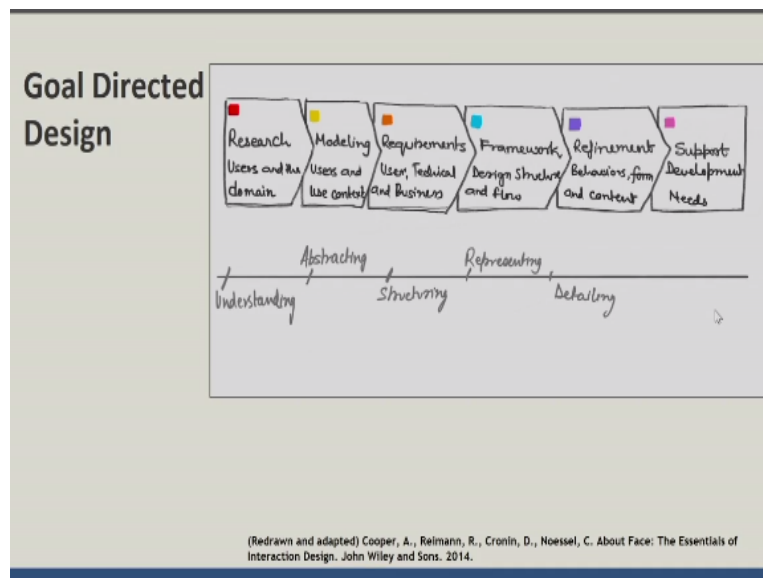


Interaction Design
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Lecture - 06
Overview of Goal Directed Design Process

Hello, we have seen in our earlier sessions that a good knowledge of users in terms of their goals basically desires motivation, needs, their context of use and how do they imagine their interactions with the device that is their mental models. So an information of these is critical when it comes to designing interactive products. Therefore, we can say that the design process behind interactive products are pretty much goal directed design process and today's session is about having a brief look at the design process.

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So if you see on your screen there are 6 different stages of this design process. The first stage is the research, then comes the second stage which is modeling, you have the third stage which is the requirement definition, the fourth stage is called frame work definition, the fifth stage is the refinement and the sixth one is support, development support to be precise.

If you look through this process and you imagine interaction design continuum or a scale from the left of the screen towards the right of the screen, you would find that the process is actually addressing couple of activities of the design team. The design team in the earlier part of the process is kind of trying to understand users, the domain, you know technology constraints, so lot of things.

And then they are trying to abstract, so they are trying to you know kind of derive insides out of their knowledge gained in the last session, last stage and they are trying to abstract the knowledge which is important to drive the project further and then what they are trying to do, then they are trying to structure that abstracted knowledge and once the structure is complete or once the structure has evolved, they are trying to represent it and then they are trying to detail that representation.

If you remember the first session that we had this particular word representation is importation because somewhere we came to an understanding in our first session that user interfaces are representation of surfaces. So that is why if you see there is a kind of that is why we are saying that the first stage is the research which is about understanding. Then the second stage is about abstracting which is you know modeling users and use content.

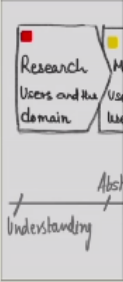
Then the third stage is basically the structuring part as I have told you and this is the requirements you are structuring them formally and then representing that is where you know the way we know of design begins basically. So very generic understanding of design is that you know you start from the point when the representation comes, no, the point is with interaction design you start right from the beginning which is you start from understanding your users, their domain and context.

So that is why we have 3 more stages which are preceding the stage of representation and this is good for your understanding and after representation lying is the detailed part, the detailing of the design. So let us look briefly at these several stages one by one. Why briefly because we are going to have a separate session on some of these stages because they are very critical for the design of interactive artifacts and they have different methods and tools and techniques.

So we will have a very comprehensive understanding of these stages somewhere in the sessions to follow but in this session let us get a brief understanding of these stages by having a look at them one by one.

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Research



- Ethnographic methods and techniques
 - Field observations, Contextual inquiry, and Interviews
- Cross validate the data
- Help with interpretation

When it comes to research you know you see that you know we are interested in knowing the users. That is, we are interested in knowing human beings essentially right. Remember those 2 black boxes from the first session, a machine on one side, a human being on the other side. So in the phase of research we are trying to understand the human beings. So we have to follow certain methods and techniques which are based on ethnography.

