Entrepreneurship
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Testing and Validation Part 2

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So, given these kinds of restrictions or constraints or the realities which startups have, how does the startup go about developing? So, if it is an established company, which is having its very well defined product line up, the protocol of product development and testing is very clear. Let us look at an automobile which is being developed. It will have a complete specification protocol, starting from the materials to the components to the end product.

It will have complete master lists of test to be performed, what should be the tension of the seat belt it will be defined, what kind of crashworthiness it should have it will be defined. Therefore, there is nothing which is left to the chance and it is also be treated by the company that, that product is going to be as strong as its weakest component.

For example, a bolt and nut, if bolt and nuts are not strong enough, the entire auto mobile may not be crashworthy. Therefore, there is equal weightage given to every component of the product and then the product is accordingly tested.

But as we have considered, startup is not like that. Startup is coming up with a new technology which is not yet fully proven into an area where there is going to be an emerging market or a new market that could be created. And it is also important that it should be

demonstrated as soon as possible. So, the concept of minimum viable product has been established.

The concept of minimal product has been articulated very well by “Eric Ries” in the book, “The Lean Startup”. What it says is that minimum viable product is that version of a product which allows a start-up team to collect the maximum amount of feedback on the core nature of the product this company is trying to develop. So, to repeat, a minimum viable product is that version of a new product, which allows a team to collect the maximum amount of validated learning about customers and its product with the least effort.

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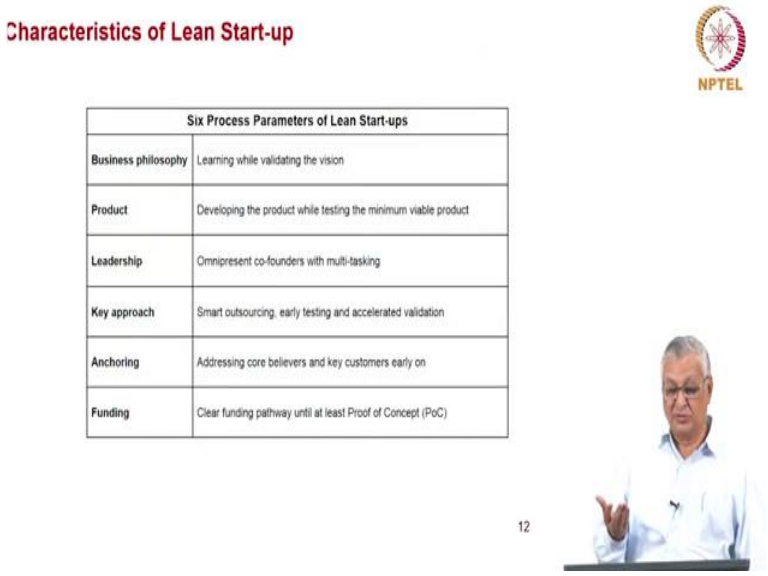

So, minimum viable product is an important concept in the startup development because it helps you stay lean. When you are startup, you got to stay lean. You got to conserve your resources. And how do you do that? We already considered that the business philosophy of startup is basically learning while validating the vision.

Second product level, you learn how to develop the product even as you are developing the product and testing the product. Therefore, the minimum viable product is an important component of a lean start-up.

Then when you think of leadership, the leaders are omnipresent. They are doing multitasking and they are fulfilling many tasks at one go. The key approach, they do not want to rediscover the will. If it is possible, they would like to use whatever is available infrastructure and get on with the job, so smart outsourcing, early testing and accelerated validation that is the approach.

And they have a concept of anchoring. That is they believe, who are the core customers for my product, who are the co-believers and they latch on to the key customers early on. For example, if it is a digital product, if it is a technology oriented product, there are certain platforms which allow the companies to put their products on their websites and then understand the feedback because it is the kind of community which feels the same.

Similarly, if you are doing a product, which is for let us say speech impaired people are people who are challenged in terms of speech, for example, stammer. Stammer is an issue with many children and even adults. So, you can develop certain games, you can develop certain apps, which help people to move out of the stammering zone in their day to day lives. And for those people, you have got to develop your products with your key customers, the clinics, the clinicians, the doctors, the people who are undergoing this kind of challenge.

And when you do that, and when you latch your product development to those kinds of customer groups, you can definitely do a product that meets the requirements in a significantly focused manner and of course, clear funding pathway until the proof of concept.

So, the concept of lean startup is enshrined in these six principles. Out of which on the product dimension, the minimum viable product is an extremely important case of accelerating product development in a meaningful manner.

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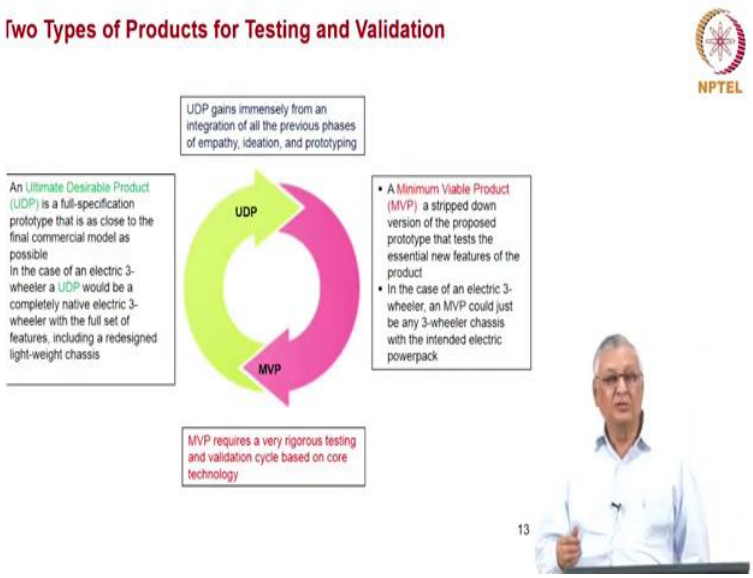

Now, along with the concept of minimum viable product, I have also proposed concept called ultimate desirable product. So, when we look at a product, you can have the core of the

product being described as the minimum viable product. So, let us think of a three-wheeler, electric three-wheeler you are developing.

