Product Engineering and Design Thinking
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Module - 08
Industrial Design, Design Entrepreneurship and Design Thinking
Lecture - 36
Design-Driven Innovation

Welcome back to the course on Product Engineering Design Thinking. Today, it is lecture number 36 and it is a module 8. Today, we will be discussing Design-Driven Innovation. Now, from the very beginning, you have understood that when something is being said driven, it means that a special emphasis is being placed on it, of course, it is.

And then, we will see that not like the common belief that all the innovations are only just by improving on technology alone is not really true. Because from the existing technology or state of the art technology also based on the innovative design or rather radical creation of a meaning in a product and the design, they are of offering can be made, which actually drives the customer to a sense that they should own it.
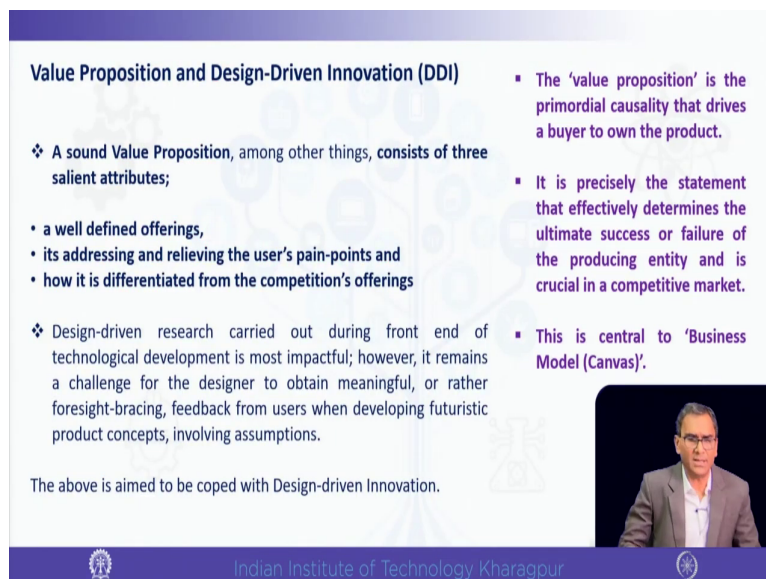
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Now, we will go to that detail subsequently, but then here we would talk about this the context of the importance of this innovation on design driven innovation in the overall perspective of value proposition. The value proposition is all the very important thing because after all at the end of the day, this is what attracts or motivates the customer to consider why they should possess something, buy something, pay for something.

So, what value is being proposed? That is the important question. So, in whenever any organization is trying to create a business, manufacturing, engineering, any oriented, then the first thing is what it is going to do, what is going to serve, how it is going to solve the problem of the customer. So, that comes the where comes the value proposition. Now, we will talk about that, then we will discuss briefly on how the strategy of design driven innovation is varying from that one of the design thinking we discussed.

Particularly focusing on creating meaning in a product like the Apple created a new meaning of listening to music on the go with the iPod or many such examples. We will talk about the DDI steps design thinking Design-Driven Innovation steps. We will talk about the examples of this design driven innovation cases.

We would talk about the paradigm in design discourses with exemplification and also, we will examine whether this design driven innovation can be interfaced with or coupled with some other existing or available paradigms, methodologies like say design thinking or technology innovation together. So, if we can do that that also we create another mode of or paradigm hybrid paradigm and then finally, we will talk about to what is the action plans or steps or road map for design thinking, design driven innovation.

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So, with this preamble let us go in. And so, here as we mentioned that the value proposition as I said is the value proposition is the primordial causality that is the first reason primary reason why that drives a bar to own the product. It is precisely the statement that that value proposition statement is precisely it determines the success and failure of the company because it states and also to be remembered as I just now had said that for a business it is important.

So, this is central to business model or particularly if we talk about structured framework, we can call it business model canvas. It is actually the central piece in the business model canvas. We will talk about that. We will talk about the business model canvas its value proposition component etcetera in a subsequent lecture, but today what we will do is we will talk about the value proposition the sound value proposition among other thing consists of three salient attributes.

They are well defined offerings; it addresses the and relieves the user's pain points and how it is differentiated from the competitors offerings. Now, design driven research this carries out carried out during front end as we said that the front end is very important and always it is so because the concept gets determined there and it is most impactful at this stage.