Now ethnography is a very established tradition in social sciences and we borrow some of our methods. The interaction design community borrow some of their methods and techniques which are primarily used in the research phase from ethnography. So that is why we are saying that and what are these methods and techniques. So for example field observations.

So if you were to kind of imagine you know designing a new interface for air traffic controllers, one of the essential thing that you would like to do as a member of the design team is to visit one air traffic control tower. So that is a part of the field observations, you would be visiting the ATC tower and you perhaps would have a notebook and you are making your notes while you are seeing those ATCs on the fly, on the job.

You go and check with your users, you go and observe your users while they are performing specified tasks or activity or you know something that is relevant for the design of the interactive product. So that is what we call field observation. Now comes contextual enquiry. Contextual enquiry is a very specified way of enquiring about certain set of activities and you

adopt a different model in this contextual enquiry for example one of the models that people adopt is master apprentice model.

We will understand that in the coming sessions, but contextual enquiry is also one form of you know having very specified very focused set of enquiries around a particular activity that is relevant for the design of interactive product. Then of course you can carry on with an activity like structured or semi-structured interview. Then you can interview subject matter experts, that is with another set of people that you should be considering.

Then you can also interview people who are involved in the development of that product you know people who are providing resources, so management people, you can also interview them, you can also know their point of view. So while you are doing research you essentially have stakes in users, but you are also trying to get sense of the boundary conditions, get a sense of the context of the design.

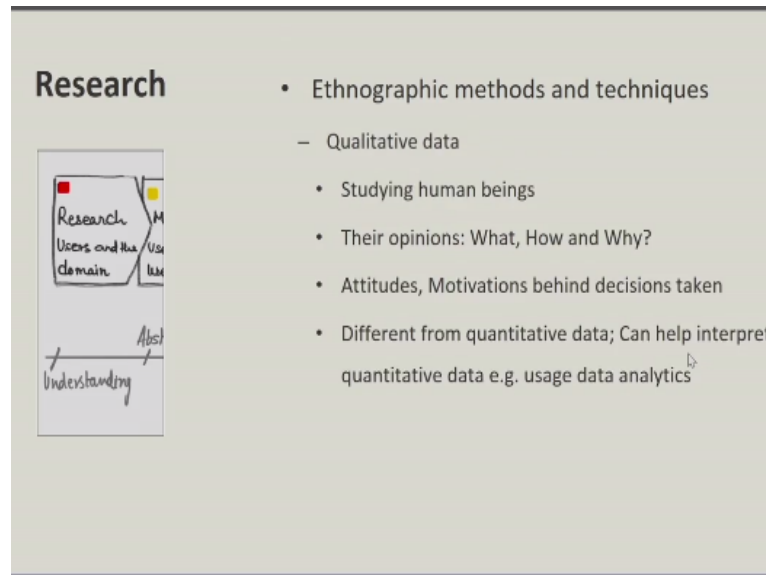
So you have to consider different actors in the process. So you are considering users as I said, you are considering subject matter experts, you are considering developers, you are considering resource people who are providing the resources to the project and if there are other relevant groups you may want to consider them as well. So what essentially happens that you know for example you have collected some data out of field observation and then you perform a semi-structured or structured interview.

Now most of the time what happens is that you know if you employ 2 different methods they help you to cross validate the data, okay. So you might have a sense of you know certain insights which you have received out of field observation. Now you are not so sure about that or you need more evidence, you need more you know pointers to kind of prove a certain proposition.

Now that particular case if you can also examine it with the help of interviews and you can merge their insights and find some coherence in the insight, then this is what we called a cross validation and it helps with interpretation also. So for example most of the time in a design team or in a team which is cross disciplinary team also interpretation is a big problem. So you know you have a field observation now people are trying to interpret that.

And corresponding to the backgrounds that they belong they might interpret the same observation in different ways. So if you have to use more methods let us say which are more focused around a particular set of enquiry it also helps you evolve a better interpretation of your observation or insights.

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The slide is titled "Research" and features a diagram on the left and a bulleted list on the right. The diagram shows a box labeled "Research Users and their domain" with a red square and a yellow square. Below it, the word "Understanding" is written, with a horizontal line and the word "Abstract" written above it. The list on the right is titled "Ethnographic methods and techniques" and includes the following points:

- Ethnographic methods and techniques
 - Qualitative data
 - Studying human beings
 - Their opinions: What, How and Why?
 - Attitudes, Motivations behind decisions taken
 - Different from quantitative data; Can help interpret quantitative data e.g. usage data analytics

And as you would see that in case of research you basically gather the qualitative data. So as I was suggesting that we are studying human beings so we are basically kind to get a data around the opinions that they express you know about the factors that appeal them, factors that prove frustrating for them. So their goals you know what do they think they would be accomplishing by using a particular interactive person.