In the electric three-wheeler, what is the minimum viable product? A electric power pack which replaces the internal combustion engine and which sits on the frame which has three wheels. And is able to commute from point to A to point B in a safe manner, in a continuous manner that is because what you are validating here, is the ability of the electric power pack to have the required amount of acceleration, the required amount of range, the required amount of breaking power as you go through the operating cycle of a three wheeler.

But when we look at the ultimate desirable product of a three wheeler, you might look at a completely different picture, wherein it is not only like a Bajaj Auto or TVS auto, TVS motor three wheeler. But completely even different, you can think of a native three wheeler that means, native means it is a three wheeler developed for electric purposes from ground up that means, that the entire profile of the three wheeler could be different, the kind of materials which are used could be different, lightweight material.

And the three wheeler itself could be designed in such a way that there are more safety requirements in the three wheeler like seat belts may be incorporated, better coverage during monsoons could be provided. Therefore, the ultimate desirable product will be MVP plus plus plus something else. Therefore, you have got two concepts of product. One is the minimum viable product, which test the core functionality of the new technology which you are developing as a startup. Second is the ultimate desirable product which is a full specification prototype that is as close to the final commercial model as possible.

If what is envisaged in the minimum viable product is not proven, there is no way in which a startup will be able to sell its product even if the other aspects of ultimate desirable product are met with.

On the other hand, if you have a minimum viable product, which is scoring very well, but you have not provided the other features and other embellishments which come as part of the ultimate desirable product, what would happen is that you will not be able to make the right positioning in the marketplace, you will not be able to get the right kind of market share. Therefore, to look at in a different way, MVP is highly testing oriented. It ensures that the key parameters of your technology are proven and then they are established.

Whereas ultimate desirable product gains immensely from all the kinds of phases you have gone through from ideation stage to the prototyping stage. And then it connects all these things into what the customer feels delighted about with your product. So, MVP and UDP are two parts of the same coin, if you may say so, but MVP is the core and central to startup success.

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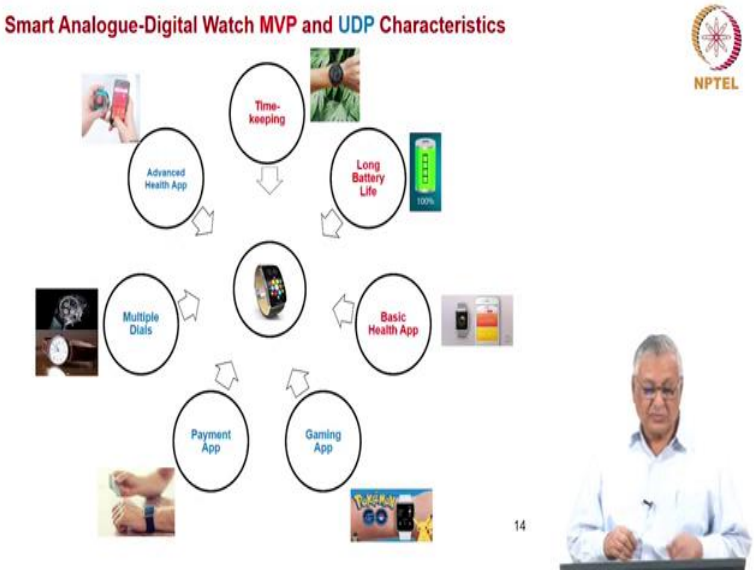

So, let us look at one example here. It is the same smart watch, which we have discussed on a couple of occasions, which is at the center. So, if you look at seven functionalities for this smart watch, what is MVP? And what is UDP? So, timekeeping, obviously, if it is the watch, whether it is a digital watch or analog watch, it has to have very exact time keeping. Second, if you use a digital watch, which has got a screen which consumes battery life, the battery life should be very long.

Third, you are using a digital watch because you want to have certain health parameters of your body taken care off. Therefore, it should have definitely basic health application that is number of steps, the flights you take, the pulse rate, the heart rate, the quality of sleep, et cetera, et cetera. So, these are the 3 things which are absolute must when you are developing a new smart watch, and that is the MVP portion of it.

But when you come up with the other aspects, whether you do these 3 things with addition of advanced health applications, like for example, when we talk about the ECG, which comes out of the digital watch, or ability to measure the blood glucose levels from the sweat analysis that could happen in future. Or whether it could talk about the stress levels of a person

depending upon the way, the pulse behaves, the analytics which are kept in it, or whether it can analyze the breath of a person and comes up with the additional parameters.

So, advanced health application could be the part of an ultimate desirable product. Similarly, you can use the strap of the product for doing the payments. It could be a payments gateway for the person. You could incorporate number of games in the watch. So, but these are not the essentials.

So, when you are developing a particular digital watch, you may say that my MVP is this, but my UDP has got different kinds of dials, different kinds of straps, and it will have more advanced things. So, for when you convert, let us say digital watch into an analog watch or analog watch into digital watch. You can have two different types of MVP and UDP characteristics which happened here.