However, it remains a challenge for the designer to obtain a meaningful or rather foresight blessing feedback from users when developing futuristic products and concepts. Because it is a futuristic so, the customer may not fully be aware of the requirement we will give talk with the examples or quotations of Henry Ford or Steve Jobs to see why it is important we will go to that.

So, how this futuristic view points or assumptions how can that be handled when they have not much exposure in that area yet. The solution is proposed to be through design driven innovation.

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Now, we will see what is this? Now, design thinking as we have seen is focused on the stated or explicit needs because customer tells what the needs are what the pain points are and accordingly the products are developed. And they it is argued that assumptions are not easy to validate before product launch. So, the one solution is that ok if an MVP can be created then through that certain validation happens and that is possible.

But when it comes to implicit needs or unstated needs that is the that is the move on, but it is not expressed unexpressed. Then it comes the design driven innovation comes into play which says that we have to go in depth research and find out what is there and how with the available other resources we can address those futuristic issues. It is I will explain that. So, it is focused on implicit needs generally which has not been well stated.

Realize that the worth of a product is by orienting towards individual's experience and not by imposing technology. So, basically just assimilating certain technology and make an offering is not the desired outcome. Desired outcome is when the user experience it in a favorable manner and wants to buy it. Though they begin with the same user perspective both design thinking and design driven. But the user research customers have limited engagement as we said in the case of former that is design thinking.

So, for what we can see that this design thinking or which is called Human Centered Design or HCD. The strategy is outside-in that we take outside view and try to put it in the organization or its activity or in design internal design discourse or it is in design discourse. So, outside-in is the approach in design thinking whereas, in case of design driven innovation it is inside-out.

That means, how this inside out is possible? It is not ignoring the customer's viewpoints, but also to conduct research and create knowledge base enhance knowledge base acquisition of knowledge. Through that some enrichment comes and through that the thought of creating a design that solves or would solve a problem that the customer has not anticipated yet.

But through that in depth analysis study and cognition and through research that problem is found out which we call implicit need. And that is what differentiates the design thinking and design driven innovation. But let us not forget both are ultimately customer centric. Now, we have discussed that DDI mainly would be working around the implicit demand, implicit need.

And then it is actually creating a meaning, it is just not assimilation of technology or it is just not a set of function or features, it creates a meaning why? I mean what is the purpose of it? The question of purpose why it is this, why it is to be built, why it is to be built to solve a problem, why the product is there that is the question.
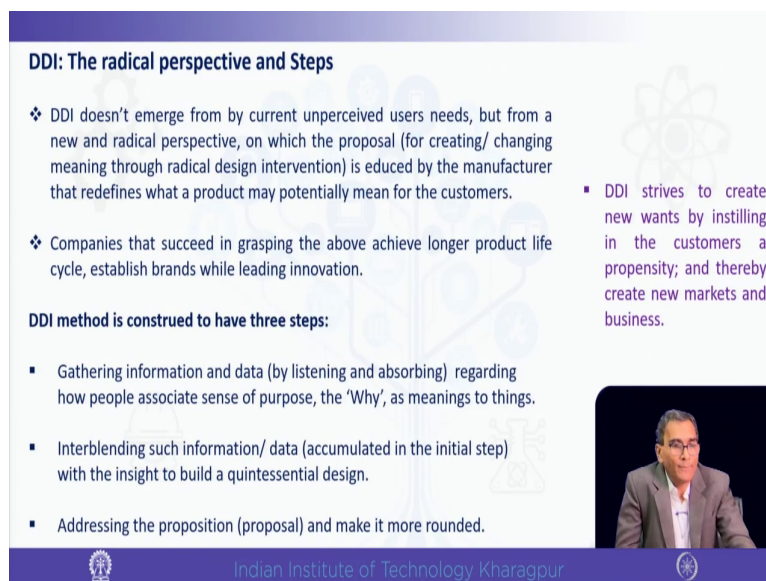
The focus of this design driven innovation which is radical in nature, it is not incremental per se because we are going in depth and trying to find out the requirement through research and the also the technology options, resource options by research. And due analysis and critiquing which is done or very true, which is not very categorically stressed in design thinking approach.