So these are very difficult set of things, these are very difficult set of rather difficult I would say that these are very different set of data, okay, and that is what we called a qualitative data. It is about the opinions people express. So they would say you know what they were doing, how they were doing and why they want to do a particular set of things. It also is a suggestion on their attitudes, motivations and the decisions that they take.

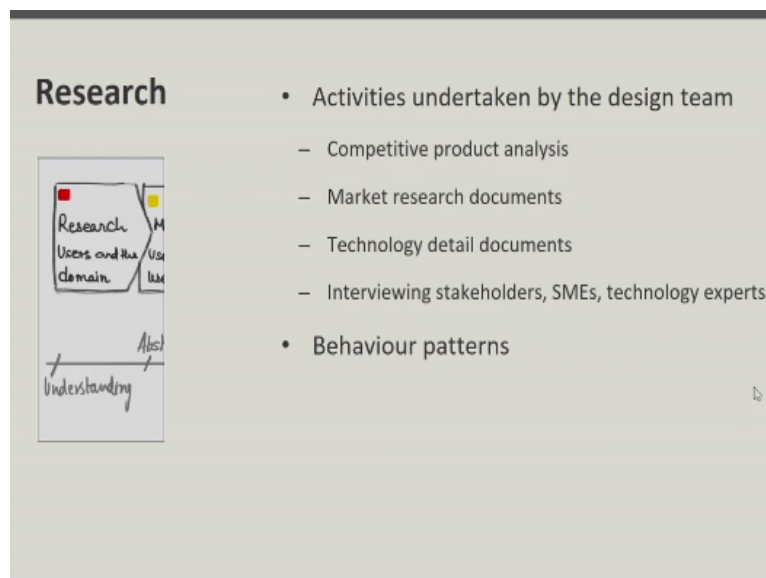
You know why do they take decisions in a particular way and it is definitely different from quantitative data. Now let me give an example of a quantitative data, so you know different people have registered for this class. Now all of them would have different you know age, so if you were to kind of record their age that is the quantitative data, that is the number that represents a particular attribute of someone, so that is a quantitative data, okay.

Qualitative data as I am saying is different. So we have said that it is attitudes, motivations behind different decisions taken and it is essentially collected from a human being. So even the you know usage data analytics, let me give you an example of usage data analytics. So these day it is very much possible to collect usage data, you know with respect to any websites that you may have.

Now it might be a suggestion from that usage data analytics that you know in a particular timeline in a particular segment in the timeline you know either the users have been visiting your website quite often or maybe the opposite. Now this is just like one set of insight that you are getting from a usage data, but why people are doing that in order to know that you have to do qualitative study.

So why people are visiting that website very often in that particular segment of the time and so that factor of why they are doing that would come from the qualitative data analysis.

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Research

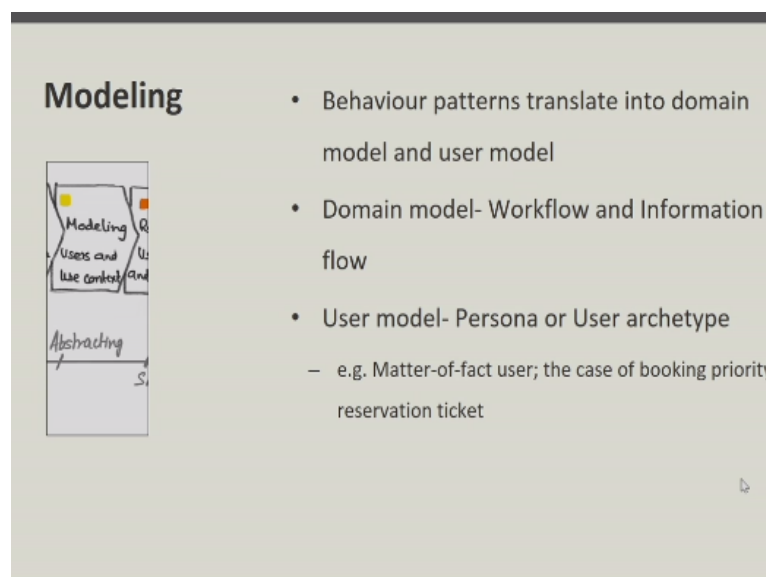
- Activities undertaken by the design team
 - Competitive product analysis
 - Market research documents
 - Technology detail documents
 - Interviewing stakeholders, SMEs, technology experts
- Behaviour patterns

So in the research phase there are like couple of activities which are undertaken very consciously by the design team. What are they? So competitive product analysis you know, so you want to know what are the different products which are available in the chosen market or in a different context, but you know which kind of cater to a similar intent. So market research documents, then technology detail documents also something which you would like to have a look at.