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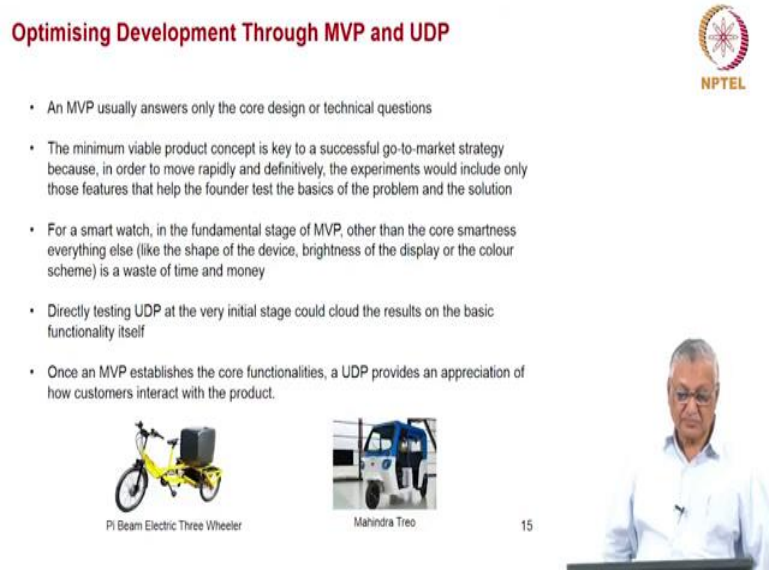

So, to summarize an MVP usually answers the core design or technical questions. And that is an important aspect to go to the market to move rapidly to be able to be very definitive, the MVP is essential. And you should do only those experiments which are as essential to prove that this MVP is viable and it is going through.

And for an MVP doing other tests is a waste of time and effort because when the core is not proven, there is no point in looking at the color of the product, the finish of the product, so they come secondary. This example is illustrated in this way. This is illustrated very effectively in these two photographs, which you can see. Pi Beam is a company is IIT Madras incubated company which is developing an electric three wheeler.

So, it has very innovatively designed an electric power pack, which drives the product and you can see that it is mounted on a chassis with an appropriate mechanism and it will deliver the minimum viable product very effectively and the company will be able to prove to itself that yes, I have got the technology for the electric three wheeler.

On the other hand, you also have a electric three wheeler called Mahindra Trio, which is a fully developed electric three wheeler with little more elegance than what a normal three wheeler seem to be having and from the looks of it, it is also lighter in construction. Therefore, it is an ultimate desirable product.

It will not be a major stride from an MVP to UDP because even as this MVP is being tested, you have all the time in the world to develop the appropriate chassis create a native vehicle design which could sit over the or incorporate the electric power pack. But if you forget about this MVP and try to do a full blown electric three wheeler and try to do the testing on UDP, it will be not only significant loss of time, but it could also mean lot of waste of money or time.

Therefore, first, a startup should focus on the MVP and then go to the UDP. The skill of a startup company lies in how cleverly it is able to distinguish between the MVP and UDP and decide on the core characteristics which the startup product is likely to offer.

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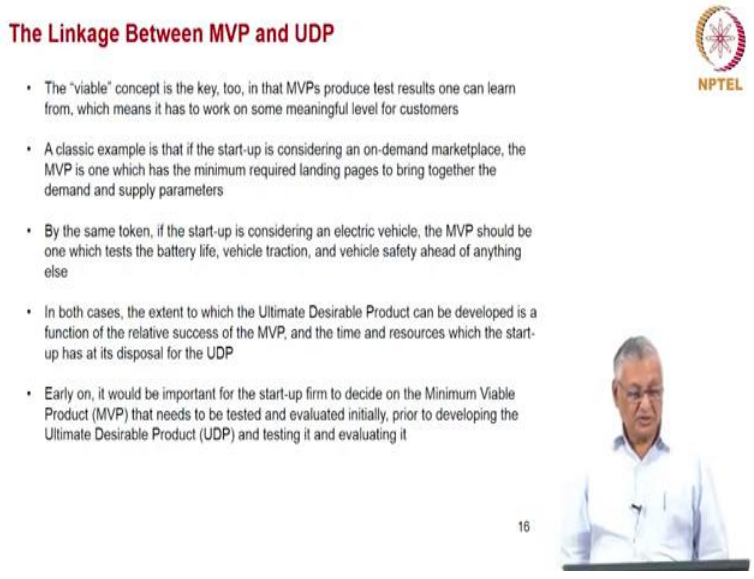

Now, this linkage between MVP and UDP is real we said. But it is also very nebulous, because the technology keeps moving. And what you thought was MVP for you need not necessarily be an MVP for somebody else. Somebody else who is in this game can make what you thought of as an UDP, the MVP.

Therefore, your ability to keep a watch on what is happening externally in the outside market and ensure that you have got your feet firmly on the ground to the competitive landscape is also extremely important. And in that again you have to decide what are the bands which you will allow for different kinds of parameters.

Suppose you are talking about the electric vehicle, what should be the battery life I should consider? Just because it is a minimum viable product, you cannot agree that the minimum possible charge is the parameter, you might like to say that my minimum viable product looks at not only the 200 kilometers which is considered a popularly accepted range, but it should go up to 400 kilometer range. So, it is possible for you to test the MVP at a much higher level of developmental challenge then is possible in your normal thinking.

Therefore, this question of minimum viable product does not mean any minimality or minimal approach in the design specifications. A minimal viable product could be maximal in its developmental challenge and if it is maximal in its development challenge and is successful in the development cycle. Clearly half the battle or more than half the battle is won for the company.

