includes:

- Focus
 - Improve designs through iterations
 - From hypothesis testing and statistical analysis to means of gathering information w.r.t. design iterations
 - From measuring goodness of design (Summative evaluation) to design improvement (Formative evaluation)

 Below the list is a smaller version of the triangle diagram from the previous slide, with the same labels: 'Interactive product' at the top, 'Process/ Method' at the bottom left, 'Usability Experience Design' at the bottom right, and 'Design Evaluation' in the center. At the bottom right of the slide, there is a small citation: 'Karat, I. User-Centered software evaluation methodologies. Handbook of Human-Computer Interactions'.

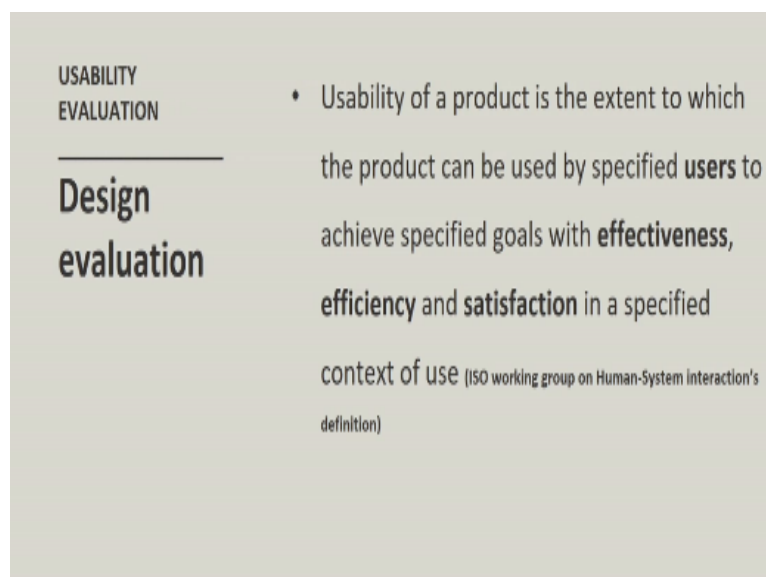
And then, we would choose appropriate method or a process to evaluate the interactive product, so when you are conducting the design evaluation, you are in a position to conduct this evaluation in 2 different ways. Consider the example of interactive pen again, now this pen, if you interview the design team of this pen, they would tell you that they have followed a rigorous process behind the design and development of this pen.

As evaluators, we can choose to evaluate this design while they were designing it that is part 1 or a different purpose could be that we chose to evaluate this design once it is complete, okay. The formal part where we were evaluating the design, when it is in the process of design and development is called the formative evaluation process, because it helps you generate insights and test results during the formative during the design and development stage of the product.

While if you test this, after it is built or design in all its great details, you are doing the summative evaluation that is you are doing a goodness test, how good is the pen with respect to other alternatives or with respect to other iterations. So, when you are doing design evaluation, it is suggested that you pay a rigorous attention to formative evaluations because as a design team member or as a designer yourself, formative evaluations will help you improve your iterations.

Whatever you are doing next should be better than the earlier done iteration, so if you conduct formative evaluation test, then that objective is achievable, you can still make your iterations better and better okay, so you have to do formative evaluation. Now, from measuring goodness of design; once again, summative evaluation to improving the design that is the focus of the design team.

