

**User Interface Design**  
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**Lecture - 05**  
**Human Factor in Interaction Design**

Welcome students to the online NPTEL course, User Interface Design. In the previous two classes we discussed about the generic design methodology in user interaction domain. So through the discussion we have seen that iterative model is more preferred over waterfall model. Waterfall model is the linear model and iterative model where it goes back to user and user give the feedback and this kind of falls within a loop.

And unless and until the final product or the website or whatever interface is designed which satisfy the user that does not launch the market. So that is to ensure whether this product should not fail because lot of money is involved within the market launch of the interface. If we look at the web application of different mobile phone or the features of the mobile phone or any other devices which has a interface part attached with that, so that is fixed when the product is launched.

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- Human cognition in UI

✓ Lesser cognitive load on users' mind provides better performance of design



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It gets updated, the software or other things but still lot of money will be already gone when it launches the market. So to ensure the failure, to ensure that product will not fail after launching

the market, so it is important to adopt the iterative model of design. And we have discussed many iterative model of design and through Donald Norman's double diamond method, Six Sigma design processes and design thinking framework.

So all of these framework has a very important component which is the user's opinion into the design. So more and more we are going towards the new process of bottom up approach of design where we start with understanding the user. So user's voice, so the voice of customer becomes very very important. So the component here we will start discussing today will the importance of human factor into the interface design.

So when we start discussing the design process, we start with user and finding their needs. So that we also have seen in the previous design process when we started discussing. So human factor in the interaction design why humans are so important, why understanding them so important. So if you do not understand the particular target audience or our real customer's need the design and everything will be not successful when we start the next process.

So the first process will be understanding the human's behavior. So few of the things which we will discuss later when we start testing and during the study but few of the human traits how they, user interact with the interface, so here I am talking about the only the interface how people interact with the interface only in this context. So what are their probable psyche of the users?

So that we will start discussing and then we will move on towards the next tools and techniques of user's study in the next class onwards. So first few of the myths or how or it can be the how people behave when they launch when they interact with the interface. So what is the human factor component which is the most common factors of human behavior when they interact with the interface.

So the first truth is lesser cognitive load on users' mind or users' processing within their psyche. Will provide a better performance in the design. More we overload users' mind that more the decision making processes more question marks comes within the users head. The users will be

frustrated and users will not fulfill the web application. Most of the web applications or the websites provide information and it might relate to some task.

For example if there is e-commerce website so they are trying to order something from the online portal. Or if it is a train booking or hotel booking website so they are trying to book something or if it is not performing any other options. For example chat, so they will try to chat with people and then other different website perform different other job. So there is a task related to the user. So users have to perform a task.

So based on the information which is given within the website these informations in the websites are telling the user to perform the task and what kind of task they can perform using this website. They are users are trying to grasp while looking at the button and then users also have some process within their mind which is their mental model. So they have already thought about some kind of probable steps of the task.

So if that matches with the website or web application that will help them to do the task faster. The faster they perform the task the more successful the website it is. So if they cannot even perform the task or it takes lot of time to perform the task they will not visit the website if there are multiple different other options the market competitors are already available, they will go to them.

So the website will lose its potential customer and the advertisement which is there in the website will also not fetch them money and potentially it will not be successful. And when users will perform the task faster when there is a lesser processing or the lesser cognitive load is there. So they quickly understand what is the task and how they can perform the task. So if something is hard to use, this is how common users will say.

This is taken from one of the famous book in UI UX design which is Don't Make Me Think, by Steve Krug. You should go read that book in your spare time. So the common behavior of a user is like if there is some task is something some product or it can even be the interface is difficult to use they will not, users will not just use it.

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Human cognition in UI

✓ Lesser cognitive load on users' mind provides better performance of design



So this is the product launching caption of first Kodak Camera. This is the first Kodak Camera for personal use. Before that there was a bigger camera. So this is for people's personal use. After industry revolution this boom in the product design. This is one of the outcome for that and so you can see the international style, the minimal style is there that is different. But the main thing is how they wanted to portray this product.