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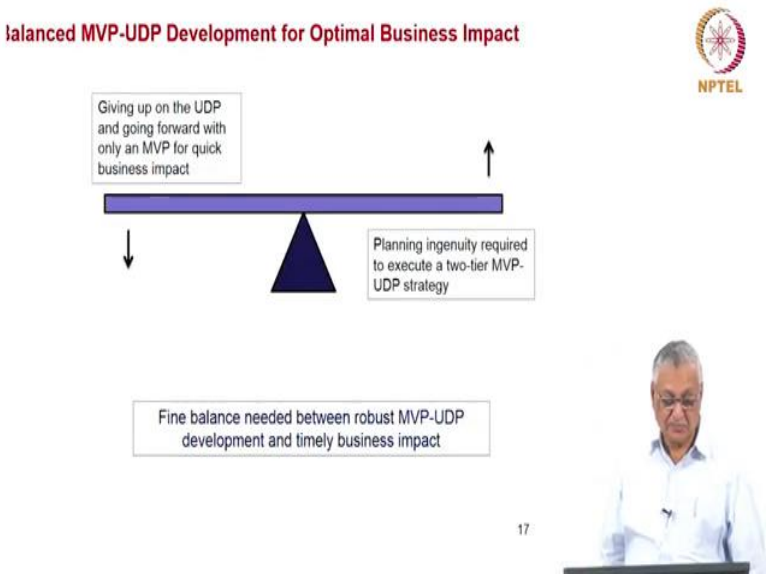

Now, the balance is very important. If you want very good business impact, obviously you need to have UDP. But if you want to have the full scope of UDP, it may be difficult for you to wait that long. So, when do you really get the MVP out, get the UDP in and what level of UDP you should have for quick business impact that is one challenge.

The second challenge is that keeping the business impact in mind, what kind of tiring you will do between the MVP and UDP? How do I plan? Should I start planning the UDP only after MVP clears certain levels of tests, or should I do it in parallel? Or what should be the maximality that I should prescribe in the minimum viable product.

So, how do I really plan out this MVP-UDP strategy? So, on one hand, MVP-UDP strategy, on the other hand balancing in terms of timelines and business impact between the launch of an MVP oriented product versus launch of a UDP oriented product. Therefore, there is a fine balance which is needed between robust MVP-UDP development and the timely business impact.

And for a startup, it is not possible for a startup to have all the factors under its control. And it is quite possible that they may have to be some give and take or some trade-offs in how this MVP-UDP strategy is conceptualized and executed.

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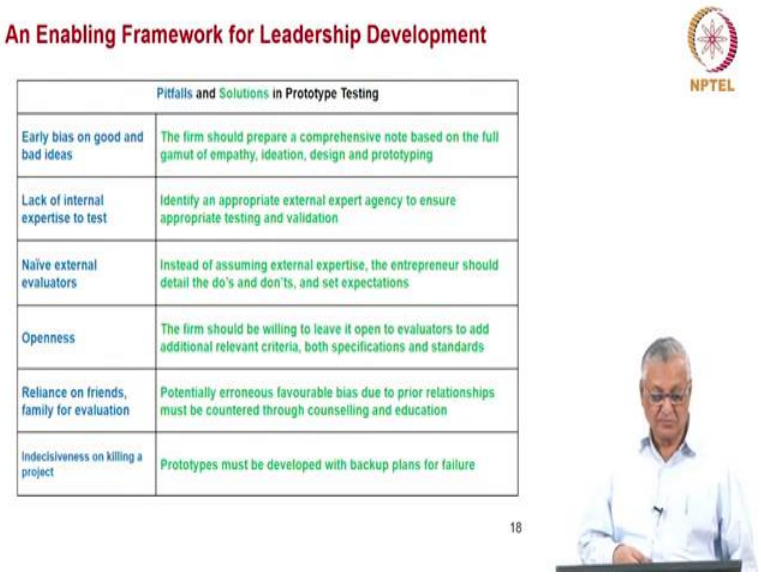

Now, looking at this, let us look at when you do the startup leadership development. You have certain pitfalls that work and there are certain solutions that work. The pitfalls are shown in blue color and the solutions are shown in the prototype testing. We have discussed that the testing process is very quantitative, very rigorous and metric driven and the validation process is both quantitative and qualitative. And it is driven not only by the experts but also by the customers and other experts we have said.

So, there are few pitfalls which happen during this testing and prototyping phase. The first pitfall is early bias on good and bad ideas. People think that what they have developed is

either a good idea or a bad idea. And the tester, who probably is not a developer himself or herself, also has got his or her concepts of what is a good idea and bad idea.

Therefore, they tend to be a bias because they have the testers have not gone through the entire process of development. This comes with an advantage, Yes, they come with a very objective, unbiased way but they come with their own internal biases and inadequate appreciation of what this product is trying to achieve.

Therefore, the startup firm should prepare a comprehensive note based on the full gamut of design thinking that has taken place that is empathy, ideation, designing and prototype phases that why have I developed this product, the way I have developed. And therefore, eliminate the potential for a bias that this is a good product or a bad product. It is a product and this being evaluated based on this set of specifications and the validation parameters.

Second, pitfall, which you may have, is that there is lack of internal expertise to test. Normally, people treat and rightly so, start a product as a very competitive proprietary product. You cannot give it away to a open market. It can be given away to other regulatory agencies to test because information leaks and you would like to protect the competitive advantage.

Therefore, having enough number of internal testers who can test a product and take it to this test stage is extremely important. And the only way you can do if you do not have adequate internal capability is to identify a reliable testing agency which respects and protect intellectual property to take care of this development. It would be necessary to assure appropriate testing and validation when you do not have sufficient internal resources.

The third one, third pitfall you have is naive external evaluators. Many times, we think that what we do not know internally is well known externally, is not necessarily be so. So, who you think are the external evaluators, even if they are professional evaluating institutions, they may be so steeped in the established technologies, they may not appreciate the kind of new technology that the startup is bringing. Therefore, instead of assuming in a blind manner, that the external consultant or external testers have all the ability to test based on new technology.