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USABILITY
EVALUATION

**Design
evaluation**

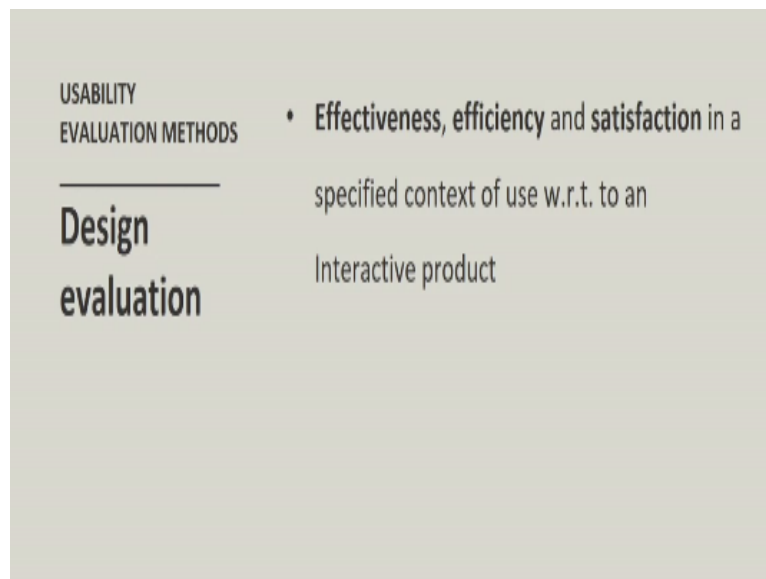
- Usability of a product is the extent to which the product can be used by specified **users** to achieve specified goals with **effectiveness, efficiency** and **satisfaction** in a specified context of use (ISO working group on Human-System Interaction's definition)

Now, one of the aspects as you had seen in the earlier slide, the usability, experience and the design in general, the one of the very essential aspects which a lot of these formative evaluation methods are focused on is of the usability. So, let us understand the definition of

usability from ISO working group on human system interaction, what they say is usability of a product is the extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

So, this is ISO's working group definition of usability, so you can see that there are few important keywords which are surfacing up, the what the keywords are; effective efficient and satisfactory, okay.

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So, if you can imagine the design evaluation methods, which are based on formative design evaluation, they would consider these 3 keywords very rigorously and we are interested while we are doing the formative evaluation, we are interested in knowing whether the iteration that the design team has just produced whether that iteration is effective, efficient and satisfy, so these are the 3 different goals that we have when we are conducting the formative design evaluation.

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USABILITY
EVALUATION METHODS

**Design
evaluation**

- Choosing the evaluation method
 - Purpose?
 - By whom?
 - For what?
 - For whom?
 - How much or for how long?

Now, let us look at these evaluation methods, how do we choose them, if we have several methods how do we say, I want to use this method versus the other method, okay so there are different parameters, there are different dimensions that you may like to consider. One of those dimensions to begin with would be; what is the purpose of the evaluation again that becomes if you imagine the triangle of a design evaluation framework that I have shown to you earlier, purpose of the evaluation is that the key dimension.

It helps you choose which evaluation method you want to deploy, okay so you have to consider purpose, then by whom, for what, for whom should I do this and how much or how long, let us look at these dimensions one by one.

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USABILITY
EVALUATION METHODS

**Design
evaluation**

- PURPOSE - Choosing the evaluation method
 - **Summative evaluation** with claims regarding the product (e.g. This interactive television is rated 5* star by the users in comparison to other televisions), OR
 - **Formative evaluation** with insights to inform the design iteration (e.g. 70% of users still could not achieve their goals by using this interactive television, hence design needs to be improved).

So, when it comes to the purpose, summative evaluation once again you may conduct a summative evaluation where you make claims about an interactive product, about its goodness okay, so one of the claims could be let us say that we are considering an interactive television, a claim like the one shown on the screen, this interactive television is rated 5star by the users in comparison to other television that is a summative evaluation claim.

So, that could be the purpose okay, all the formative evaluation with insights to inform design iteration, okay. So, for example 70% of users is still could not achieve their goals by using this interactive television and hence design is to be improved, so that is the formative evaluation statement, so you have to very precisely find out the goal or purpose of your evaluations, so that is the first dimension which will help you choose the evaluation method.

And within the scope of this course on NPTEL, once again we are considering the formative evaluation methods, so our goal here is to understand methods, which will help us improve our designs while we are designing or developing them. The other dimension would be by whom, okay, so you have to consider you know, who is going to evaluate that design, is it the expert or the real users.

So, for example if you are considering experts, you would have to consider a method like heuristic evaluation which will come later in this session, so and if you are using real users, you can use a different other methods. So, by whom, it means who should be considered to evaluate the design that is also the other dimension which we have to make sure that you know about that.