So they are writing that, "You press the button, and we do the rest". So they are trying to emphasize that the new Kodak Camera the main feature of this is, you just press the button and rest everything is like a black box. What is happening within the camera you do not need to know and you get the best result and the best picture comes out. So there is no different process. There is just one process. You click the button and this is the function is done.

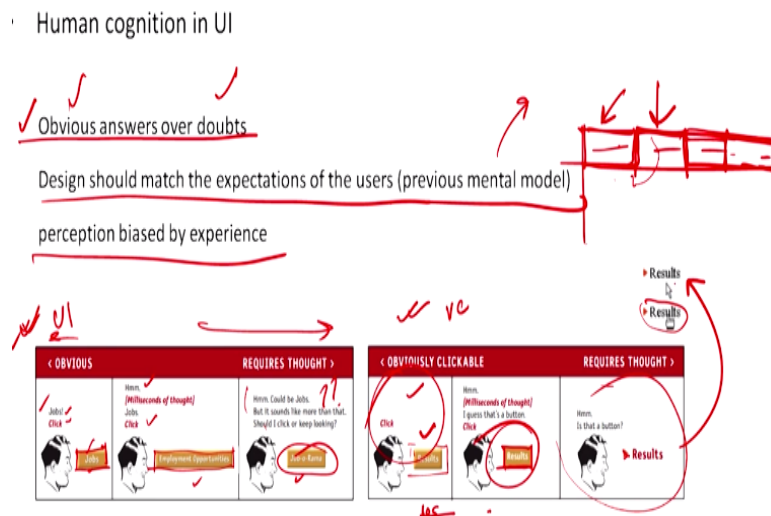
So they are focusing on the ease of use and that attracts the users the most. So if the product is easy to use, users will be happy. But on the other hand users want more and more features. So there is a optimum balance you have to perform. So even in the website users wants those website to fulfill lot of task they want and each and every task should be very quick and lesser the number of steps for each and every task is convenient for them.

So they want multiple options at the one side and users want and then they want this options or the task to be quickly fulfilled. So there is a balance has to be drawn from the designer's side. So the main thing is here when in this point which I am trying to mention is the lesser cognitive load quicker the process of one particular task better it is. Next, to achieve this most obvious answer over doubts has to be design.

So there can be multiple, when we create multiple ideas, when we think about multiple solutions there can be different ways to represent, fulfill the task, different terminologies can be there. Different type of informations can be there. But when we are segregating we are converging toward one idea. Then we should look towards selecting those options which is more obvious than those option which can create a doubt within users mind.

So if they are not sure about how this, if they click on the button what will be the expected outcome if they are not sure and which the expected outcome does not match with them we will not be able to perform the task very easily.

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So design should match with the expectation of the users. So always user have a mental model. So whenever users are exposed to a different product they will create a perception about the other product which they are using. This can be based on because they have already used similar

product or if they are not using the similar products, still based on their previous expectation they will have a perception of the product in mind.

So which we have discussed in the model of designer's conceptual model, customer's mental model and the system image this triadic relation we have discussed. So based on that they have always are expectation of how the information will be processed and how it will function. So the perception is biased by their previous experience. Their experience changes and each and every that is why different user group will have different biases and their expectation might differ.

So that is why identifying the particular user group is the first task for the designers and then analyzing what will be their behavior will come in the next process. So this is just a simple example from the same book, Don't Make Me Think. So if we just design and based on just typography of design and the UI component how we write what will be the text on the document and the visual communication component.

How we are designing the button, based on that it can be obvious or doubtful. So it can either in this side this is obvious and this side is doubtful or requires more thought. So if we just create companies HR part of this website so there is a job options. So if we just write job that will be more obvious and then if we write more redundant words like employment opportunity or we write the word so that starts creating a little bit confusion.

So user will in the first option they will just see the jobs, they will click and they will see different job profiles. And then if we write 2, 3 more words then they will start processing and they will start taking more time and then they will arrive to the decision. And if we write some obscure words something which is not so obvious and not so directly connected with the particular terminology then it will be more difficult for the user to interpret.