The entrepreneur should clearly tell what are the do's and don'ts of testing? And what are the expectations out of testing, that ensures that even if the external evaluators are somewhat naive to the product, they are able to evaluate the product in a more comprehensive way. The

fourth pitfall is lack of openness. Ultimately, it is lot of effort, time, money and as they say, a lot of toil that goes into making startup product come to the prototype stage and testing stage.

Therefore, human behavior being what it is, there could be a kind of little closeness on how you receive the feedback, how you offer the product. But the firm should be willing to leave it open to the evaluators to add additional relevant criteria, both specifications and standards.

If they are able to say that you got a good product if only you had these other two fact features, it would have been a great product, you should be open to look at that kind of feedback from that comes from the external evaluators.

Then another feedback is that to keep this entire cycle of development and testing within yourself, you tend to give it to the friends family for evaluation that again is like for example, when an author is doing a manuscript, he or she tries to give it to the family or well-known people for evaluation.

And not necessarily the feedback is completely unbiased because there is a bias, which comes out of the family ties and the friendship ties. Therefore, there is likely to be a potential positive bias towards accepting what probably a third party customer may not accept. Therefore, again, there is lot of need for counseling and education for those people who are evaluating as family members or friends, a new product.

And the sixth pitfall is indecisiveness on killing a product, when you do a prototype and then it comes with a feedback which is ambivalent at best that is it is not clearly telling you whether this product is worthy of further progress or not.

You should have very specific criteria and methodologies whether to stall the product, to pause the product or to kill the product or do certain improvements, so that the product gets over the weakness and if so if you choose the last path, what is the time and money involved in taking this product to the next level?

Therefore, there is an enabling framework which exists for testing and prototype which is quite behavioral in terms of preparing the evaluators and the testers for the kind of development that takes place through the testing and prototype phase.

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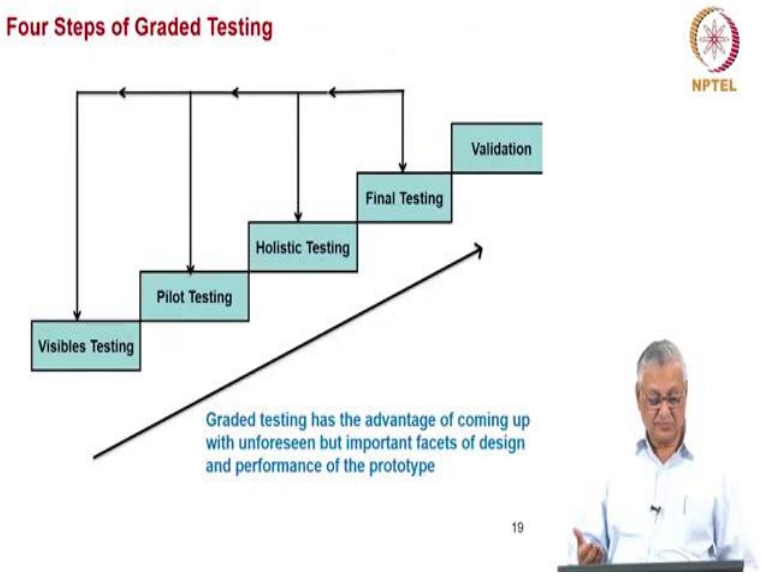

Then, there are different types of testing. As you can say, there are four steps. The first is the visible testing, how does the product look like when I face the product. Many time they first contact with the product, the look and feel as they say, that determines whether the product is winning the heart and the mind of the customer, yes, heart is won by the looks and feel of the customer.

Therefore, the visible testing, the optics of the product that is extremely important. Next is the pilot testing, so it is like the car, automobile when you see the car you get the visibles testing, but when you switch on the automobile, when you start the power of the engine, the noise level, the way the product starts to speed up, that gives you the feel that is the pilot testing.

Then when it goes through the full cycle of road testing, then you get the holistic testing. And finally, when you measure the emissions, when you measure the fuel economy, when you see how what is the level of heat conductivity that is taking place, when you see the interior comfort, the levels of air conditioning, the music system, et cetera you get the final testing. And with based on these four, you get the validation. So, graded testing has got this advantage of coming up with unforeseen but important phases of design and performance of the prototype.

So, if the optics are not good or if the initial wow factor is not there, then you got to sit up and take notice even before you go into the holistic testing and final testing. And quite possibly some of these things can be easily addressed and holistic testing and final testing can

go on, even as you are trying to address these matters, but it is important to conceptualize testing in terms of these four grades.

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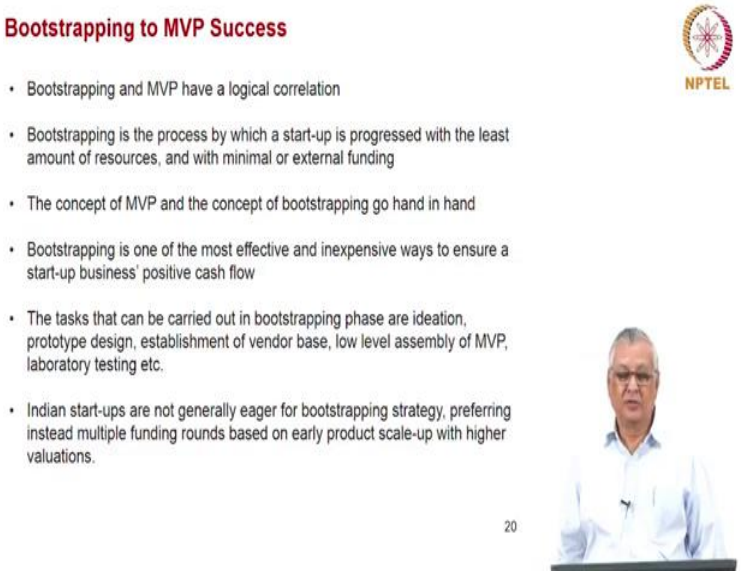

When we talk about MVP, it is also necessary to talk about another important helpful concept which is bootstrapping. Bootstrapping and minimum viable product have got a natural and logical correlation. What is bootstrapping? Bootstrapping is a process by which a startup is progressed with the least amount of resources and with minimal or external funding. That is the kind of camp.