So, consequently DDI aims to address the users in inferential motives and provide meaningfully outputs or products. So, here we can say that it can be considered also a design

driven strategy or rather it is a kind of a design push strategy, it is a push strategy, design push strategy. There are other tools which of course, which actually is called design driven innovation by Roberto Verganti besides the other two very commonly available strategies called market pool strategy and technology strategy or tech strategy.

So, and also, we will let us not forget that the world is now having a shift of transfer between physical product and digital product meaning products which where physical is now becoming digital and many digital applications are also having its physical configuration; the challenge driven remains in this to add value to create a new meaning and experience a new result out of this redesigning.

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This is the radical perspectives and steps. The radicality is this that they to create and change meaning the meaning of the product why this why part or the purpose is the main question

and is induced by the manufacturer that redefines what a product may potentially mean to the customers, what it means, what a music system would mean, what a car would mean that is very important.

What a dining in a restaurant means, is it just eating food or it is creating a meaning, maybe a dining would create a memory in a restaurant or a coffee shop. So, that is what perhaps you have heard about companies like say Starbucks and here in India we have Cafe Coffee Day and so, that they actually are creating that experience and so, they are creating a meaning out of their service.

Similarly, here we are talking about the product. Now, the method DDI method is having three steps first is gathering information and data by listening and absorbing regarding how people associate the sense of purpose, what actually it has to do, how why they will hire the product to get the job done, why or as meanings of things this is called meanings of things. Interblending such information or data accumulated in the this step with the insight to build a quintessential design.

And then to create a more rounded proposition is the third step. So, design driven innovation tries to instil in the customer propensity that the buy and create new market and expand or create a new business.

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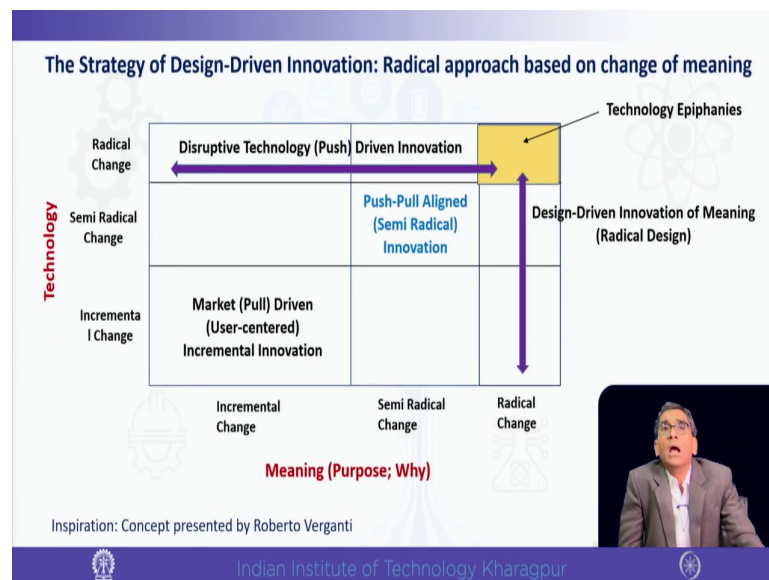
Here it is you can see the strategy of design driven innovation a radical approach based on change of meaning. Here what you see is this that there are if we say that incremental change and then you see there is a radical change on the other side. Here the in between there is a semi radical change.

So, you would perhaps notice that radical changes are relatively lesser compared to incremental changes. So, that kind of a known approach has been considered in this diagram. And here you see that the when the radical change in meaning and radical and disruptive technology that is pushed that is disrupt the market. The current the new product is bringing that disruption in the market, replacing the old products and creating a new market for itself that is disrupting called disruptive technology.

And this technology is a push and or it is a push driven innovation. So, when these two things coincide it creates a according to Varganti is a it is called technology epiphanies in this yellow region. But in other regions also you see that incremental innovation happens or push pull aligns. Sometimes what happens is also a thing that it may not be entirely on market pool or mentally or not be technology push, but based on some created technology some alignment is shot out now that how that technology can be used in a particular market.