And then they will be confused and then there will be lot of question marks rather than obvious decision. So that was the UI component how we what we write in the button. So that comes within the user interface design and then next when we are designing the button, what kind of

color, whether there will be drop shadow or beveled edge. Then comes the visual communication design component.

So for example if they want a result and the button is like beveled which looks like a button and they can click it. So that is more obvious. So if you delete the, if it is like a flat we are not comparing the material design or the flat design versus iOS design. So here there can be a drop shadow in terms of material design. So if there is a google's material design which we will discuss what is the visual style. So visual style also differs.

They can be a drop shadow so that it looks like it can be clicked. So it is not just whether there will be beveled edge or not. It can even be flat. But if there is a drop shadow or something, some visual cue that this button can be clicked then also it will be an obvious decision. So it is not a comparison between iOS and material design, no. So if the button does not give any visual sensation that it is already clicked or whether it can be clicked because sometimes when there are multiple buttons you can also see the buttons are designed like this.

So this button if you look at this button is clicked. So because this is joined like that so we cannot click this button again so we will land on to the same page. And these buttons can be clicked. So there are different other ways to treat this in terms of visual communication design. We can treat it in a different way. So if we treat it properly, so if there is a difference between these two buttons so that becomes obvious solution.

If there is no difference so if we design like this and if we do not know which button is clicked so everything looks same then it falls under this so whether we click it so they will again click the button and they will be more confused. And if this button does not even look like a button, for example it looks like a dropdown or something then they will not even understand.

So if the only solution if they by chance mouse over the button, the mouse only comes on that then it can be like a hand and then they can understand whether okay we can click it. So otherwise they will be missing this button. So this also creates lot of confusion. So based on visual communication or UI UX design component how we were designing. So you always need

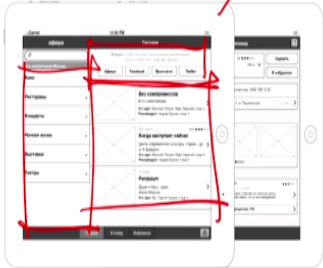
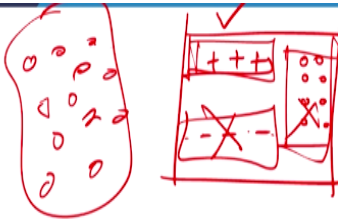
to think about the, you have to provide them the obviously solution and obviously function so that their mental model their expectation and the function matches.

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Human cognition in UI

- ✓ Clarity of information displayed
- ✓ User seek a pattern of information



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Next is when many of the times we have to provide lot of informations because I was just telling that their expectation from a particular website the function of a particular website or the product the expectation will be more. So they will expect the product to function, perform different task. For example if you see the first initial mobiles were just to make calls. Now the mobile phone includes watches.

It includes many things which was not envisioned earlier as a performance task of the mobile phones. Because the user wanted or expected many task to be performed by a small device that is why this features got added. So they will want lot of tasks to be performed through a single website but they will want a very clear and small step for each and every task. So the information what you need to provide will be more and more if you want to cater to different task.

But when we are showing the information the clarity of the information displayed has to be there. That is the main focus and we will discuss how to achieve clarity and how to do all these things in terms of visual design and UI UX design when we discuss that particular subject. But what user want from their perspective is they seek a pattern of information. So when there is a



different information is there if there is no link within this information they will be lost within the information.

If there is a one type of informations are placed in one side, another type of information is another category and other type of informations are placed in one part of this webpage then they will understand okay this is the type of information here. This is another type if information and this another type of information. By looking at different option they can negate what they do not want and what information they want. So just scattering the information will not work.

So there has to be a pattern within the information. So in better design you can see a particular type of information will be clubbed in a particular side, another type of information. So there will be different parts which will give you similar kind of information so that the user can interpret the information in a better way. So there are many other ways to club so we will discuss just as principles and other visual cognitive principles to achieve this and how visual design can help, UI UX design can help in this, we will discuss that.

But the thing is the user want a pattern of information. Otherwise they will be burdened with the plethora of lot of informations. They will not able to perform the task.