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USABILITY
EVALUATION METHODS

Design
evaluation

- FOR WHAT - Choosing the evaluation method
 - Kind of the measure, or attribute to be evaluated
 - Evaluating the performance, noting down the problems, moments where users commit error or have a deficiency of information to complete the task etc.

And then for what, choosing the evaluation method, so for what; what kind of measure, you now, what is the attribute that I am interested in, am I interested in the satisfaction is score or am I interested in finding out a grey area in the design where users commit most of their mistakes, what is it that I am interested in, what are the attributes that I am interested in as the designer or a member of the design team.

So, evaluating the performance noting down the problems, moments where users commit errors or have a deficiency of information to complete the task or all these different attributes that I may be interested, so that also you need to bear in mind.

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USABILITY
EVALUATION METHODS

Design
evaluation

- FOR WHOM - Choosing the evaluation method
 - For whom would the results of the evaluation be useful?
 - Are they the designers, or developers and engineers, or management

And for whom, what do you think is the audience for the evaluation results okay, so you might do an evaluation test and would get results out of the test but what do you think are the

audience of those results, are these the members in the team, are these that members of the design team, engineering team, development team, management team, for whom are these results impart, so we have to also pay an attention to this dimension.

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USABILITY
EVALUATION METHODS

Design
evaluation

- HOW MUCH or FOR HOW LONG - Choosing the evaluation method
 - Budget, time and money available, people in the team, no. of users in an evaluation, availability of resources
 - e.g. Do you have enough android tablets to conduct evaluation with five users at a time?

And then how much or how long you have to always consider resources available to you when you are choosing the evaluation method. For example, heuristic evaluation might prove costlier than design walk through's, so how much and for how long is the estimation of the resource on part of the person conducting the design evaluation, so budget, time, money, how much of these things are available, how many people are there in the team.

And number of users that you can get access to with respect to the evaluation availability of other resources may be the infrastructural resources, all those things are a measure that you would have to be consider, when you are deciding to choose one evaluation method versus another. Let me give an example you might be interested in knowing, how does a particular banking application performs on an android tablet.

And if you want to consider 5 users at a time, then you would have to have 5 android tablets at your disposal, so in that sense do you have that resource available to you, how much and how long okay, so these are the different dimensions which have to be considered or have to be detailed by the team interested in the design evaluation. Once you have the detail this dimensions, or have a good understanding of these dimensions, you can choose a particular method.

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VERBAL REPORTS or
THINK-ALoud
EVALUATIONS

**Design
evaluation**

- Ability to record how users are using the system
- Window to sneak into users' short term memory (what all are they thinking at any given point)
- Collect concurrently with the task performance

Now, let us start considering these methods one after the other, the first method that I am going to detail before you is the verbal report or think aloud evaluation. What is happening here that you are asking you users to verbalise their interactions with the interactive artefact, so here if you are doing this, the method has the ability to record how users are using the system and it is a window to see the contents of the short term memory.

Remember, I had said to you earlier in one of the sessions that our short term memory is fairly limited, in fact human beings can only store close to 7 ± 2 as per an early understanding and 4 ± 2 as per the new understanding, improved understanding of short term memory, so number close to 6 to 7 is what our short term memories can store, so if you were employing a method like think aloud protocol or think aloud evaluation method, you gain access to knowing what is there in the short term memory of the user, okay.

How do you do that? You ask your users to verbalise their interactions now, this is very interesting and there might be at times if you were not wise in this method, you might come with certain obvious mistakes, what you might be doing? You might be intervening in between the interaction that one should not do and also you should be considering to record these protocols were the task performance is on-going.

Let me give you an example here, suppose that I am interested as an interaction designer, I am interested in knowing what really is happening in the mind of the user when he is composing a message on the SMS application, so I would ask users to verbalise his

interaction when he is composing a message on the SMS application. Let us say, if I am the user I would verbalise as I am doing the task.

So, this verbalisation and task performance should happen concurrently, let us see an example here, once again I am the user who is going to look at the screen and going to compose a message on the SMS application and here it starts okay, so here is the messaging application, I click on the application, the entire application opens up and then where is the icon for compose a new message; okay, oh yeah, here it is.