Music bands typically have this bootstrapping approach wherein they get together with certain minimal equipment, they make their music, test it out and see whether they are generating the appropriate wipes. So, it is a very effective and inexpensive way to ensure a startup businesses positive cash flow.

What are the things that can be done in bootstrapping phase? Definitely ideation can be done including empathy, prototype design can be made, then vendor base can be established. A low level assembly of MVP can be made and laboratory testing can be done. Typically, if there is an incubating infrastructure, an incubator which we discussed in one of the previous sessions, it is possible to have bootstrapping done as part of the incubation setup.

But Indian startups generally do not favor going through the bootstrapping route. They believe that this is a kind of suboptimal way of developing even a minimum viable product. They believe that minimum viable product itself is a kind of subset of the entire product development.

And only one step before the ultimate commercialization can be done. We got to take many other steps like the ultimate desirable product and then testing and validation. So, over and above that if you do half attempt at the minimum viable product through bootstrapping, the entire emphasis in startup development may not occur. That is the approach.

But in west bootstrapping is seen as one of the efficient way in ways for seeding out or separating out, good MVPs and not so good MVPs. Indian startups prefer funding at least till the MVP stage is reached and the MVPs are well tested. And they would like to do it with multiple rounds. As the product gets developed, people would like to increase the level of valuation, and then get the appropriate funding.

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There are companies which enable startups. These are the 4, 5 companies which are listed here. And the advantage with bootstrapping, as I said, it is minimum expense and fast track development. But at the same time, once you get into a bootstrapping ecosystem, it could also become a constraint forcing a very excessive expense control. And there may be an appropriate time when somebody has to move from bootstrapping approach to a classic funding style.

The other way to look at is that the monetization of MVP to by licensing out to somebody else could help the company become successful. For example, when we talk about this electric three wheeler, let us say you have got the technology, which is core and central to this development. And if you give the technology as a licensing product to somebody else

and fund yourself, probably you could do a better MVP and later on a better UDP. So, it is again case by case strategy that could be adopted by different companies as they go forward.

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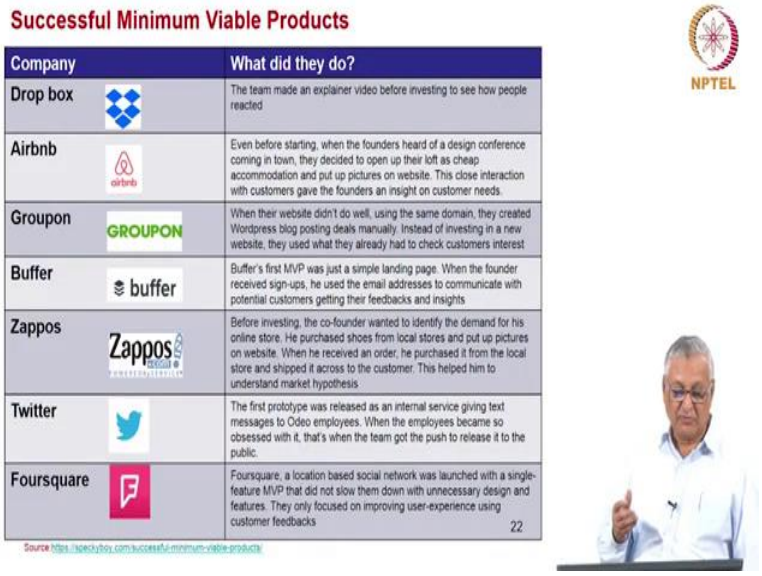

Now, let us look at a few examples of successful minimum viable product and it could be an a thematic minimum viable product or it could be an actual minimum viable product. We have seen in terms of the three wheeler what a minimum viable product is, which is physical, which can be seen, which can perform. But when we come to digital apps and digital solutions, it could be a different approach to the MVP stage. In case of Drop box, the team made an explainer video before investing, to see how people reacted.

So, they are able to get a thematic approval for the product. Airbnb, which is in the hospitality segment, they offered certain of their own facilities as a cheap accommodation and put up the pictures on the web. They saw the response. Then Groupon, when the website did not do well, using the same domain, they created world plus blog posting deals manually.

Instead of investing in a new website, they used what they already had to check customer's interest. But first MVP was just a simple landing page. It enabled the founder receive signups, he used the email addresses to communicate with potential customers getting their feedback and insights.

Zappos wanted to verify the demand for the online stores. So, he purchased shoes from the locals stores, put up pictures on website. When they received an order, he took the shoes from the source and then delivered. So, the cycle which he would actually implement, he tested out on a pilot basis.

In Twitter, today it is a big social media component. The first prototype was released as an internal service giving text messages to the Odeo employees. When the employees became so obsessed with it, the team got the energy and enthusiasm as well as inspiration to make it into the public social media platform.

Foursquare, it is a location based social network. It was launched with a single feature MVP that did not slow them down with unnecessary design and features. They are focused on improving user experience based on customer feedbacks. So, these are digital products which we have seen and which are obviously are different from physical products. Digital products have got great scope for scalability and adding features as layers or the product as we go forward.