So, there the alignment comes similarly for a market pool how the technology can aid it further. So, that kind of alignment happens particularly for the technology pushed kind of a thing where one has to look for the market. So, the at alignment, which also yields result.

Now, here on one side you see the y axis you see the technology and other side what you say that is the purpose or why that is emphasized, which is expressed in term of the Varganti called meaning the meaning of a product it gives a meaning to the product. Here and also when you are saying meaning as we had already discussed about or will be discussing about the this user experience that also will go together that meaning also has that flavor in there.

Now, here we will go to certain examples we will take the example. So, example of a Fiat Panda why Fiat Panda? Because this is a car model which has lasted for 40 years it is the and when a product continues for that long after 4 decades it means that this continuous the thinking on my customer will need to borrow is always being considered and that is the essence of design and driven innovation.

So, let us see how it is doing it. Now, in case of this thing that according to studies its design, consideration based on high degree of rationality and accessibility and it incorporates smart solutions for practical utility, versatility and use of use at an affordable price among its amongst these are the products and product portfolios.

So, affordability aspect also is there why because it provides a sense of value we will come to that part before that let us see what this Fiat Panda has done. If we look at the design

innovation features as below it has created a visibility enhancement; that means, they have made the you know the panels thinner or smaller narrower rather narrower and the glass part is more.

So, it gives a no 360 view of the you know of the environment. So, when one is inside the car it is its visibility is more it gives a it gives a different kind of meaning that someone is in that environment is a part of that it gives a meaning designing uncluttered interior the car is small.

But how this spaciousness is being filled that is what is the consideration. So, it is not a new technology always it is a design aspect that is coming in the floor how do we design. So, that a new meaning is being created out of the available technology solutions.
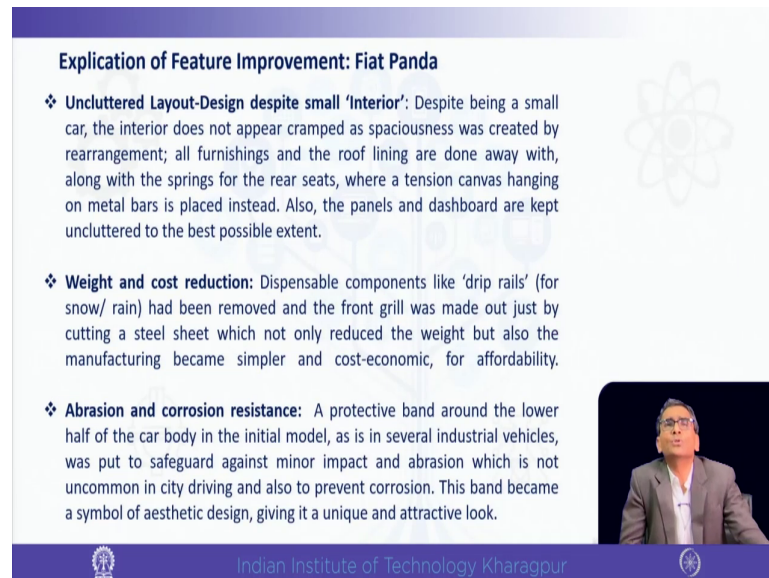
So, uncluttered interior how it has been done we have listed it out you can read it later in detail which you will find in subsequent slides I will show the slides, but we will pass through because those are detailed out weight and cost reduction by doing say removing the rail on the top of the car. And where which is used for the snow and rain, but if it can be removed that weight will be lesser and there are few other things had happened so, it reduces the weight and cost.

There is a electronic braking assist at the at within certain distance which is quite progressive at that point in time it will give a through a leader a sensor the assessment that ok a car is closed. So, accordingly the action is to be taken. So, electronic braking assist, electronic communication connectivity because now everybody feels that everywhere it is a should be connected all over.

So, we will show how they did that. Electronic communication connectivity in building now during COVID the what they did is a full just sanitizing system they implemented, including the you know purification, air purification and sanitizing activities. And finally, they have again that vision continued that first (Refer Time: 22:56) and develop through design is that

HV versioning that through the continuous design discourse intervention it has been achieved.

