Entrepreneurship
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MODULE 3
Ideation and Prototyping- Part - 3

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Now, there are different Ideation approaches, how does Ideation happen? By doing one particular theme as I said. Now, questioning the basics, that is one way of Ideation, why should we do this? The five whys? So, when facsimile was there, that is putting a fax and then sending it to the telecommunication and gets reproduced. By questioning the basic, saying that whether this is required at all when we can transfer it through the internet the facsimile became irrelevant.

Then secondly is role reversal, the role reversal means traditionally A and B perform a task in a particular manner, I want to eat so I go to the restaurant order and take it, but, when you come to food delivery as a new business, it has reversed the role. The restaurant itself is bringing the food to you, so it is role reversal that is another way of generating ideas.

Then convergence of functionality, phone for talking brought into several other things within its fold, navigation, camera, the sensitivity, health care steps monitoring etc. That is the smart device. Then you have Disintermediation, when you look at pharmaceutical marketing, the

manufacturer gives it to the C&F agents, these C&F agents gives it to the wholesale agents, the wholes agents give it to the chemist that is on one side.

Then you have got the doctors who take the advice from the pharmaceutical companies, they write the prescriptions, they give it to the patients, the patients goes to the retail pharmacist and then they buy. So, there is lot of value chain which is there, but when you have e-pharmacy where in the doctor's prescription is automatically linked to the patient need and also through the mechanism of supply then lot of disintermediation is occurring. Therefore, the products which are supplied through e-pharmacy probably 20 percent to 30 percent cheaper.

Then Divergence of Functionality, probably it is the same apparel same dress material but you can call it ethnic boutique. Then you have got a different way of presenting the product proposition. Then, ergonomics new age furniture wherein you can get it more in terms of protecting your physical bodies situation. Then Safety Health Environment could be another way in which you can get new ideas, bio pesticides or bio fertilizer, aggregation ride handling, then miniaturization simplification smart phones.

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Like that when you look at certain themes, they can be applied to many products and here in happens the question of generating different ideas. Now you look at this, when you looked at Miniaturization, left was the old desktop then new desktop the CPU itself is embedded in the

screen. The Form Factor optimization, from large bezel smartphone you got into bezel less smartphone. Portability, battery was outside and was being used to charge. Today battery is a power bank which can charge the cell phone. Then, you have got Robotics, a reception desk is getting shifted by the automated caller system.

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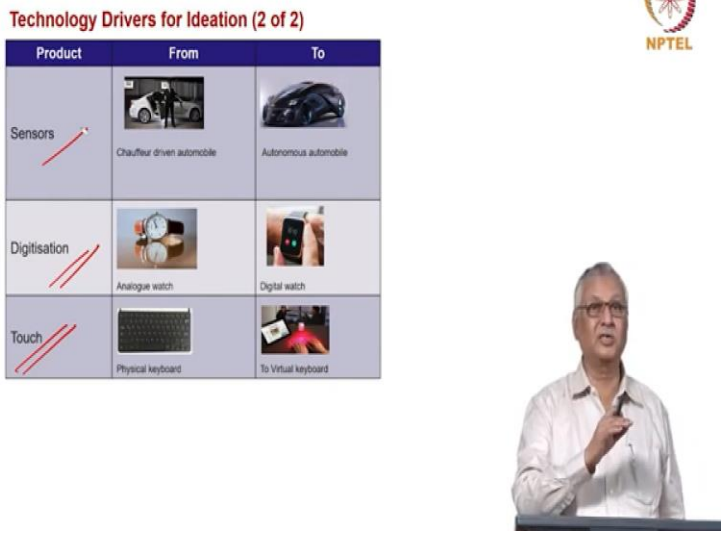

Similarly, Sensors, if you have a Chauffer driven vehicle, what the Chauffer does is to sense whatever is happening. So, if you have a Radar, Lidar various cameras etcetera, you are shifting from Chauffer driven automobile to autonomous automobile, analog watch to digital watch and a physical keyboard to virtual keyboard. So, when you look at these things, there are certain basic technologies, digitization sensors they have in fact being available for long period of time. If you see even equipment of 20 years 30 years old, you will find the program logic controllers or the displays had touch sensitivity, but it took 20 years for the touch to be applied to smart devices, to smart phones, computers, etcetera. So, technology drivers at times tend to be available for large number of years but they get applied to different parameters, different situations later.