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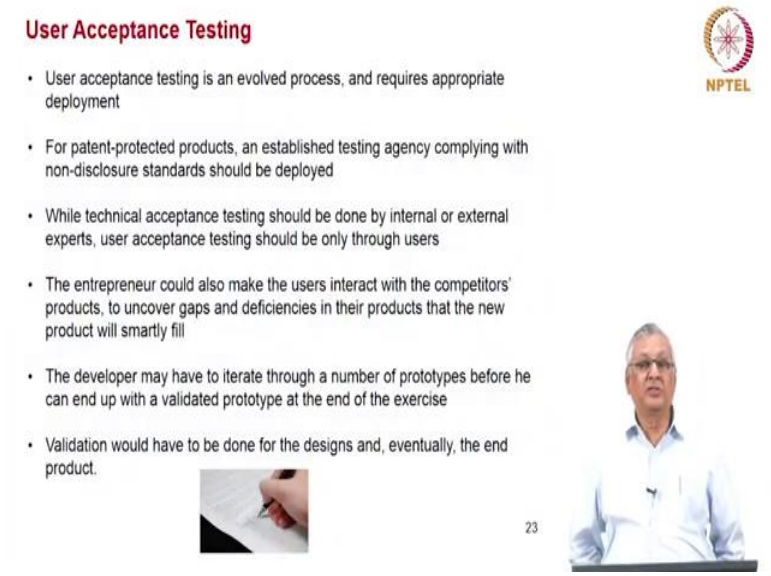

Let us also look at one important aspect of development, which is user acceptance testing. This is a very formal sign off of a product development cycle, which probably is much more relevant in case of B2B products, that is products which are sold by businesses to other businesses, where the user has to typically accept that the product meets the user's specifications.

And for patent-protected products is very important that the user acceptance happens in a manner that the ingenuity and the proprietary nature of the startup is also protected. Therefore, user normally for example, when he looks at user acceptance, he would like to understand the source code. Make sure that the appropriate controls are incorporated both at the backend and at the front end.

And he or she would like to know how the whole system architecture has been defined, where are the, what are the kinds of language sophistications that are deployed in development of the product. But all that means that the technology is being given away in terms of detailed evaluation even before the user accepts.

Therefore, is it may be useful to have a buffer of a third party capable party, which does an independent established to user acceptance testing and assures the customer as well as the developer that this has been done.

Then, the other aspect is that user acceptance testing itself gives number of feedback mechanisms which can be used for further testing and their cases where there is a debate between the customer and the developer that the customer has participated in the co-development of the product.

And therefore, there must be some kind of benefit that should accrue to the user because the customer has made seamless development possible because of the evaluation process and the user acceptance test process.

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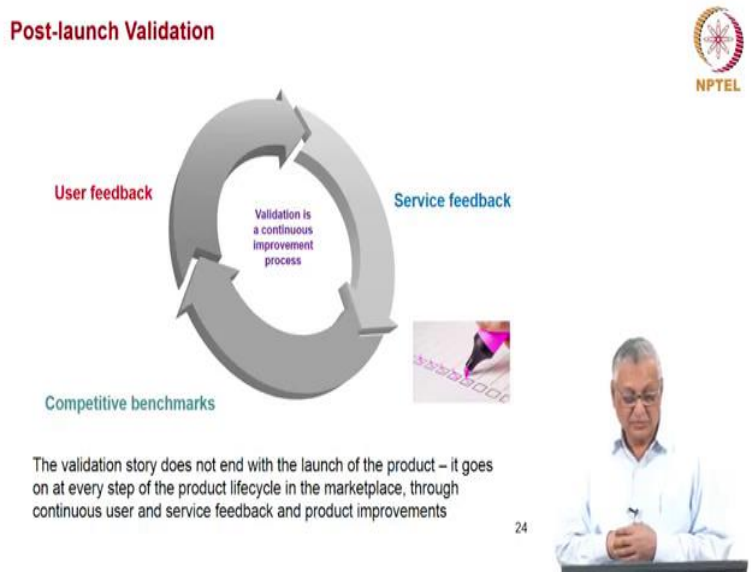

Now, this testing and validation does not end with the signing off of the product at the end of the testing and validation process. Let us also remember that this testing and validation basically occurs at 3 levels. One is at the material level, second at the component level and third at the end product level.

And all of these are tested in the testing and validation phases, but based on accelerated conditions. When we look at a pharmaceutical product, we give a shelf life to a pharmaceutical product. It says it is 2 years, 3 years, 4 years depending upon the nature of the product that is the active pharmaceutical ingredient which is put in the product.

And to determine whether this shelf life is going to be there, we pass this product through what we call stability studies. Stability study means you put it at a particular level of temperature, you ensure that there is certain degree of humidity in the system and you test the product after 6 months, after 9 months, after 1 year and see whether the product has got a particular level of degradation.

Let us say when you put in the product, it has got potency of 105 percent. And then by the time you did this accelerated stability, stability and then accelerated stability that means higher temperature and higher humidity you see the degradation following in a particular manner. Then you conclude that the shelf life is likely to be this much. So, you give a shelf life of 2 years, 3 years or 1 year depending upon the degradation curve.

Similarly, you also know that the degradation is dependent on the type of containers you have used, the kind of packaging material you have used. So, a number of factors go into determining and suffice it to say that this is another kind of simulation which is relevant for pharmaceutical products which you have used and based on that, you have given certain expiry rating, but you cannot trust with that.