And as I am saying interviewing stakeholders is a very conscious exercise that people do, subject matter experts, technology experts. Let me give you an example of a healthcare monitoring application. So if you are a member of a design team, who is given the task of designing the healthcare monitoring application, you may be required to kind of make an archive of or make a repository of all the other applications which are catering to either directly to healthcare or you know or looking at similar aspects of maintaining health.

So one of the essential outcomes of the research phase is that you get a set of behaviour pattern. So you get to know how people are doing things and why they are doing things in a particular manner. So you get this what we call the behaviour pattern. Once you have the behaviour pattern then you can very well advance to the next stage of the goal directed design process.

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The slide is titled "Modeling" and features a diagram on the left and a list of bullet points on the right. The diagram shows a box labeled "Modeling" containing the text "Users and use context and". Below this box is a horizontal line labeled "Abstracting" with an arrow pointing to the right. The bullet points on the right are:

- Behaviour patterns translate into domain model and user model
- Domain model- Workflow and Information flow
- User model- Persona or User archetype
 - e.g. Matter-of-fact user; the case of booking priority reservation ticket

So which is the stage of modelling. Remember in terms of the scale, the continuum, it is also the stage when you are abstracting information which we have received in the last phase. So last phase was research where you were gathering all the ground data, qualitative data and now you have to abstract that data. So you have behaviour patterns as data coming out from the research phase.

In the modelling phase what you are going to do is this that you are going to translate those behaviour patterns into something called domain model and user model. So you might be wondering what these 2 new phrases mean, domain model and user model. Let me ask you to

recall your interactions with the banking application. So assume that you want to access banking application to meet a certain object transferring money to a registered payee.

First of all, what you want to do is that you want to secure access to the banking applications by either inserting your password and user IDs or even by using some biometric information like touch ID. So securing access is the first thing that you do, next thing is that you choose from the available menu the action of transferring the money. Once you have chosen that particular menu item you go on to choose another set of menu item saying that it is an intrabank transfer or interbank transfer.

So in this way you know through couple of stages you know through hierarchically moving from one menu to the another menu you go on finding the registered payee and you transfer the money. If you look at this process of transferring the money it essentially has involved couple of steps. So those steps if you think about them that is what we call workflow and across the workflow if you imagine you know all different nodes in the workflow there was a requirement of some information exchange between the user and the system.

So when you are accessing the banking application you are giving information to the system and when the system was suggesting you that this much money is left in your account and you know the amount transfer should always be less than the amount which is kept in the account that was the information you were receiving from the system. So in a way across a particular workflow there is a particular information flow also.

If you think about these 2 flows together you come across what we call a domain model. Now let us talk about the user model. The user model is the persona or a composite user archetype. Now these 2 phrases are again new to us. We have not really used them in our earlier session. So let us understand them by means of an example. The case that I am going to ask you to consider is the case when you are trying to book a tatkal ticket or a priority reservation ticket.

And by considering this case we would understand a user archetype called the matter of fact user. So you know there are times when you know you had to book a priority reservation ticket or a tatkal ticket and imagine when you had to book the same in midst of you know a lot of people trying to do the same. So there are lot of users who were trying to book their

tickets at the same time and if it is a vacation time or something festival time it is becoming very difficult to do that.

So but anyways if you are on to one of these situations and you were supposed to book a ticket you would use one particular interface or the other to achieve your end. We all have had an experience with this activity and we have seen that you know couple of times when you are trying to do that your interface breaks down, it becomes ineffective, there are wrong clues being given to you.

Most of the time you are entangled in question related to your journey and the travellers, but did you ever mind it? In fact, if you think about this you would say no I did not mind it, I had to do that and I would anyways do it, given any means to do that, I would try to achieve the task of booking a tatkal reservation ticket. So the point is that is what we called a matter of fact user.