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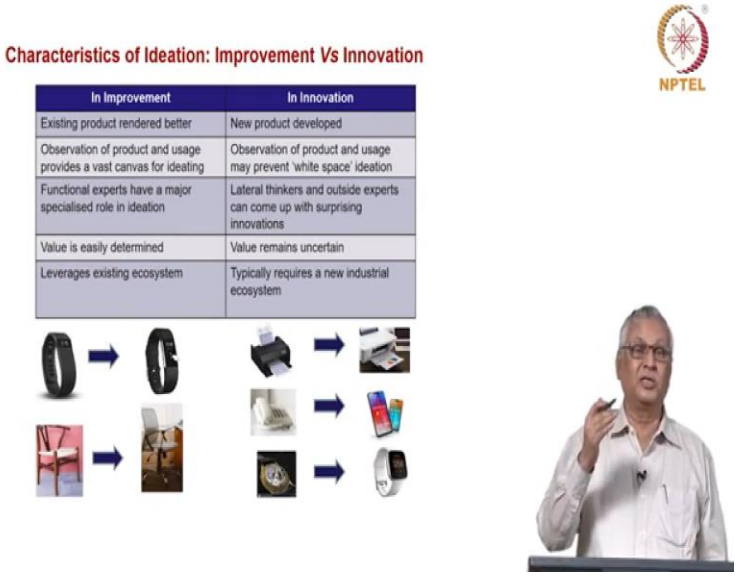

So, we got to look at all times, so what is improvement? What is innovation? Improvement is existing product getting rendered better, now you have this Fitbit, what you see in the left side is the first model, what you see next is Charge HR 2, which has got a bigger display. Clearly this is an improvement not a radical redefinition, earlier it was only showing either time or the steps or the flights you can scroll around or select. Whereas now, all these things are being shown to together it is an improvement.

Similarly, if you look at the other one, a printer becoming a laser printer, color printer, these are improvements. Similarly, the chair become an ergonomic chair, improvement. But when you look at the landline phone becoming cell phone or mechanical watch becoming a digital watch, they are innovations.

So, the differences between the improvement is that when you observe a product and usage gives you lot of scope for ideating, but then here in innovation you have to think afresh with white space, say that, yes I just do not want this kind of a small display, how do I get completely different, so lateral thinkers outside experts help you in innovation.

In the improvement phase value is very easily set, you provide more functionalities, therefore the price is higher the profit is higher. Whereas, in innovation you are not very sure what is the

ultimate value which is found out. The improvement uses the existing ecosystem everybody is able to improve incrementally, whereas in innovation you require a new industrial ecosystem.

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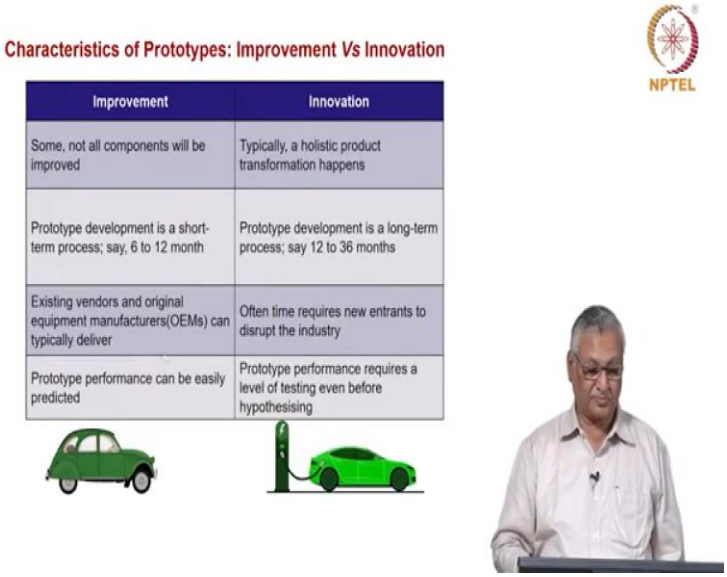

And prototypes also are having the same advantage, in improvement not all components need to be improved. When you look at generations of cars, you will find that most of the internal parts remain the same, the external parts get changed or if the internal part like an engine is changed, it is quite possible that the gear box remains the same, the axel remains the same. Therefore, in improvement not all components are changed, whereas in innovation a whole holistic product is developed. So, when you talk about electric vehicle, we have got retro fitted electric vehicle which is remove the IC engine put a electric power pack.