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Here what I will show you these are the you know details I did not read out the details, but I have already explained what are these. As I said that drip rails were removed in case of wetted cost reduction. The unclutteredness you can see that briefly I am saying that that created by rearrangement, wall furnishings and the roof lining are done away with along with the springs for the rear seats.

Also, the panels and dashboards are kept uncluttered to the best possible extent. So, it gives us sense of spaciousness for this abrasion corrosion instead of what they did was to have a protective band at the lower part of the car. So, that if it slightly rubs then also there will be no scratch.

Incidentally that becomes every you know I would say attractive design symbol people like that lower part with that band and that gave some attractiveness although it was intended for you know scratch resistance, abrasion resistance and corrosion resistance, but people liked it for other reasons too. So, that became a thing.

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Electronic break assist I have already discussed that the leader sensor where the range is 12 meter. So, that it detect an imminent impact and apply breaks. Electronic communication connectivity here I would just like to touch upon few points for reasons is that a communication connectivity became a vital requirement in this model in its segment was first to provide a Cradle Smartphone Holder, which we see in many cars today and a navigation feature which was created by Waze.

And then a feature into an app that app was created by you connect with a building Wi-Fi that was created by wind communication. Now, you can understand that these are the things created by other companies the technology was developed by other companies technology is available they have not run for technology they are available technology they assimilated it in a meaningful thoughtful way. So, that it actually creates the meaning.

So, at the sanitization part I have already said and interestingly it the sanitization module is called D-Fence, which has been created by the parent company that FCA that is Fair Chrysler Auto automobile and so, you understand all are the basically kind of thoughtful intelligent assimilation, but it has created a new meaning this assimilation has created new meaning. So, that is what is the objective.

Similarly, the app talked about the HEV versioning also now this is the new consideration that is coming in the electric car world and the auto automotive world. So, concept including product architecture and component sizing a different this again the component sizing of different size and shape of this when its hybrid then it is not only ice engines. Then it is also it is ice engine as well as motor so, electric motors and batteries.

Now, what they have done is that we have got it from the existing range with some modifications minor modifications. So, that it down downscale dependence on technology and making it design driven. So, by sizing of the motor and engine, which is not going into the (Refer Time: 27:14) of technology, but by sizing the engine that is designing that engine configuration the objective is being realized that is the idea or a nicety of a design driven innovation.

An example: Genesis of 'listening to music on the go'

❖ Prior to iPod, endeavors of the companies, to advance in the pursuit of 'listening to music on the go', was by technology substitution; for instance, only replacing the MP3 player instead of a CD walkman.

❖ Notably, the Rio PMP 300, first portable consumer MP3 digital audio players of Diamond Multimedia Inc., was with limitation that could contain only 30 minutes of music, stored in a 32 MB device, however, it was much smaller than a CD walkman and obviated the need of carrying a bunch of CDs.

❖ Subsequently, 'Diamond/ MP3 Association' developed the software, and yet it was meant to get digital content onto the player. It was not central to the immersive experience of listening to music.

❖ 'Apple Inc.' recognized that existing solutions were mere technology replacements and strived to develop a product with a new meaning.

▪ Steve Jobs at Apple, keenly listened to and observed the industry and interpreted a new meaning for digital music with "a thousand songs in the pocket" solution (iPod).

▪ Diamond Multimedia acquired Xing Technologies, for the hardware, besides the online music publishers, GoodNoise, MP3.com and MusicMatch, to emerge as 'MP3 Association'.

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Now, another example is that I have just told you that I talked listening to music on the go that was created by Apple, Apple and the iPod today all you know that what it is, but prior to iPod endeavours were made to achieve this we had the walkman CD, CD based walkman and then only replacing the MP3 player then what happened the technology substitute should happen and the walkman was replaced by the MP3 player.

Again we have to note the Rio a PMP 300 the first portable consumer MP3 digital audio player which was created by Diamond Multimedia then diamond ah became MP3 association with the merger of few other companies like say music match or say good noise or say hardware company Zinc Technologies and they created MP3 all together they wanted to do this.

But the limitation was that they could create, but and they could create, but the limitation was about 30 minutes of music could be hard and the capacity was 32 MB that the device was that.

However, one thing must we must say that it was smaller than the CD Walkman and obeyed the need of carrying so many CDs. And as we said that diamond and MP3 association developed the software and yet it was meant to get digital content onto the player.