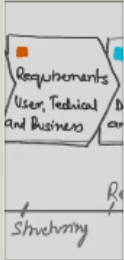
A matter of fact user would use anything, would do everything in order to achieve his end. So you do not mind using any platform, you do not mind using any interface as long as you could book your ticket, okay. Another attribute of a matter of fact user is that you know he is not so appreciative of the interface if it succeeds. So if you could book your ticket you are not that appreciative of a particular website or an application which has helped you book the ticket.

At the same time a matter of fact user is also not so critical, is not so critical of the application or the interface if it fails. So that is you know what we called a matter of fact user archetype and you would wonder what are the potential of coming across such an archetype. The potential is that we all in spite of belonging to different context, in spite of belonging to different backgrounds, we all can relate with this user archetype.

So that is why we need to come up with personas and user archetypes in order to model in order to abstract the information which we have received in the research phase. Now with this understanding let us move to the requirement definition phase.

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Requirement definition



- Putting “Personas” into specific scenario of interests
 - “A typical day...”
- Exploring different levels of interactions with respect to goals and motivations of the persona

So what you are seeing on your screen is the requirement definition phase. You would appreciate that user archetypes or persona from the modelling phase they do give us important formation about the behaviours, attitudes, goals and motivations of our users. They are however insufficient in terms of extracting requirements for the interactive archetypes. So because you know like the matter of fact user archetype is a standalone concept right.

And so if you were to imagine a different application where you are conceding this archetype you still are not aware of the requirements of this application. You are aware of the persona and the user archetype, but as far the requirements of the application are concerned you are still not there, okay. So they may tell us distinctly about who the users are, you know, so the user archetype, the personas they would tell us distinctly about you know whom we are targeting, you know whom we are kind of considering in our user base.

But they may fall short in suggesting how will the users behave in a specific situation. Now this idea of specific situation is what gets translated into scenario based design. So you have a user persona, you put it in a particular scenario and then you imagine you know what are the responses which are possible in a particular, in the scenario that you have been using. So for example you might want to put a user archetype like matter of fact user in a scenario when he has to book a movie ticket.

So the same user archetype but put in a different scenario maybe he has to book a movie ticket while on move also. So the scenarios also changing, so you can change scenarios from being you know location dependent scenarios to location independent scenario. So you can

vary all these things in a scenario, but the essential thing that you are doing as a member of the design team is that you are putting personas into the scenarios.

And then you are trying to see the entire story trying to find out the responses which leads to you too distil requirements from the interactive product. So basically you know as a designer you conduct an exercise where personas are put up in scenarios, in this exercise usually start with like a typical day in the life of particular persona and then you go on imagining how the response it would be.

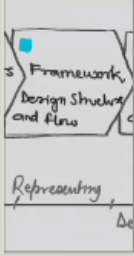
So they would define interactions at a higher level first and then go on detailing these interactions further till a logical end is reached. While arriving at the logical end the designers must be sensible to respond to the goals and motivations of different user groups. Now you know this is also an opportunity for the design team to kind of a evolve their design with an understanding of critical task satisfying key user goals.

So you might put you know different personas in different scenarios but the idea is you know what are the key goals, what are the very critical goals that must be satisfied. So you can now prioritise these goals. You can now prioritise different task which satisfy these goals. So that prioritisation as a process can happen in the requirement definition phase and what it lets you do?

It let us you evolve a balance understanding of users, the technology behind the interactive device and the business behind the interactive device. So you now have a structured information about the interactive product you are going to design. So that happens in the requirement definition phase.

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Framework definition



- Overall design of the Interactive product
 - behaviour
 - visual design
 - physical form
- General interaction design principles
- Interaction patterns

Now as you were saying you know once you have a restructured information it is the time to start representing that information and that is where you know the most usual way you understand design starts happening. So you start representing that information into prototypes and mock ups into things that people can actually see and visualise. So overall design of the interactive prototyping in terms of behaviour, it is visual design and at times the physical form.

So let us say if you were to kind of imagine blood pressure metre for elderly population you have to consider not just the behaviour, how it would show up in different information on the screen, how it would behave or interact with the elderly user, not just the visual design, you know, how it would look, would it look peaceful, would it look welcoming to the elderly user, how it would look that also is something that you would have to design.