The second is a native electric vehicle where the whole thing is done ab initio from the beginning. So that the whole design, reconfigure to the requirements of the electric vehicle. Prototype development in a normal improvement situation is a short-term process 6 to 12 months. Whereas, here it takes 12 to 36 months if you are really developing things. And you can use the existing vendors in an improvement process but typically you require a new vendors innovation, you cannot develop an electrical vehicle unless you have the ability of nickel batteries usage, then you have lithium ion batteries to be put in, so that is the challenge.

Whereas, prototype performance can be easily predicted an innovative product performance cannot be predicted, it could work may not work.

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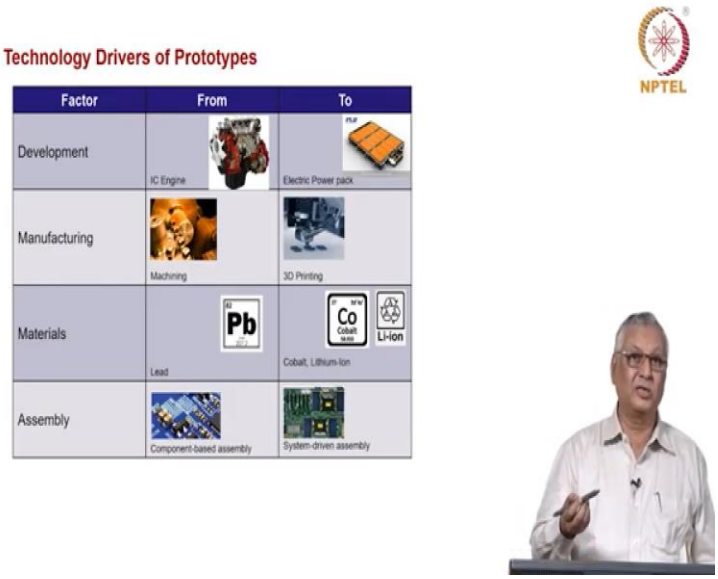

So how does this, for example, this IC engine is moved into the electric power pack, you can see how the configuration is different. So, you put this engine in the front of the vehicle and there is a space for that, but electric power pack you put it at the bottom of the chassis, therefore the entire chassis design is different. Which means also that you get additional sitting space, where the engine used to be there probably you can have more people sit or that area itself can be eliminated, therefore there is fundamental based technology development that is happening.

Secondly, prototyping can be done in the conventional way of taking a bar machining it or you can use the 3D printing. 3D printing is what is called additive manufacturing, most of our manufacturing is subtractive manufacturing, that means you take a big steel slab you cast it into a smaller bar, round bar or something like that, then you take put it in the lathe, remove all the things which you do not want or chip it away and then you get the final component.

Whereas, in 3D printing you use this as base material as powdered and through digital means you just print it to the shape. So, you add layer after layer and therefore, the loss is not there and therefore you can also make very complex prototypes based on this 3D printing. Then materials are also novel use it differently. Then the assembly, earlier you used to do in improvement

projects component based assembly, but today when you go into the innovation, you do a complete system board assembly.

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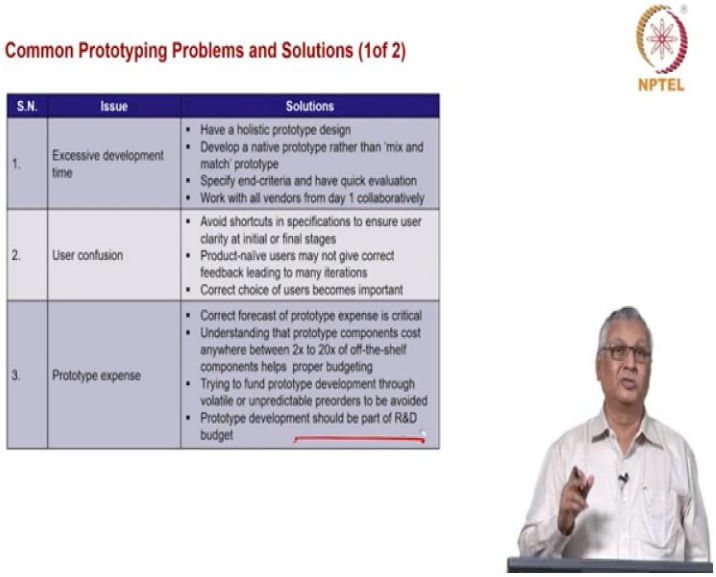