It was not truly still that it was not still central to the immersive experience of listening to music, which was discovered could be you know keenly observed and thought properly by Steve Jobs at Apple and he listened to the market to the industry and thought with the foresight the company and Apple recognized that existing solutions were more technology replacements and strive to develop a product with a new meaning we will see that.

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And here we see the Apple solution enabled users in converting their music bouquet to a high quality digital format legally purchasing digital music flexibly and affordably managing digital music libraries, storing much more songs on a single device by tapping into the latest information storage technology that is the you know hard disk which initially was available with 5GB or 10GB options.

Why 5GB or 10GB options? We will come to that because it was actually not developed for this iPod, but it was the hard drive that was developed for the then laptops. So, those laptop hard drives were thought say this is that. So, that hard drive was given a new meaning when it was brought here it was not from scratch one was drive developing a hard drive, but it is to find the meaning of the hard drive how it can be used so, here and just got simply chasing technology.

So, playing on the hard drive what this did they made some little change with the co-created with the vendor and that is why this 5 GB or 10 GB was there, but it created a meaning that meaning could be interpreted and such was created by repurposing the hard drive that was co-created I say with the vendors and create the suitability with this co-creation.

And that became the radical differentiator that is what is important and it was a trail-result and that permitted interestingly that caption came a thousand songs in your pocket. So, it gave a new meaning it is just not a just not a music system or it is not just listening music it is 1000 songs in your pocket. So, it keeps a different kind of freedom, flexibility, a meaning, a purpose of listening music etcetera.

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So, here we would talk about the design discourse proposed by Veraganti and also we would just point out that how Apple implemented it and. So, what is that this listening acquiring

knowledge for gaining insights for possible product meanings. Then interpreting - developing vision and proposition of new meaning referred to as proposal addressing - disseminating and sharing the vision with other networked interpreters I am using a term called interpreters.

So, we will see what is that interpreters and influencing. Now, what happened due to this creation of new meaning the approach the new meaning it this approach was design driven approach was used across other products like say MacBook, iMac, iPhone that is which is the smartphone.

These products embodied the tools that help users manage and tag along the way of using digital things. So, it has changed the way people look at digital things. This led an our technology fannies that go beyond technology substitution it is not merely mere technology substitution it is coming from the original design thinking or driven concept.

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Another example quickly I will just look at is this is the Nintendo Wii where technologically advanced consoles were already available with Sony PlayStation and Microsoft Xbox. But what actually the did was they tried and find out that those needs expertise and expertise in the doing the game and it is not that many people could play together in a family as a family.

So, that is the concept it is just one technology that is a concept that was brought in the design concept brought in. So, in the case of design thinking or in other words design push strategy design pushed as I said the innovation is driven by the engineering to cognize, foresee and effectuate the creation of new product meanings. The uniqueness characterized in consequence of the meaning and the design language is more impactful than with the functional conformity and technology.
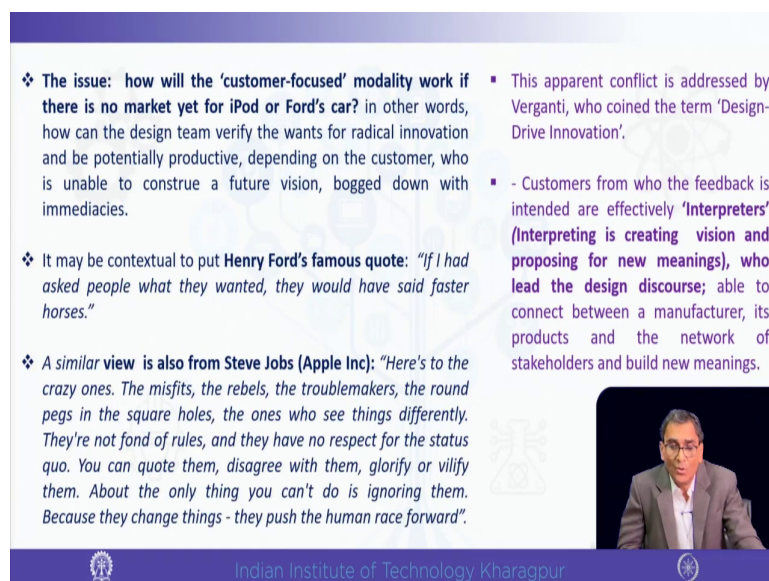
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- ❖ **The issue: how will the 'customer-focused' modality work if there is no market yet for iPod or Ford's car?** in other words, how can the design team verify the wants for radical innovation and be potentially productive, depending on the customer, who is unable to construe a future vision, bogged down with immediacies.