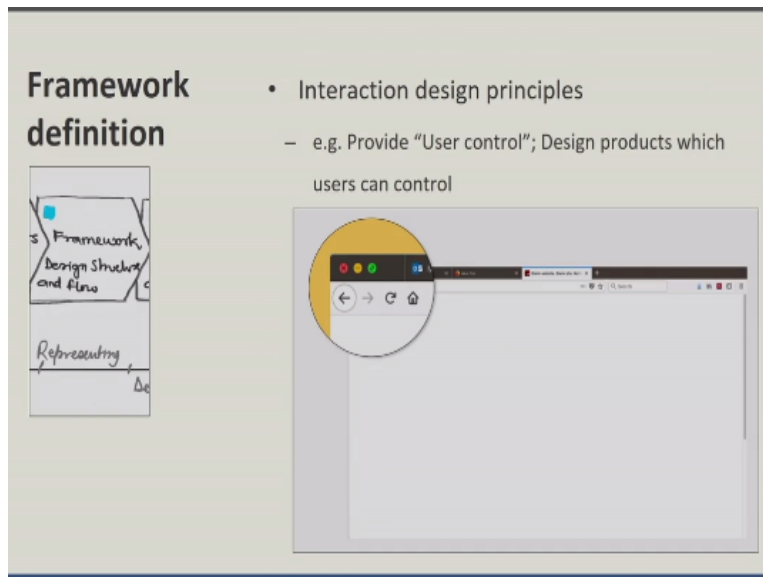
But in this particular case when there is an industrial design involved and there is an involvement of industrial design you have to also iterate for physical form. So overall design of the interactive product in terms of behaviour, form and physical form is going to be the focus of the exercises in this framework definition phase and general design, general interaction design principles have to be followed.

And in this phase also you have to follow certain interaction patterns. Now let us understand what this interaction design principle is or what an interaction pattern is.

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Framework definition

- Interaction design principles
 - e.g. Provide "User control"; Design products which users can control



So look at your slide now, so you know you would imagine that you know one of the, have you ever wonder by the way that you know all the skins that you have in your interfaces have these 3 buttons always you know, you have a button to close the interface, so that red button with the cross mark, you see there right on your left side of the screen, that particular button is responsible for closing the interface.

So while you have a button with yellow background which is responsible for minimising the interface and you have a button with the green background which is responsible for resizing that interface. Now have you wondered you know what exactly are these 3 buttons doing. So the idea is that users while they are interactive with the interface should always feel in control of the interface. It is not that difficult you know you ride a bicycle, you want to feel in control of the bicycle, it should not be the other way around.

So in a similar way one of the interaction design principles is that you should design products which enable user control. So you have to provide a lot of user control in your design, so that is why in the framework definition phase when you are representing, when you are actually iterating on the form, behaviour and physical form of the interactive product you have to follow certain interaction design principles like the one shown on your screen.

Now let us understand what a interaction design pattern is. Before we go on to the next screen let us talk about you know few things that we all can you know, we all have experienced with interactive products. You might have come across situations when you have done an action

and then you want to reverse that action. Why you would like to do that because you imagine that what you have done is either a mistake or it is unintentional, so you want to reverse that.

Now if you think of an interaction pattern, now these interaction patterns are solutions which are given for identified problems okay, that is what a pattern is. An interaction design pattern is, an interaction solution given for an identified or known problem.

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The slide is titled "Framework definition" and contains the following content:

- Interaction patterns
 - Design solutions to known problems
 - e.g. Multi-level undo or a Linear multilevel undo

On the left side of the slide, there is a hand-drawn diagram with the text "Framework Design Structure and Flow" and "Representing". On the right side, there is a screenshot of a Photoshop window showing a multi-level undo menu.

Martijn van Welie. (June 2018). Interaction Design Pattern. Retrieved from <https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/interaction-design-pattern>

So the known problem is that people want to often at times they want to undo their actions, they want to reverse their actions for one reason or the other. Now there is a pattern called multilevel undo or linear multilevel undo, which is a very detailed, very established pattern. So you see that you know in several interfaces that you see, for example the one that is on your screen is from a Photoshop window.