So, when you have this kind of prototyping, what kind of problem we encounter? The first problem is that there is excessive development time, you have got several contradictory requirements which emerge in prototype and therefore, there is excessive development type. When you look at electric 3-wheeler, it is quite possible for example, just to have a frame put an electric thing and then develop, but that product is not saleable. So, you got to re-prototype the whole thing and re-introduce. So, there is an excessive development time. So, the choice in prototype development, do I do a holistic prototype? Or do I do a short cut prototype?

Second, user confusion, user is not always very sure what he wants. Therefore, avoid shortcuts in specifications make it very specific to the user and make sure that he appreciates the chain that is being made. And thirdly, expense of the prototype, normally you should budget at least 20 times of what normal component is, just because a cam shaft is 2 thousand rupees it does not mean that a new cam shaft for an electric vehicle if at all it is required can be done at that price, no may be costing 20 times.

Therefore, prototype development should be part of R and D budget. So, you should be willing to prepare 2 to 20x of the product cost as the prototype cost.

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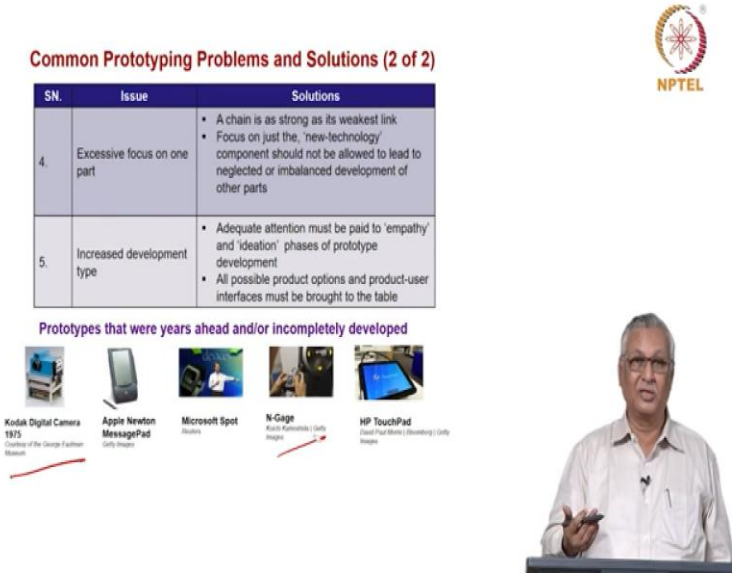

Then excessive focus on one part forgetting about the other parts, and a prototype is going to be as strong as its weakest part. Then, increased development type, but you can see very interesting examples here, there were prototypes that were years ahead and had to be called off either because they were incompletely developed, they were developed far too soon or the companies did not think they were good enough. Everybody talks about Kodak example, as how Kodak was the innovator in the film photography, and how it lost out completely in the digital photography field.

But the fact remains that a Kodak engineer as earlier as in 1975, developed a version of digital camera, but the management did not think that this prototype was worth its way. Then, we have Apple, even before palmtop came palm, Apple designed a message pad called Newton, again it was kind of abandoned for lack of interest by the management. This smart watch, maybe in 2000's, and then it was abandoned. There was also the gaming device and-gage, then touchpad what you see as iPad was developed by HP years earlier.

Why were they kind of left to the history? Either they were delivered far too ahead without surety about the technological trends or they were incompletely developed or the managements lacked the interest, I mean there is also this very famous case of IBM saying talking about the desktop computers, wondering whether more than 1 or 2 pieces of desktop computers will ever be sold in this world.

But what made the change happen? Microsoft's operating system. So, the collateral change that was going to come with the operating system was not perceived and how a mainframe computing system will be becoming a personal desktop system was not envisaged. With all this knowledge, Microsoft could not envisage that what was a personalized desktop operating system could become a mobile operating system. So, there were always discontinuities in the thinking of technologies, in the thinking of managers once they reach a particular level of accomplishment or achievement in the development.