So this icon is on the bottom right corner, I click on this icon, oh, oh, no this is not the icon, maybe there is some other icon, so I need to go back, I am going back, oh, yes, I am back to the main interface again, oh, I see, yeah here is that yeah, it is somewhere hidden here, yeah, okay, so I get a message window and let me now type the message, okay and maybe I will include this, I will include an icon here, okay.

Okay and now it is time to send the message, oh yes, the message is getting send, okay, so this was one protocol, this was one verbal report and once again, if you notice you can play this video again, you can notice me doing this task, I am verbalising as a user as I am doing the task that is very much important, you should make sure that your user verbalises this while performing the task itself, so that is one of the essential conditions for your protocol to be a fruitful protocol, okay.

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VERBAL REPORTS or
THINK-ALoud
EVALUATIONS

**Design
evaluation**

- Be careful about;
 - Present task in as much as clarity to the users
 - Minimum intervention
 - Include no leading questions
 - Clear your doubts after the verbal report gets generated

Be careful about that you have to present task in as much clarity as possible to the user and minimum intervention is required, you tell it very precisely to the user and this is the task if you have any problems understanding the task, please ask me now but once the task is starts, I would not be intervening unless, it really is the major breakdown of the task, so you have to register yourself as a designer to help you the user, do the that that is not something which you would do in a verbal report evaluation process.

So, minimum intervention is required and include no leading questions, if you can play back the video where I was trying to act as a user and perform the verbal report evaluation method imagine that there was a designer next to me who would be you know helping me out intervening, no, you are actually that icon about compose messages, there you are not really seeing that.

If those interventions, those leading questions and hints and cues would be coming while I am interacting, my verbalisation would be to disturbed, okay so you have to make sure that you are intervening not at all or if at all required minimum intervention should be exercised and also there should be no leading questions. Now, clear your doubts in is as the designer, you have doubts because your audio visual recording this session perhaps.

And if you have doubts about the manner in which a user is completing the task, you can clarify those doubts once the task is completed, was the verbal reports are received okay, so this is how you handle the verbal report evaluation or think aloud evaluation.

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VERBAL REPORTS or
THINK-ALoud
EVALUATIONS

**Design
evaluation**

- Analyse the content of these reports* to generate insights
- Can be performed at any time during the design and development process of the interactive product

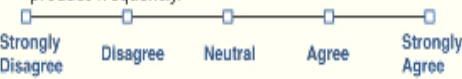
And you can then analyse the content, you can record this entire interaction, can analyse the content, can write it on, transcribe it again and write it on a paper or digitally type it and then you can analyse the content, see if there are different themes emerging out of the verbal reports because those themes will give you an indication of changes or modifications which have to be brought in to the design to make it better.

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QUESTIONNAIRE BASED EVALUATIONS


Design evaluation

- Can include a number of items against which the response is required
- E.g. I think I would like to use this interactive product frequently.



Strongly Disagree Disagree Neutral Agree Strongly Agree

- E.g. I think that the information presented was consistent



Strongly Disagree Disagree Neutral Agree Strongly Agree

So, this method of verbal report, it can be performed at any time during the design and development process of the interactive product. Now, we are moving on to the next method which is the questionnaire based evaluation method. This method just like the verbal report evaluation method, this method also can be performed at any time during the design and evaluation process.

Once again, we are doing formative evaluation method okay, so that is why we are saying that can be performed at any time during the design and development phase of the interactive artefact, what is the condition; you should have clear questions in mind, okay very specific and concrete questions are required were you are composing the questionnaire and if you composing the questionnaire, you can collect subjective response to different questions against a specified scale.

So, what do you see on your slide is the specified scale, where you have neutral right in the middle of that scale and on the right side of the scale, you have agreed; strongly agree on the left side of the scale, you have disagree, strongly disagree okay, so this is a balanced scale where across the centre of the scale responses to the left or balance with responses to the

right, so against this is scale, you can put up a question and you can seek response from the user, okay.