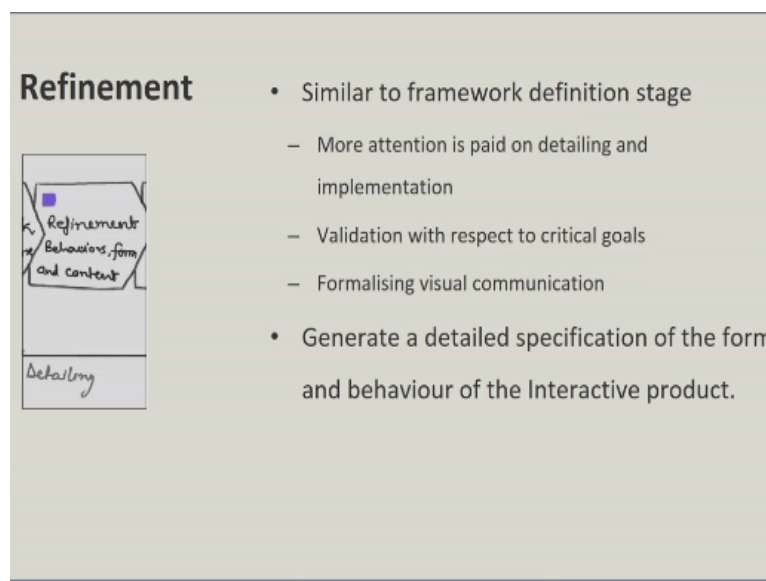
You see that you know while somebody was working on the screen, the white screen behind that whole menu he has performed these many activities. So from he has opened up then he has made a layer, he has rectangular mark, then deselect, you know so many things that he has done. Now at times you want to undo them. So what you essentially do as part of this pattern is that you record user actions and then you keep a repository of them, you keep a list of them.

And then you let user access that list and delete either a particular action or a set of actions at once and let him exercise that control, let him have that freedom to delete what he has done if he thinks that that is not an appropriate action that he should be doing. So in this particular

pattern if you see it is a very established pattern for a known problem that people want to undo their action sometimes.

So while you are doing the framework definition phase you would design your iterations based on these patterns and design principles, that is why we are saying that in the framework definition phase you have to you know evolve your behaviour, visual design, physical form and you have to use general design principle, be aware of them, be sensible towards them and interaction design patterns okay.

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The slide is titled "Refinement" and features a diagram on the left and a list of bullet points on the right. The diagram shows a vertical stack of three boxes. The top box is labeled "Refinement" and contains the text "Behaviours, form and content". The middle box is empty. The bottom box is labeled "Detailing". To the left of the top box, there is a small blue square and some handwritten-style text that appears to be "x" and "y".

- Similar to framework definition stage
 - More attention is paid on detailing and implementation
 - Validation with respect to critical goals
 - Formalising visual communication
- Generate a detailed specification of the form and behaviour of the Interactive product.

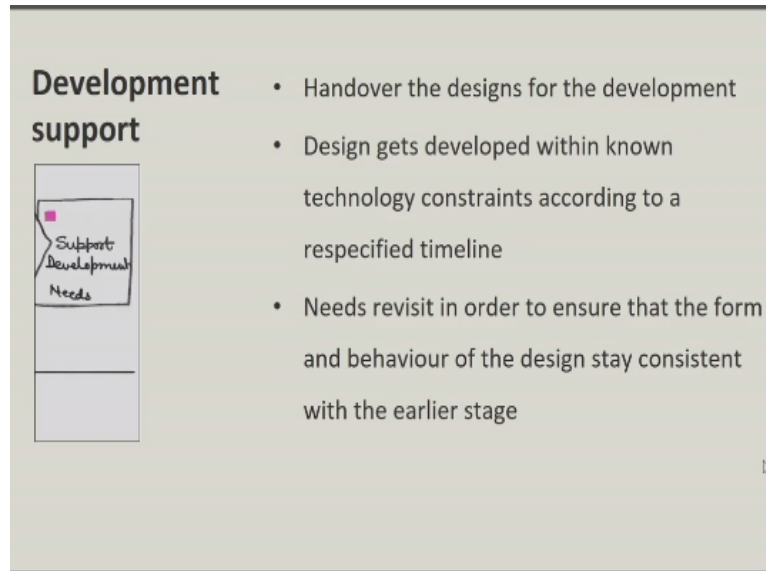
Now comes to the refinement phase. So you have done enough iterations, but still you know you have to do final refinement, so it is very much similar to the framework definition phase except that you know there is more attention which is now paid on detailing. So let us say in the earlier phase if you were just doing the paper prototyping, but in this refinement phase you actually would do high fidelity prototyping.

You will use visual design, actual visual designs. This is one more opportunity for a design team member to validate his design with respect to critical goals of the interactive product and formula is visual design. You put up guidelines you know how to design icons, you put up guidelines on what background to use against which foreground, what should be the length and breadth of the dialogue box all of these is a formalized communication.