So, we have to be continuously aware of the way the technology is likely to change, how the customers are going to be using new technologies if they are offered in a particular manner, and keep developing prototypes all the while, which could meet number of different users.

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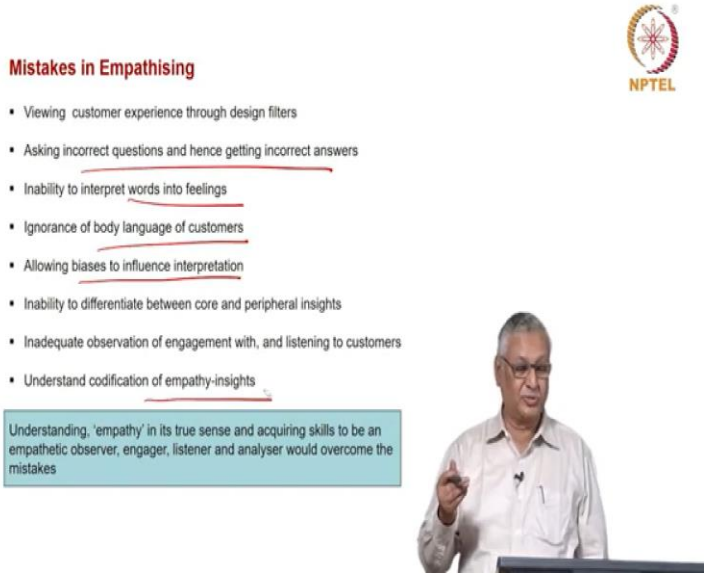

So, we talked about three particular things, one is empathizing, second is ideation, third we talked about prototyping. So, what are the mistakes we commit in various phases? When you look at empathizing, very common is to in spite of all whatever we have spoken about

empathizing being a co-experiencing with the customer, we tend to experience through our design filters, the brain says that if this is the customer need probably this is the design solution.

So, we tend to become very technical in how we evaluate the customer requirement. The second, asking incorrect questions and therefore, getting incorrect answers. Like, for example, looking at the shopping cart example, suppose, are you happy to live with a small shopping cart, because you need to be driving your child to the school, that is an incorrect question obviously the answer will be, yes, but on the other hand if the question was, what is the maximum amount of groceries you would like to carry, if the shopping cart was at a limitation?

Then probably you could get a situation, saying that I need a big shopping cart etc. Therefore, asking the correct questions and getting the correct answers is extremely important. Then, how do you interpret words and feelings? People can express through words, but are these words really explaining the feelings of the customer? That is again important. Then we talked about the market research was an empathic thing. Where market research says it is outsourced, whereas empathetic research is based on the in-house people.

There the advantage is there, because empathetic observers can look at the body language of the customers and they say that, yes even if he is saying something, there is something else which is being imputed into that. The other one is very famous, allowing biases to influence interpretation, and there is also a core insight and a peripheral insight, what is core to the customer experience? What is peripheral to the insight? Like for example, color could be peripheral whereas, the core functionalities is important. Then in adequate observation because of poor engagement, then lack of training on how do you really do the empathy thing.

So, empathy in its true sense, is a very complex subject, which needs a trained eye, trained person within the startup organization.

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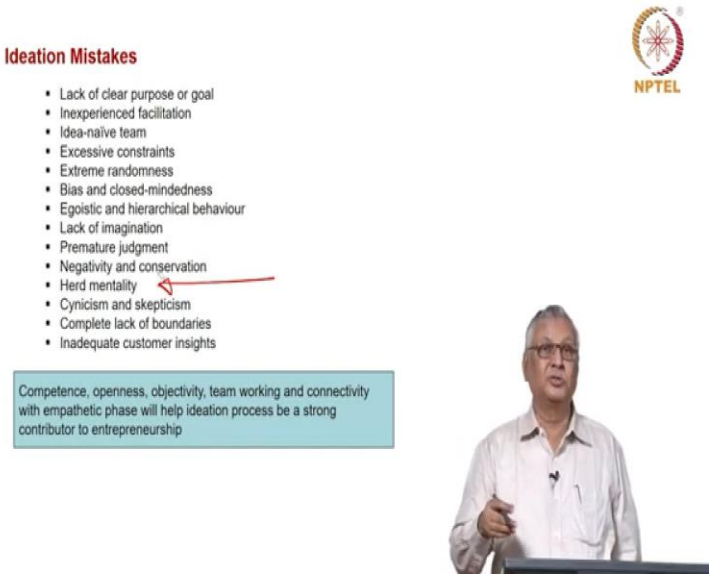