Now, it can include a number of items against which responses are required, so in terms of the scalability, questionnaire can include a number of items not just one or two, may be you can go up to 10 or 12 or 15 of these are questions but once again, be precise, specific and concrete in terms of composing those questions. So, an example of such a question would be let us say as a user you have used a particular system.

And post your usage you are given this questionnaire, where one of the statement in the questionnaire is I think, I would like to use this interactive product frequently, since I have use the product I may disagree with this statement, agree with the statement or strongly agree or strongly disagree or I may choose to be neutral, okay, so this is my subjective response to a statement which is written up of the scale.

Once again, the next statement could also be I think that the information presented was consistent, as a user I can choose to give my response on this scale from being strongly disagree of the left hand side to being a strongly agree on the right hand side, so this scale is applied to different statements which are talking about different attributes of the interactive artefact.

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QUESTIONNAIRE BASED EVALUATIONS

Design evaluation

- Include specific questions and not the generic ones
- Ask questions based on actual system use rather than from a hypothetical or imagined situation

Once again include a specific questions and not the generic ones and ask questions which are based on actual system uses and not a hypothetical conditions. Okay so if we have design a

prototype and prototype could do few things, you must ask your users about those things with the prototype can do, not about those things which the prototype is still incapable of doing, so let us say if you were to say that imagine that this is happening and then you read this statement and give your response.

This is a hypothetical situation on the other hand, if you tell your users since you have used this would you like to read the system, would you like to read the system across this statement, so you have to always base your questions on actual system usage and not on imaginary or hypothetical situations.

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QUESTIONNAIRE BASED EVALUATIONS

Design evaluation

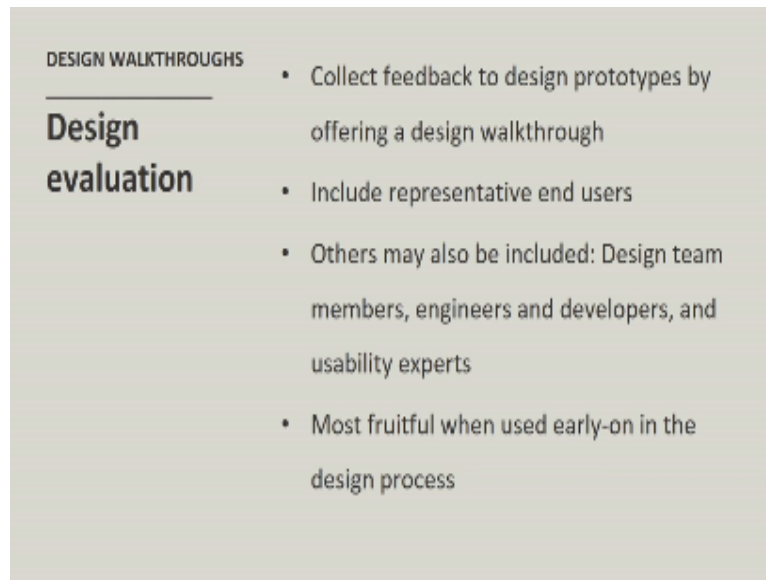
- Useful interpretation comes from concrete and specific questions
 - e.g. What do you think is the most difficult step in transferring of funds using internet banking? (versus) When do you think you would call the customer care for help in case of an online transfer of funds?

Useful interpretations come from concrete and specific questions okay, if you have been using hypothetical situations, you will get responses because the user would, he may oblige to give response okay but can you derive interpretation which is useful in sense of improving the iteration itself that is something which would be a far possibility in that case, so useful interpretations always come when you have a concrete and a specific question.

Once again, look at your screen, there is an example which would illustrate this point, what you think is the most difficult step in transferring of funds using Internet banking okay, versus when do you think you would call the customer care for help in case of an online transfer of funds okay. The first one is a bit specific and concrete while the later one is hypothetical, in the first one we are saying since you have use this particular part of the application, what do you think about this step.