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## Human cognition in UI

Clarity of navigation,

elimination of redundant information and steps



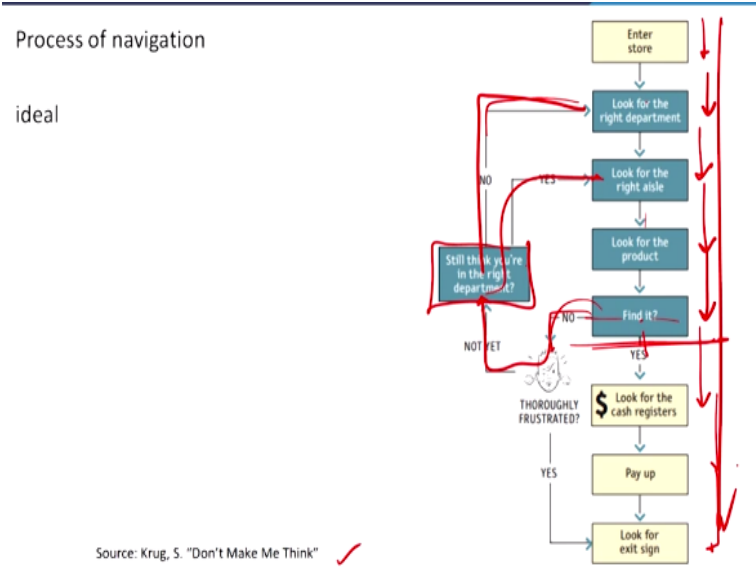
And within this information also they want clarity of navigation. So how do they want to navigate their eye and how do they want to perform the next task. That is also important or also this is clubbed with a clutter of information. More the clutter, difficult for them to navigate within this. So elimination of all redundant informations and steps are very important. So within that if the one word can solve and one button can solve one stage can solve the task, we should definitely look for that.

So deletion of data has to be there. So more the data more the eye will be, they will not read the data. So what is a design for is to look at all the data but they will not. They will just look at few datas. What they are not looking at they act as a redundant information and that function will not be fulfilled if they are not even looking at it. So there are processes of understanding where they are looking at, where users are looking at their theories, also they are testing like eye tracking process.

So users eye can be tracked. Whether they are looking at a particular site or not. So there are eye tracker equipments for that. We will show few examples of eye tracker analysis in later classes. So redundance of information more clutter of information creates difficulty and the stages also if there are difficult stages they create difficulty. Especially for the first time users. First time users will not know what is, how it will be performed.

Subsequent visits can give you a better performance but if these two matches, if the first time and users perform like a subsequent visitors then that is the best solution. So they will know, their expectation exactly matches with the what they are looking for.

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So this is from the same book, Don't Make Me Think. So this can be compared, so this process of navigation in UI UX can be compared with the navigation within a space in architecture. So within that we have around us we have lot of buildings, informations, navigational signages. Through that we can navigate within a space. So similarly the interface between these human and computer help the user to navigate within the website.

So they act as a signage and directional signage to where they will go to perform the particular task. So this has been compared like a store. So they enter a store and then they look for a particular department and then when a user visit a store so they have some particular product in their mind. Then they look at the particular department. Then they look for the right aisle whether they are on the right aisle. They look for a particular product.

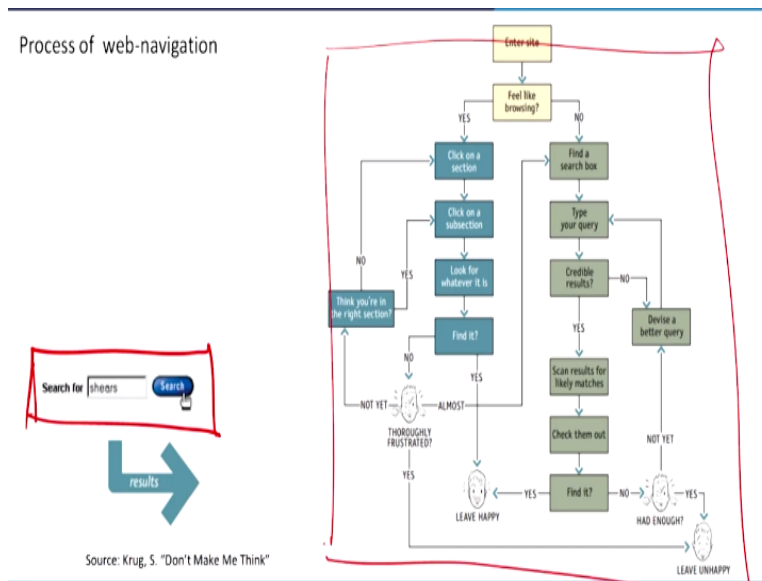
If they find it, then yes they go for the cash register, pay and then exit, it is successfully done. Or if not then they, if they do not find it in the aisle then they go back and then they start again from still you think you are in the right department then they go to the right department's aisle or if they do not think then they again go back to the previous the broad holistic to the store level and then they start processing it again.