Then in the ideation stage, there are again many mistakes, one, ideation cannot be completely open ended, it has to have a clear purpose or goal mostly coming from the ideation stage, empathization stage. So, from the empathizing stage you get the clear purpose. Then, ideation itself is a workshop kind of system, you need experienced facilitator. Then people must have lots of ideas brimming within their system, unless you have hundreds of ideas you will not get even tens of for good ideas which can be filtered further.

Then, ideas also should not be operated with lots of constraints. Similarly, there should not be excess randomness also. Ideas, as I said they should have a boundary, they should have a goal, they should have certain constraints but not too many constraints, they should be open ended but not too random. So, again it is the question of paradoxes, how do you really manage these opposing ends? And again in ideation like with anything there is also this herd mentality that you know people are doing like this why not we do this.

And most ideas are always challenged by not the technical aspects or the customer's aspects, but the in-built Sinicism skepticism which lies within us as human beings. Therefore, how do you do, you have to have competency in ideation as a process you should be open you should be balanced you should be objective and you should know how to work with the team.

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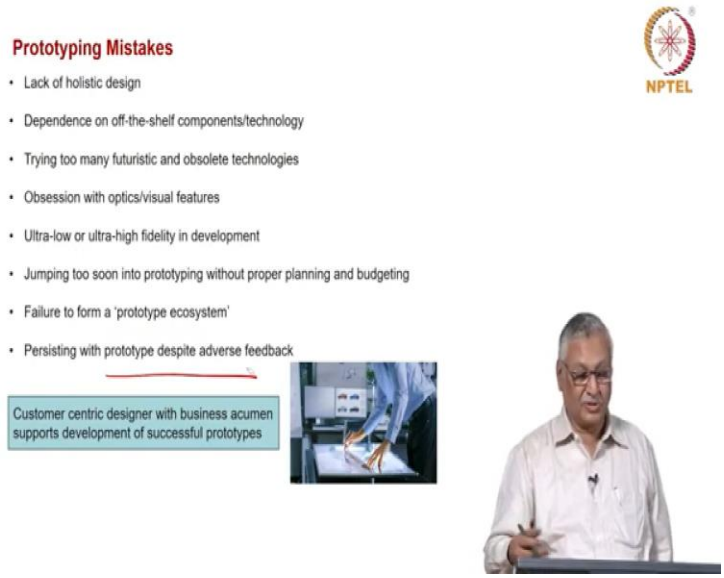

And when it come to the prototyping, you have the lack of holistic design, you are going to be dependent on off the shelf components which may not gel with the holistic product. Trying either too many futuristic technologies or trying too many obsolete technologies or in prototype you forget about the core performance and look at the visual optics and peripheral activities.

Then again go for either ultra-low fidelity or go towards ultra-high fidelity in development, and again jumping into prototype development without proper planning and budgeting. And also coming back to what we saw earlier through lots of blue circles, the failure to form a prototype ecosystem, that is not only you, but various other stakeholders are travelling with you in this prototype development. And the most important thing is not killing a prototype when you get adverse feedback.

Because your goal is not to make just one prototype, you want to make a prototype which meets the ideation requirements, which is empathetic to the customer, therefore if the prototype for whatever reasons not working well, you should be willing to let it go by and start with a new

prototype. So, how does this happen? Customer centric design should be there, you should have business acumen, then you will have lot of successful prototypes.