- ❖ It may be contextual to put **Henry Ford's famous quote**: *"If I had asked people what they wanted, they would have said faster horses."*

- ❖ A similar **view** is also from Steve Jobs (Apple Inc): *"Here's to the crazy ones. The misfits, the rebels, the troublemakers, the round pegs in the square holes, the ones who see things differently. They're not fond of rules, and they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can't do is ignoring them. Because they change things - they push the human race forward".*

- ▪ This apparent conflict is addressed by Verganti, who coined the term 'Design-Drive Innovation'.

- ▪ - Customers from who the feedback is intended are effectively **'Interpreters'** (Interpreting is creating vision and proposing for new meanings), who lead the design discourse; able to connect between a manufacturer, its products and the network of stakeholders and build new meanings.

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Here we would see the issue how will the customer focused modality work if there is no market yet for iPod or Ford's car. What will happen? How can the design team verify? In because if something is not there how can they verify the whether, something would be you know how will they be able to comment whether it is required because they do not have any experience because they are always immersed with this even DSE emergency problem is exigency.

So, they do not have the time or idea to look out and look for what tomorrow would require. Here one thing I would like to tell you here the interesting thing is that I would put the quotation of two persons as I said in earlier that what the customer would say it is not too undermined or thing that customers will not be able to give enough focus, but then that also is limited to some point in time which is compensated through design driven approach.

Now, what Henry Ford said if I had asked people what they wanted they would have said faster horses; that means, if faster horses are there it it is to solve the problem, but they would not say we need a car. Similarly, Steve Jobs said here is the crazy ones the misfits the rebels the troublemakers the round pigs in the square holes; that means, who does not match with the traditional concepts the ones who see things differently they are not found fond of rules and they have no respect for the status quo.

You can quote them disagree with them glorify and vilify them about one only one thing you cannot do is you cannot ignore them because they change things, they push the human race forward.

So, there lies the concept of both Steve Jobs I read the quote I just read the quotation you can read it because you do not have to remember quotations, but then what you is get from this is that one has to think a step ahead it is no way saying the customer is not to be considered or their viewpoints, but then also there is a one step ahead that has to be kept in mind.

This apparent concept has been solved that if the customer cannot say the user cannot say what is required and, but that is required for futuristic product then there is a conflict how that
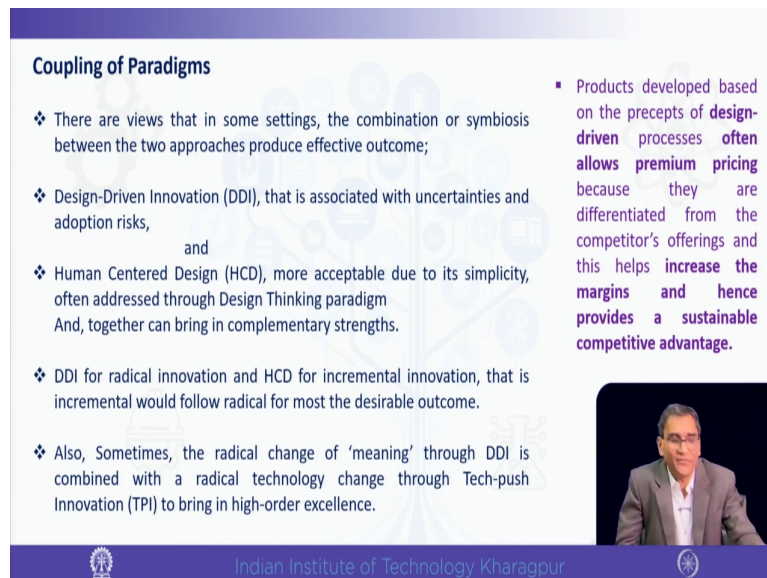
can be solved here Varganti has a solution he has a proposal he said that the customer here comes in the form of interpreter as remember I asked you to look at the word interpreter.