So this is you can compare this process of earlier shopping the traditional method of shopping right now is there in the e-commerce website. So we go we see what are the different brands are

there then different typology of products and then we start going to the next to next level of interfaces. So if we do not find that we will again go back. So if the design is proper this will be a straight line and it will be the quickest process.

Interaction design is design logically and the steps are very easy to perform and it puts lesser cognitive load on the user. It will be like this and otherwise there will be lot of confusion.

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Now within the store there is a helper to help people. But within this interface design there would not be anybody to help the users. So that is why within this store this is again the example of a store. They have a probability to ask people. And then they can always crosscheck. But within this e-commerce website and most of the webpages there will not be anybody to assist them.

So there will be if the design is very complicated and the clarity is not there, the obvious options are not there and it is not performing the way they are expecting, it is not matching their mental model then they will be puzzled within the website. So chances of getting puzzled within a website is much higher and they will not be able to solve their problem because there is nobody to help them. So this is how it has been designed.

So that is why there is also a search button where this particular terminology or what you are looking for is there. But search, more they use this search button, so this is not a good website.

So if the website performs without the search button it will be a better design. So if all the time they have to type something on the search button to identify where exactly they are, so that the website is not performing well.

So I am not talking about the search button of e-commerce website because in e-commerce website we search the product. So that is a essential part of the search button or the flight search. So these are the websites, different kind of websites when the search button has to be there and which the performance of the search button is different and we will also discuss the position of the search button in that case. So they want the people to search.

Otherwise in terms of other websites for example institute's profile page, the website of a particular institute or website of any company, so there people should not go for the search button to identify whether there is a job profile or search particular domain of this, a particular hierarchy within this information page. So the webpage should be self-sufficient to help users to navigate within the page.

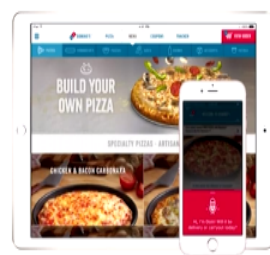
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## Understanding the users

Target Audience:

A particular group of users, who will be using the product/ interface design



Customers, who will be ordering pizza via online web-application

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So to identify when we are discussing about the users behavior, their commentaries the important part is identifying the real user. So this is called the target audience. In the next class we will start discussing about after identification how we exactly pinpoint who are the user how we find out

what is their behavior and how will they perform. But in today's class we will end with the discussion of who is the customer. So they are called target audience.

A particular group of user who will be using the product in terms of it can also be interface or tangible product. So that group of users are called the target audience. So for whom we are designing the website or designing any interface. So if we give an example it can be very defined target audience or it can be even for all. So that depends on the company or what kind of website it is. For example if it is irctc its target audience is huge.

Most of the Indians who travels through train in one particular certain time most of us have travelled through train and this is the only website, one of the most commonly used website. There are competitors but irctc target audience is much more if you compare with that of a Dominos website users. So Dominos target audience will be only the customer who is ordering pizza via online web application. So that defines the particular user's behavior.

So Dominos has much more defined set of users. So they have a particular behavior and instead of irctc they have a vast range of people to cater. So their behavior will change. So they will have different kind of expectations and there will be more uncertainty into the behavior. But Dominos has a very particular target audience who will be ordering pizza online. So their set is very defined.