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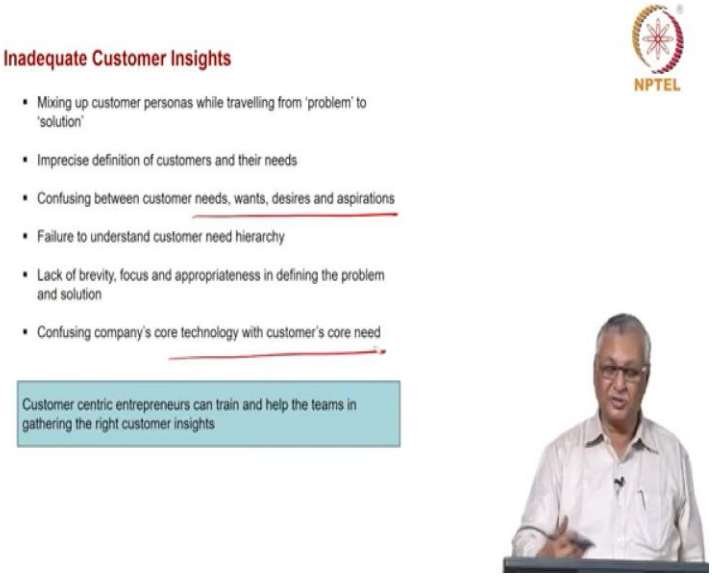

So, what I have found through customers particular list that, A: they are very customer centric, they understand what the customer needs. They are able to distinguish between customer persona and actual problem. There could be different no, very argumentative customers, they could be very demanding customers, but they are not clearly specifying the problem. So, you should be able to get from the customer persona what the real problem is, so that you can travel from the problem to the solution very well.

Secondly, confusion between needs, wants, desires, aspirations. Customer may want the moon, but does he really need it, does he really want it. What is the difference between the four aspects, when he expresses to you or when you go through this empathetic phase. Then, what is the need hierarchy has nice to have, essential to have. What are the differences, then most importantly not to confuse the core technology with customer's core need, yes, we discussed that a core technology is the first prerequisite for a startup to be successful, but when you are looking at him or her and trying to fulfill the need, it is not the core technology that should drive, it is the need, if the need and the core technology do not match, then you might as well look at different customer grouping or look at a different core technology.

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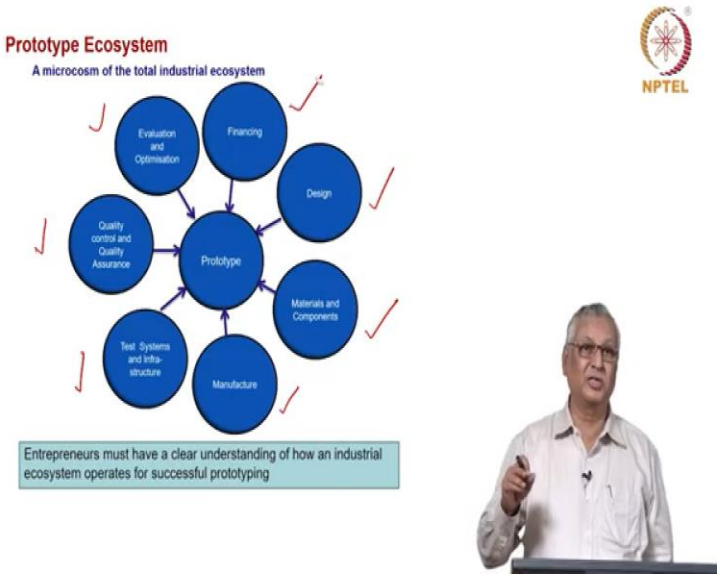

Just because there is a core technology you should not try to force fit into the customer's product requirement. So, once again, I would like to highlight that we should treat this prototype development as a microcosm of a total industrial operation. Whether it is a 10 numbers you make as a prototype or 1 million products, it goes through the same aspects. You need to have a good design, you need to have a materials and components, you should know how to manufacture, what are test systems and infrastructure, quality control and how do you do evaluation and how do you finance the whole thing.

The only difference is that in a full-fledged organic manufacturing operation which is of high scale, most of the things are within you, and you have control over all of these things, but when you are doing a prototype, typically you tend to use available people, available resources you can outsource many things and try to develop a prototype.

So, entrepreneurs may be good at designing, may be good at ideating, at prototyping, but they should also understand how the whole industrial ecosystem operates. I have known entrepreneurs who thought that a prototype can be made in six months without appreciating that even to get a component, you have to go through different bureaucratic processes within the vendor system and you have to have various governmental forms etcetera.

Therefore, they had certain lead times which are involved in developing a prototype. So, understanding how an industrial ecosystem operates is also very important for the customer not

because he would like to operate that way, but because that knowledge is important to provide the right timelines and the budgets.