What is saying that when do you think this will happen, when do you think you would do that that is the hypothetical situation, imaginary situation, so this example is listed before you to bring out that point that interpretations, useful interpretations will only come when you have questions which are specific and concrete.

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DESIGN WALKTHROUGHS

Design evaluation

- Collect feedback to design prototypes by offering a design walkthrough
- Include representative end users
- Others may also be included: Design team members, engineers and developers, and usability experts
- Most fruitful when used early-on in the design process

Now, the third method is a design walk through method, okay, it is meant to collect feedback to design prototypes by offering a design walk through, walk through as a term, if you can imagine it is like going through the design, going through different steps of the task, going through different parts of the design okay that is why we are calling it a design walk through. So, while you are offering a walk through, you have the opportunity as the designer to get the feedback, to receive the feedback from representative users, from experts, from other members in the team.

So, you need to include a representative and users, others also can be included, so for example members of the design team, development or engineering team, even usability experts you can include them in this design walk through process, most fruitful when used early on in the design process. Once again a clear indication, that we are paying more emphasis on formative evaluation methods; methods which are helpful in the formative stage.

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DESIGN WALKTHROUGHS

Design evaluation

- **Scope:** Paper prototypes, low-fidelity prototypes with limited functionality, or high-fidelity with greater design details




Image courtesy of Kulkarni, T. R. (July 2018). Paper prototypes for everyday design. Retrieved from <https://paperprotos.com>

All these methods if you use them early on the process, you get more insights and more opportunities to improve your design. The scope of this method is fairly wide, okay from paper prototypes to low fidelity prototypes, which have very few are designed is to very high fidelity prototypes with a lot of great design detail, this method is applicable, okay. So, what you see on your screen is a paper prototype, even on a paper prototype, this method works.

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DESIGN WALKTHROUGHS

Design evaluation

- Use prototype to 'walk-through' a set of typical end user tasks
- Let people identify design problems, or offer design alternatives
- Encourage peer discussion when required
- (If possible) Quickly sketch design alternatives and offer the walk-through with such alternatives

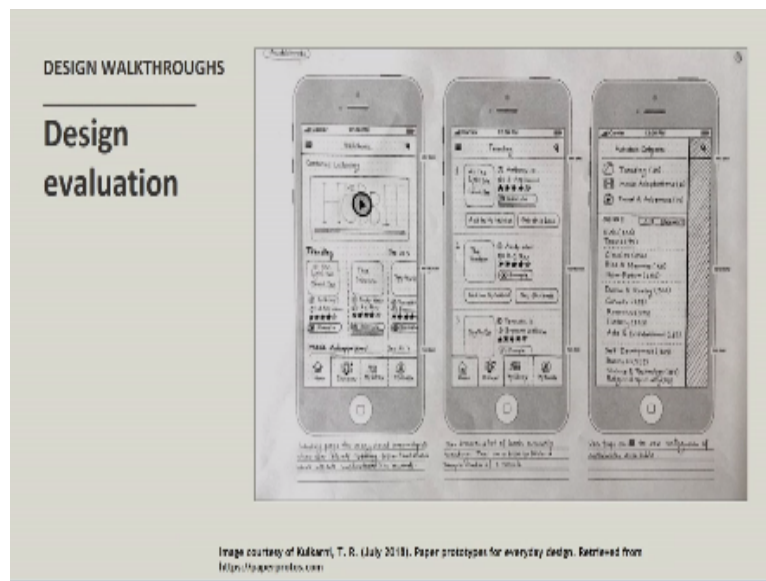
Image courtesy of Kulkarni, T. R. (July 2018). Paper prototypes for everyday design. Retrieved from <https://paperprotos.com>

Use prototype to walk through a set of typical and user task, when you are offering the walk through, you should consider typical and user task and that should be the emphasis of your walk through. So, often design walk through which includes typical and user task, okay, let people identify problems and make suggestions for modifications of these design okay, so imagine that it is almost like you are showcasing before them, how a particular task would be done.