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## Understanding the users

Target Audience:

A particular group of users, who will be using the product/ interface design

Potential target audience: Added features to cater to need of different user groups



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So that will differ based on the type of company and what we are designing for. Now there can be a potential target audience. They are not the exact target audience but if we change our product they can be within our target audience. If I give an example of a car so when this nano car was developed, so existing target audience of the car user were not exactly the target audience of the Tata nano car.

Because they were looking for a very low cost car and they wanted to target the two-wheeler users. But not exactly two-wheeler users because their expectation will also be different. The performance of two-wheelers are different, if some people might be fascinated about the two-wheeler driving so this is different. So there was something in between the target audience between the two-wheeler users and the four-wheeler users. So there it will overlap.

So nano might be somewhere here. So the target audience might not be the again somebody will be a potential target audience who have never used that particular product. Even for iPad when apple first launched the iPad it was not even there in the market. So identifying a particular target audience based on existing product is difficult in that case.

And even in the case of when the product is adding some new features to cater to different type of users which they are not right now catering to. So identifying them so who can be a potential target audience might be a different task.

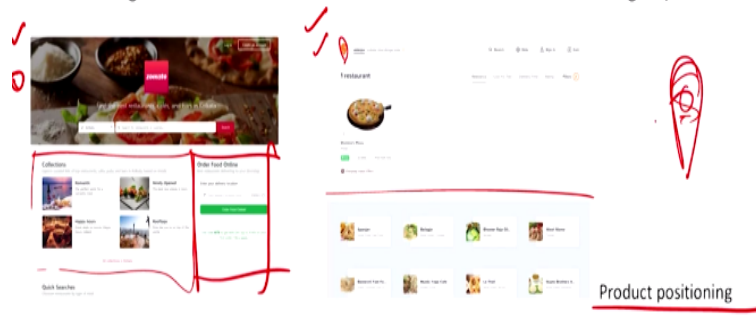
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## Understanding the users

Target Audience:

A particular group of users, who will be using the product/ interface design

Potential target audience: Added features to cater to need of different user groups



So that is also based on the product positioning, how we are positioning the product. So how the same kind of product or same kind of websites can be positioned in a different way so that their target audience also might shift. For example if we take Zomato and Swiggy, right now they perform in the similar task. But the way Zomato project the company and where Swiggy project the company they are different.

Because Zomato, the first key features of Zomato is giving the review of the different restaurants, I am talking about the menu, what are the different chains and customer review, that is the first and foremost task of Zomato and Zomato is designed like that. And then there is another part which is added which is you can order food online if it is the possibility is there. But within Zomato everybody knows that within that there will be lot of restaurant which will not give you the online order.

So Zomato does not only cater to those who gives online order. So Zomato position themselves in a different way. So based on that the potential target audience will also change and the customers expectation from the company will also differ. Because when they are launching in the Zomato website if they are already acquainted about the Zomato company and their brand image they will expect some different kind of task to be performed within this website.



And then the Swiggy on the other hand their main thing is ordering food online and they will deliver it. So Swiggy also that is their strong point, to deliver, faster delivery and that is how the company evolved, to locate the, so their logo is also like this and which gives a kind of a identity of a location and wherever you are so they will deliver the food. But now Zomato also performs the same task, Swiggy also performs.

But Swiggy is more defined into only this kind of task which they will just deliver. So that is how the expectation, there can be similar people when they interact with two different product their performance, their expectation and their behavior will differ. So that is how the positioning also changes the target audience behavior and how this product has a image on the people.

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Kano Model

Model of customer satisfaction, [Noriaki Kano, 1980s]



And now let us discuss another model which is given by Noriaki Kano in 1980s which is called Kano model and which is the interface between the product and the customer and how the performance of the product and the satisfaction level of the customer varies. Now this model is there is x and y axis. So in this y axis this is portrayed that not implemented features to fully implemented features. So more and more features towards product is in this side.

So more and more products are having the same features are on this side. So it can be the early mobile phones, it can be the new mobile phones. There are lot of features implemented within that. So this comes in this axis. Now customer's satisfaction and dissatisfaction is plotted in this

direction. So it is 0. So customer has a neutral opinion and then dissatisfied and satisfied. So this is the performance for a bare minimum performance.