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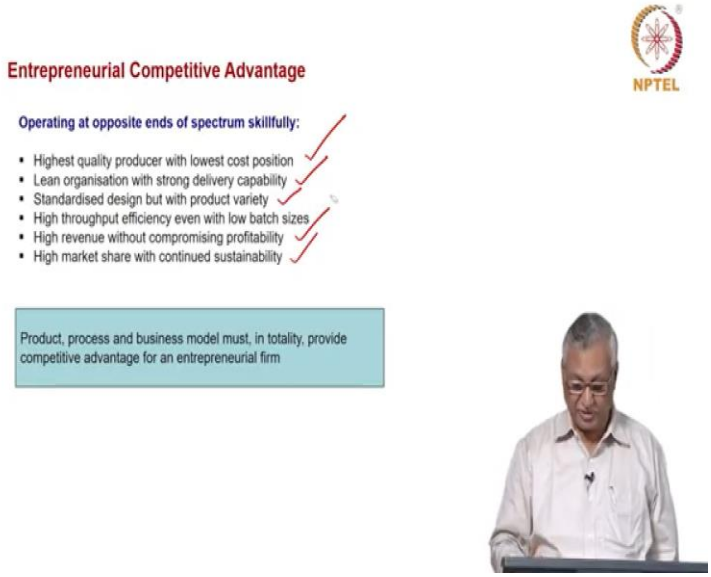

So, I will again come back to the same thing, please try to operate at the opposing ends of the spectrum skillfully. Try to be a highest quality producer, with the lowest cost position, ideal. Need to have a lean organization with strong delivery capability, standardized design but must offer good product variety. High throughput efficiency even with low batch sizes, high revenue without compromising profitability and high market share with continued sustainability. So, it is almost like a management lesson, so startup development, startup coming up with products is a management lesson. Product, process, business model they should all be aligned in totality provide competitive advantage for the entrepreneurial form.

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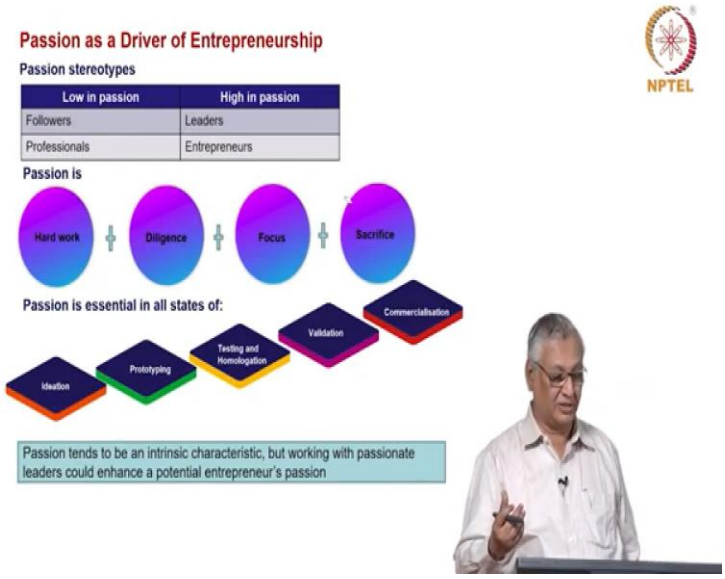

So, when you look at, we talked about theme, we talked about common thread, we talked about passion but left it. Now, why passion is a differentiator for the entrepreneurship in this difficult phase.

Ideation and prototype, are two of the phases where there is lot of challenge because ideas do not get crystalized properly, prototypes do not get developed properly. So, if a person is low in passion you are unlikely to be good in developing a product through the prototype stage. Lot of hard work is involved, lot of diligence is involved, focus is there and finally there is sacrifice. Passion is essential in all the states, there is no doubt about but ideation and prototype take consume lot more amount of passion than other stages.

Passion tends to be obviously is intrinsic to the person, but working with passionate leaders can also enhance a potential entrepreneur's passion.

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So, with this we come to the end of our ideation and prototyping stage. To recall, we spoke about these 5 stages as the essential building blocks of prototype development ideation being the foundations for you to test, validate and then commercialize a concept. In the subsequent session, we talk about testing and homologation and validation, and finally we will talk about commercialization. So, the principles which are set out in this module are extremely important to ensure that we come up with the right ideas and also develop the right prototypes, so thank you.