Even as you launch the product, you take the products and in fact samples from every batch and you put them under stability test to see how in real life the product is moving. Therefore, post launch validation is extremely important. And there are again, 3 types of post launch validation post launch validation, which is possible. One is user feedback, second is service feedback, third is competitive benchmark feedback, what is user feedback? User feedback is that I have bought this product for particular reason. And this is the kind of feel I am getting.

Second is that you have various prescribed service parameters that there should not be any bugs in the app, if it is a digital product, the service parameters should be 10,000 kilometers or 30,000 kilometers or 50,000 kilometers if it is an automobile and if it is an industrial equipment, there should not be any change in the processing parameters, the manufacturing tolerances, things like that.

But if the actual performance of the device equipment or the portal does not follow these parameters, then you get to a service feedback saying that the service cost is going up. The warranty cost is going up. That is the second feedback you get.

The third feedback is that your product is performing in this manner, both from a user perspective and service perspective but I am not getting the same level of feedback. In fact, I am getting a better feedback from the competitor.

Therefore, even after launch, a product gets continuously tested and validated, except that this testing and validation happens in the field in actual real life conditions. And this is all the data analytics that could happen with the vast amounts of data that could be collected and stored and analyzed, as we go forward.

Therefore, it goes through at every step every through every stage of the product lifecycle in the marketplace. And continuous user and service feedback is extremely important. Therefore, the startup must have a kind of mechanism for capturing of the user feedback and being in continuous touch with the users.

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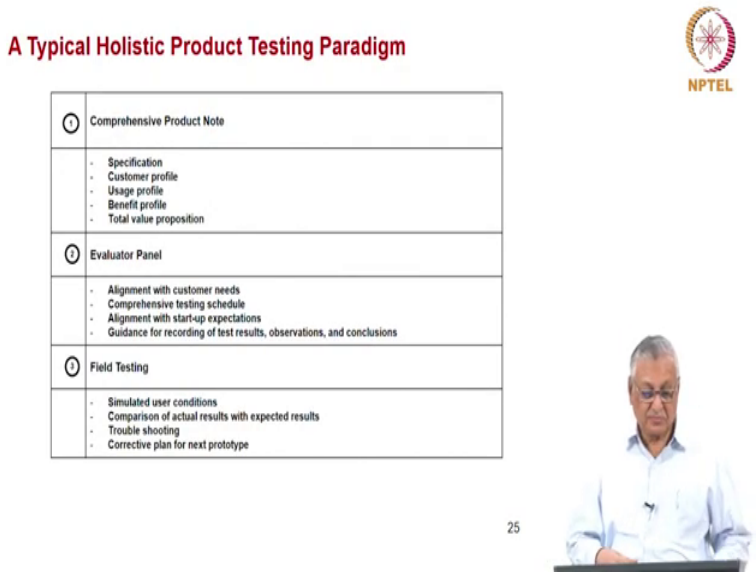

So, to summarize in a very brief manner, whatever we have looked at, a typical holistic product testing platform will have three essential requirements. One is the comprehensive product note which provides the specifications, the kind of customers it is trying to look at, the kind of usage the product is expected to have, the benefits which the product will offer and the total value proposition therefore.

If the product note gives these five parameters, the internal experts as well as the external experts will be able to analyze the product properly. Second, the evaluator panel, who will be the evaluators, the internal experts, family friends or the external experts or the customers or judicious mix of all these four categories.

The evaluator panel will be aligned with customer needs, they cannot be completely independent of customers. They should think customers based on the comprehensive product note that has been prepared. It should, the evaluator panel should understand a comprehensive testing schedule, it is not an on and off job for them. It is an alignment with the start-up's expectations.

And the responsibility is to provide guidance for recording of test results, observations and conclusions. And finally, the field testing, how do we do the field testing? Simulated user conditions, comparison of actual results with the expected results, troubleshooting, corrective plan for next prototype.

One has to be very clear that there would be glitches, there could be an anticipated the stalling of the testing. We should have the ability to continue with the field testing overcoming those kinds of issues.

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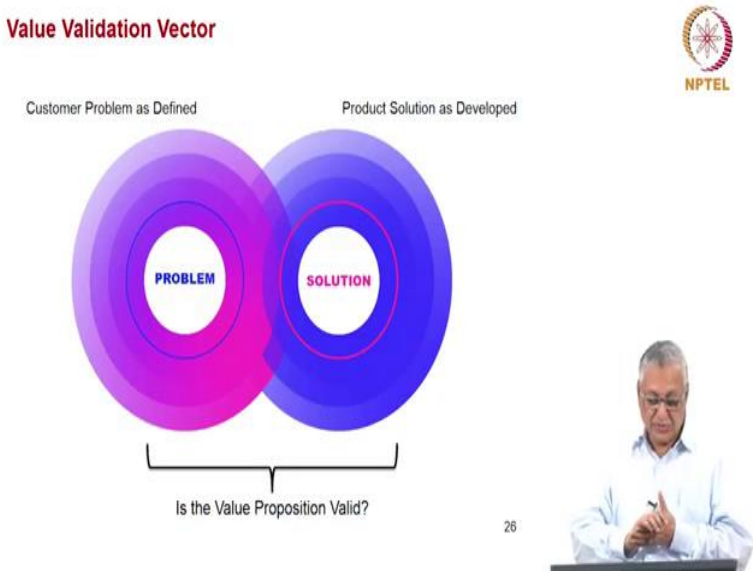

So, in this slide shows you the value validation vector. There is a problem, there is a solution. Now, how closely the problem is solved by the solution is defined by this vector. If the solution completely overshadows the problem and solves every bit of the problem by itself then it would be an excellent value proposition.

So, customer problem as defined, product solution as developed, how matched they are and how solution oriented the products are with respect to solving the customer problems that is extremely important.