So you decide on that, you freeze that and you generate a detailed specification of the form and behaviour of the interactive product that is what you do in refinement phase. More or less

at the phase the responsibility of the design team is complete and that is when the design team handover the designs to the development team and that is what we call the development support stage.

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Development support

- Handover the designs for the development
- Design gets developed within known technology constraints according to a respecified timeline
- Needs revisit in order to ensure that the form and behaviour of the design stay consistent with the earlier stage

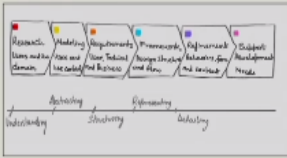
Support Development Needs

So design gets developed within known technology constraints according to a pre-specified timeline. It needs often but as a member of the design team you often need to revisit in order to ensure that you know works gets developed is consistent with what is proposed. So you have to ensure that a form and behaviour of the design stay consistent with the earlier stages in this goal-directed design process.

So if you were to you know kind of come up with the summary of this goal directed design process and you reflect on what all different questions we this process lets you to answer, here is the list of these.

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Summary



- Users
 - Who are they?
 - Activities they are trying to accomplish
 - Their imagination about ways of accomplishing the activities
 - Experiences - appealing and rewarding

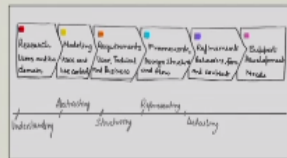
Cooper, A., Reimann, R., Cronin, D., Noessel, C. About Face: The Essentials of Interaction Design. Wiley and Sons. 2014.

So it lets you answer very critical questions about users. So it will give you a good understanding of who the users are, you know, activities that they are trying to accomplish and it would also give you a sense of their imagination about ways of accomplishing these activities. You remember the idea of mental model so that is what is being spoken here. Now it also you know tells you a bit about their experience, you know, what is it that they find appealing or rewarding or frustrating or you know or really not so good.

So it gives you a sense of what they like, what they do not like, under what conditions do they happen to like it, under what conditions do they happen to dislike it. So it gives you a good understanding of the experiences of your user groups.

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Summary



- Product
 - Behaviour
 - Form
 - Interactions with the users
 - Information structuring and organising
 - Features for first time users
 - Stay relevant across interactions with the users

Cooper, A., Reimann, R., Cronin, D., Noessel, C. About Face: The Essentials of Interaction Design. Wiley and Sons. 2014.

Now when it comes to product, it also lets you the process, also lets you define and be specific about the behaviour of the product, the form of the product, the kind of interactions it will offer to its user, information structuring and organisation. So let us say you are designing an information rich portal something like educational portal, at that time you have to structure the information and organise it very carefully.

So that understanding also can be derived out of the goal directed design process. Now it also lets you imagine and be sure of the features that you are going to provide for first time users and how the product can stay relevant throughout the interactions with the users not just at the higher level of interaction, but also at micro interaction, how it stays relevant with the user group that also this process lets you estimate.

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Summary

- Product
 - Problems users face- Managing user errors, and providing help
 - Making infrequent and inexperienced users understand how to accomplish their goals
 - Stays relevant for expert users

Cooper, A., Reimann, R., Cronin, D., Noessel, C. About Face: The Essentials of Interaction Design. Wiley and Sons. 2014.

It also let us you imagine problems which users face and how do you let your product and how do you design your product so that it let user recover from those problems or resolve those problems. So managing user issues, providing help you know recovering from error and things like that. So the process also lets you imagine your product in terms of making infrequent and inexperienced users understand how to accomplish their goals.

So the product also should be suggestive of, it should be intuitively suggested or maybe sometimes through instructional design, but it should be suggestive of you know how to accomplish goals even to inexperienced or infrequent users, people who might not be visiting the interface too often. Often in a kiosk in a bank you are not really visiting that kiosk every day, you are visiting at once in a month or once in a week.

So it is an infrequent visit to the interface. Now even with those infrequent visit, the interface should help you get a sense of how to accomplish your goals using that particular interface. So it stays relevant for expert you that is also, so people who are doing it very often like somebody in an ATM machine who is basically managing the flow of cash should also stay relevant for expert user.

So even people who are visiting interface very often that also is, the interactive product should also cater to their needs. So I hope that you now have a brief understanding of the goal directed design process. In the next sessions we will consider individually stages in a greater detail and we will see different methods which are possible across these stages, thank you.