The customer from who the feedback is intended and effectively interpreters who is interpreting is creating vision and proposing for new meanings that is called interpreter interpreting creating vision and proposing new meanings who lead the design discourse are the interpreters.

So, we have to get find out so many those interpreters who can give those feedback the interpreter can be the designer himself the organisation itself like in case of happen it was Steve Jobs and Apple Income inc. So, for a car it was a Henry Ford. So, these are things similarly when compared to this Toyota when Toyota came it created its own this thing again the same thing happened.

So, the suggestion is that to create a network of stakeholders and at those who would build new meanings they would come as interpreter who would connect between a manufacturer its products and all these stakeholders.

So, now as I said the coupling of paradigms design driven can go also with design thinking to that extent that design thinking is simple to implement whereas, DDI is with uncertainty, but it gives better result. Similarly, sometimes what happens that for the as I said already the design driven innovation when coupled with technology pushed innovation.

Then it gives higher order excels that also is possible, but these are certain possibility of coupling. Products developed based on precepts of design driven process often allows premium pricing that is also to remember the game that if we do that because of these advantages or advancements of the product the customers are ready to pay more premium price.

So, from that the more revenue comes and profit comes and that is what gives competitive advantage sustainable competitive advantage to the company. So, this is what the what is the

incentive for the companies be it corporate organization be startup to go for design driven innovation.

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So, quickly road map because finally, if we have to implement how do we implement that we have to see. So, design driven it is though these points are there, but it is not in linear sequence when it can be done something apparently. So, not exactly in that order, but then these are defining the problem most of them you will find that we have discussed in our discourse, but one or two changes are there I will tell them one while defining the problem.

Drawing up interpretation network this is a new concept here identifying user needs involving interpreters again another new concept. Rest are more or less is the same vision and concept planning screening and verification concept selection concept to MVP creation and finally,

testing for commercialization, but this interpreter component is new and therefore, that comes in the road map.

Now, the design driven innovation process serves to identify new product opportunities drawing on user insight and the actionable assistive tools in the process, which are say that we use preliminary plants bare bones that is a mocks, wire frames, prototypes and also solution drafts these are the tools we use in DDI.

DDI method helps to reveal user behavior, practice, capability and potential needs to conceptualize solutions that are novel using product engineering competence that merits incorporation into research, design and development purpose for commercialization.

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So, here I am not going to read them out this I have created for your reading subsequently, but I have kept it in this PPT. So, that you can read I have already given that defining the problem etcetera. I will only highlight these two things that especially the interpreter related work, drawing up interpreter network, track down and denote the innovation and development support network.

As well as the knowledge shear strategy as to identify the potential interpreters for providing necessary inputs for design based radical innovation and development. So, create a network of interpreters that is very important and how they will come we have understood.

Similarly, after say or at the similarly at the same time maybe the user needs identified and then involving interpreters that is also important here involving selected interpreters for current information and sharing knowledge about the market, industry chains as well as the future design possibilities and support developing novel and value different products.

So, these are two major differentiators that you can read the rest, but then these two I have read out because these are two important things.

So, rest are there you can study it in your own time because we have discussed all these concept selection, I have discussed in many times I have just put down as a roadmap here again for a ready reference.

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So, what we have seen in conclusion we are saying this presentation begins with the context associated with value proposition and design driven innovation and compares strategy with their design thinking.

Then it delineates the radical perspectives and the steps of design driven innovation followed with the example with the industry that is the one of the Fiat Panda the other one is of the iPod of Apple merely and DDI also touches upon the coupling as I we had discussed of design paradigms as practiced and possible and closes with the Application Roadmap because you will be using it how you will be using it that is there.

So, I hope you would be using it and you would get derive a great satisfaction out of your new venture.

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And before I close one thing, I would just like to tell you the reference part here. So, just note it and now I am sure that this particularly the roadmap for design driven innovation will help you in actually trying out a real case at least at the concept level and it will help you to go a long way and you it will help you, I am sure.

Thank you very much once again for listening to this course.