And then, you have an audience which includes representatives and user's experts and members of other teams that audience is helping you out to find problems with your design and also suggest alternatives, if they can get, okay. So, encourage peer discussion whenever required, if possible quickly catch those design modification or design alternatives and then reformulate your design walk through and offer it back, okay.

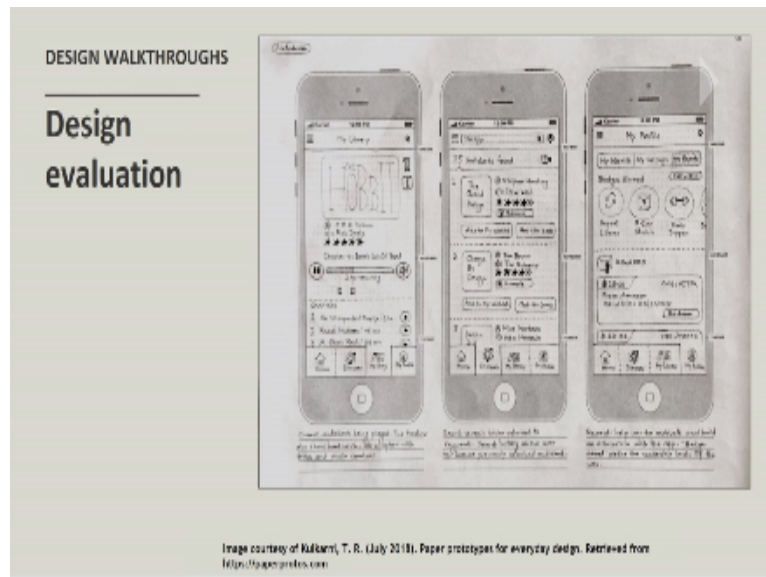
So that you can see whether the design walk through works with a newer design alternative or not, okay so in that sense, if you can see this is a fairly much, much valuable method if you are working in a team, you can do this quick usability evaluation, quick design evaluation by just considering your peer group by considering some representative and users and it is a low cost method and gives you fairly interesting insights about the improvement of the design iterations.

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And I am showing few of these paper prototypes before you know, so you can see the designer here is not only, he is not only detailed different functionality of an application, he is also written below the application okay and what is happening in that particular screen he has written there, okay. So, by using this he can very offer a walk through to the entire team or to a group of; or do representative group of end users, okay.

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Once again you can see another prototype in place.

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HEURISTIC EVALUATION

Design evaluation

- Experts weigh given designs against “heuristic” or “general rule of thumb”
- Experts with similar profiles
- Double experts are preferred- Usability as well as domain of application
- 3 to 5 experts

The last design evaluation method I am going to detail before you, is the heuristic evaluation method. If you can recall, we have used this method, you understood this method during the research phase as well you know, where we are doing the critical competitive review, where we are trying to review design or the intended product with its competitors but if you were to review different iterations, this method is still, is a very fruitful method.

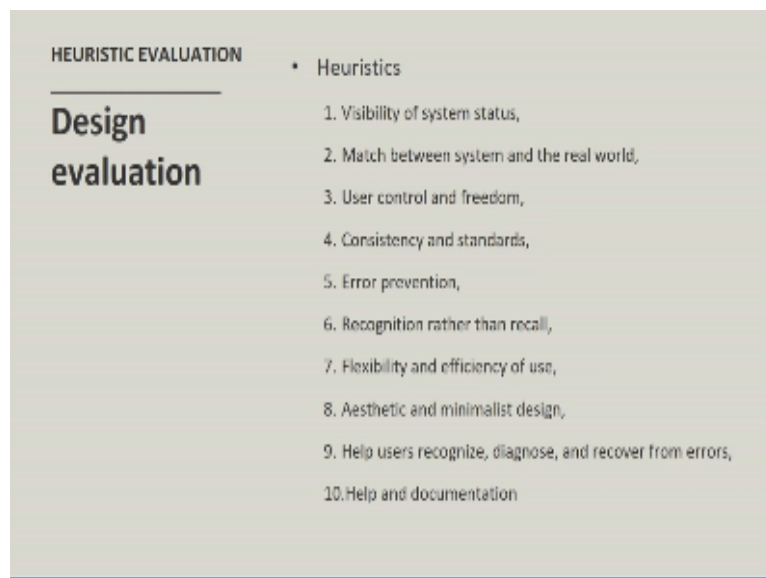
And what is happening here, once again I am going to repeat for you, you may not be in position to be to research video, so let us do a quick repeat here. In this heuristic evaluation experts weigh a given design against a set of heuristics or thumb rules, okay and the next

slide we would see what these thumb rules are and the experts with similar profiles is something that you should be considering as a design evaluator.