If the product performs okay and neutral so this will go through this line which is at few of the features, 50% features are implemented and customers are more or less it is not satisfied or not unsatisfied. Now this is if the product has more features the features over here and this has the satisfaction rate is over there. So this is called delighters which will be above this line and where there are less process, less numbers of features implemented and less numbers also is performing well, so customers are satisfied.

So this line is a delighters line when customers are delighted. Similarly, this line is a basic need or the when the customers will not be delighted at all. So this line is the bare minimal performance. Otherwise the product will not even be sold. So features are less and then gradually when this is going for the more and more features are implemented still customers are not so satisfied.

So more features will definitely lead towards more satisfaction but still it will be on the same level because features are not performing better. So performance is not pushing towards the satisfaction. So features are there but it is pushing toward the satisfaction level but still this is not crossing to the basic need and over the period of time this delighters fall back and then they become the basic need.

So more and more typology of more and more features are getting if the features are getting implemented more then these curves comes down and delighters becomes basic need. So over the period of time if we see the, take the example of a mobile. So right now we give the earlier versions of Nokia mobiles. So people will not be satisfied at all. And now we need more options but each and every options has to perform properly and then will be satisfied.

That is why the delighters are falling back within the need. So the basic needs what that time was and so there is a need of customer and this is the desire which customers wants but which is not the basic need. So over the time when the desires are added in the most of the competitive



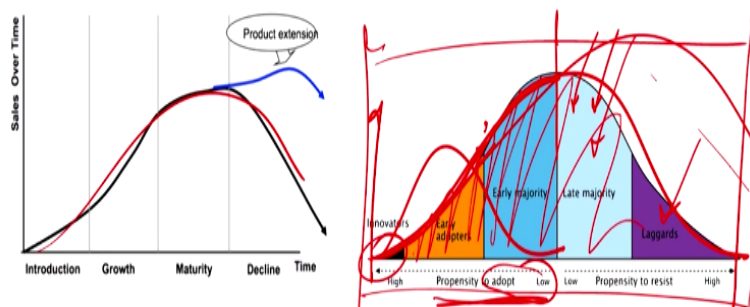
So the sale overtime or the more the number of people using the website and this is the time. So this is the time line. So first it is introduced, few of the people will be used and then there is the growth rate when the marketing started and there will be more through word of mouth or the few people will be using they might tell the next set of people, so there is a growth phase. And after that when there is a no change of the product we are talking about one single product when there is no change. So it will fall down.

That is why the new generations of mobile phone and new other products and website also changes its look and different features get introduced within the website. For example Facebook introduced their timeline and it always they try adding new features within different websites. So here when it starts to fall down, so designers and management people should envision that. Should be aware about that when this customer's expectation and the product's performance is not matching.

So the product has to be extended. Or product should change their features and then another curve will start and then when again it is falling back then it should again shift, add some features or change iterate or modify the features for a steady growth.

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Product Life-cycle



So based on product life cycle because of this kind of users acceptance of the technology or the new product or new website this kind of fallback also happens. So first the innovator only it is

confined within the innovators or the designers. They only use that and based on the propensity of the adoption, the early adopted uses the new features of new websites, new web application. So they are the early majority then the next phase is the late majority who has a little less adaptability or little less to adopt.

And then the people who are resistant on the new technology or the new website. They start also adopting the new website when everybody is using. So they start using when this becomes a norm to use, then they start using that. And then the laggards who adopt the new website or new features very late. So this is how the percentage of users changes over the time. So it creates a bell curve so designers and management people can understand where is the product right now situated.

It can be a very small bell curve based on the features of the product and novelty of the product. Or it can be a bigger bell curve based on if the product is very novel then it will be a bigger bell curve. So the next class onwards we will start discussing how to profile the customer and what are the different tools and techniques to understand what is the need of the users. So right now in this class we discussed about why users are very important for the business.

And if it is a product, tangible product or even if it is an interface, users play a pivotal role to determine whether this website or interface will function or not. So from next class onwards we will start discussing the tools and techniques to understand the user need.