Because this is a review by the expert and if the profile of these experts vary too much, you're your reviews are also not in sync with the objective of the test that is to generate insights to the iteration, to generate insights for improvement of the iteration, okay. Double experts are usually preferred; if your expert is a usability expert plus he is an also expert of the domain that is preferred, assume that you are developing a medical care application.

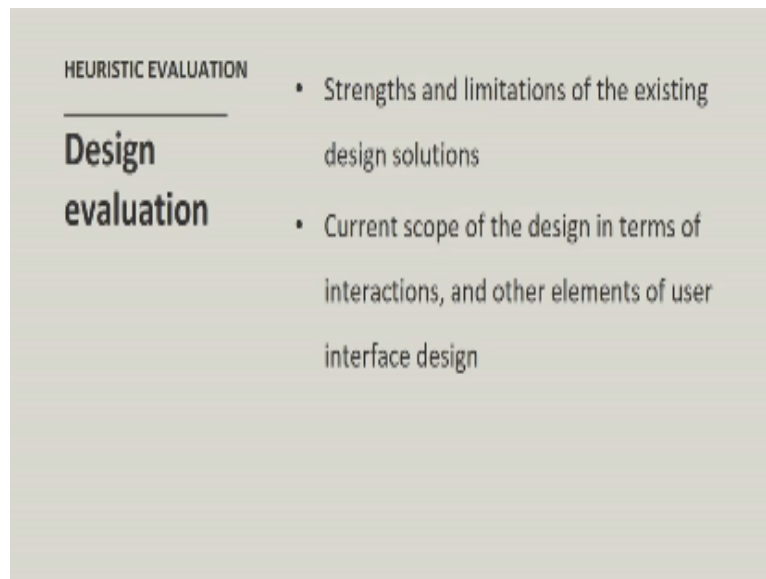
And if you are reviewing your iterations through a usability expert was says, you are reviewing your iterations through a usability expert as well as a medical domain expert, then in the second case you have a possibility to receive more fruitful designed reviews, so that is why double experts are usually prefer, experts which are not just an expert of the usability but they are also expert of the domain of the application, prefer double experts.

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And usually, a number of 3 to 5 experts is just sufficient okay, so this is more or less about the logistics of this heuristic evaluation because at times it is a costlier method and these are the heuristics which are being proposed by Jakob Nielsen, visibility of system status match between the system and the real world, user control and feedback, consistency and standards, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design, help users recognise, diagnose and recover from errors, help and documentation.

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Against these thumb rules or heuristics, you can ask your experts to review the iteration or a given design solution and the strength and limitations of the existing design solution can be found out, this is one of the outcomes of this method once again, if you are using it in the formative evaluation process when the design is into the design and development phase, when the interactive artefact is into the design in the development phase, you get to know the strength and limitations of the proposed design solution.

Current scope of the design in terms of interactions and other elements of user interface design, all different elements because if you see the heuristics, that talking about recovery from use, they are talking about aesthetics and minimalist design which is the visual design framework, they are talking about efficiency of use, they are talking about user control and freedom, they are talking about match between the system and the real world, visibility of system status.

Lot of these things, so this is a fairly exhaustive review of the design not in terms of money but also in terms of time but the advantage is that you get to cover the entire range of functionalities including interactions, data elements, functional elements everything in heuristic evaluation process, so that is where I would like to sum up today's session and I wish you best of all with your interaction design course.

And I wish that a lot of you come back and appear for the exam with all of these things, I wish you best of all and hope this course was interesting for you thank you.