Design, Technology and Innovation
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Lecture-13
Collaborative Innovation Methods Part 2

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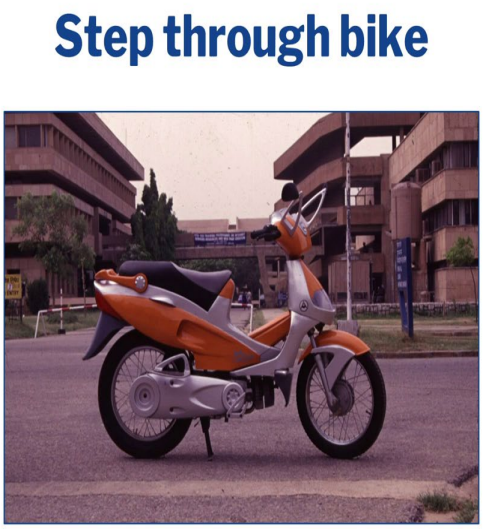

Then the third project was Hero Motors Step through bike. And this step through bike was for Argentina. It was for an export market, so we had to really work very hard with their export team, with the clients in Argentina.

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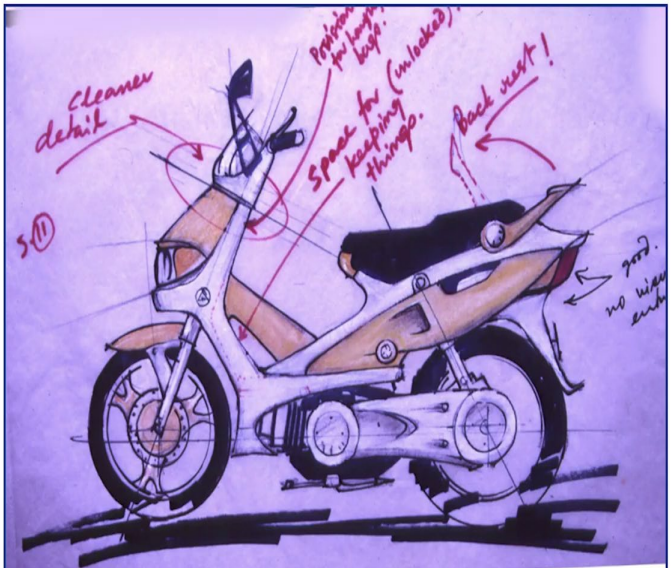

The student was sitting in IIT Delhi and, you know, with a lot of sketches.

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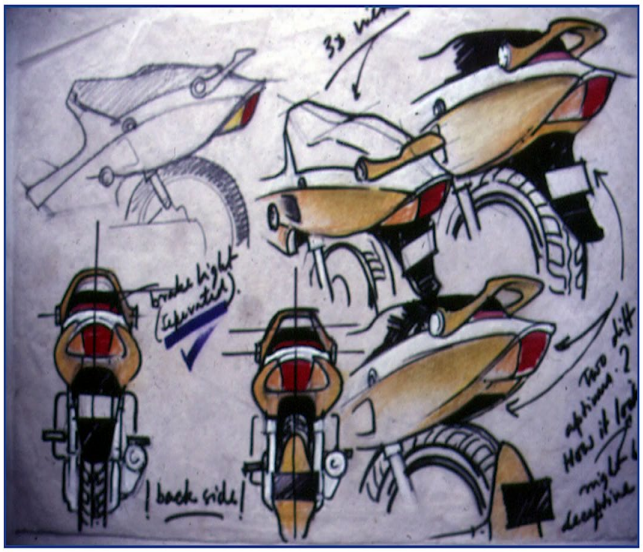

So this came, gave us a very important inspiration that your visual sketches become very very important for your design journey.

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Visualisation of sketches helps you in the collaborative model for innovation.

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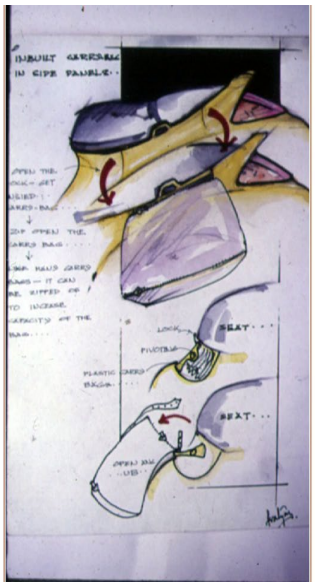

And you can see how the client wanted, in a hidden tugged bag inside the side pocket. So this bag actually would go and the side pocket would close. Grocery was very, very important for the step through bike. A lot of women would ride these bikes in that country and they wanted the styling to match their perceptions. They sent us a lot of image boards for this work and you know that is how the whole product had come up.

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And then the student built a small scale model. It was just a 1/5th scale model, very small. And with this model a lot of inputs came. When you make models, the biggest advantage is the collaborative team can give you a lot of comments. They can give you a lot of inputs to how things will happen. Using those inputs, the student then built a full scheme montage. Why it is a Montage? What is a montage over regular, sort of, model? A montage, only has half of it.

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You can notice it? Everything is half. You do not have a back side of it. So, because it is a montage. When you build a half, by layers, you can also build, like, layers. This is a foam montage and then this is a full scale montage so you can really stand next to it, take all the inspiration and everything can happen. And this is a full-scale, a non-working prototype. And all done within a span of 6

months. And the company, Hero Motors was thrilled to see this progress because in their company they take 3 years to build such a thing. And we finished in 6 months. This happens because the collaborative teaming because of the type of intensity the Core Team works on the work.

And here for example, you can see every part, you know, including the special review and stands, basic stands, the stands for the pillion rider, the seat design, the grab rail. Remember this tug away pocket. You open this box, you get a large bag which will come out of this pocket, and you can put groceries on both the sides. A lot of storage was done which was a very important thing and this was completed in that time. So while doing all this we were actually, what we were doing at the back? We were actually assimilating all the learning.

What is happening? Whom are we talking to? How are we working on this project? What are the inputs we are getting from the team? What are the inputs we are getting from the external team? All that we are logging, I am not showing you that log, but I will show you at the end, how the log helped us to build the model.

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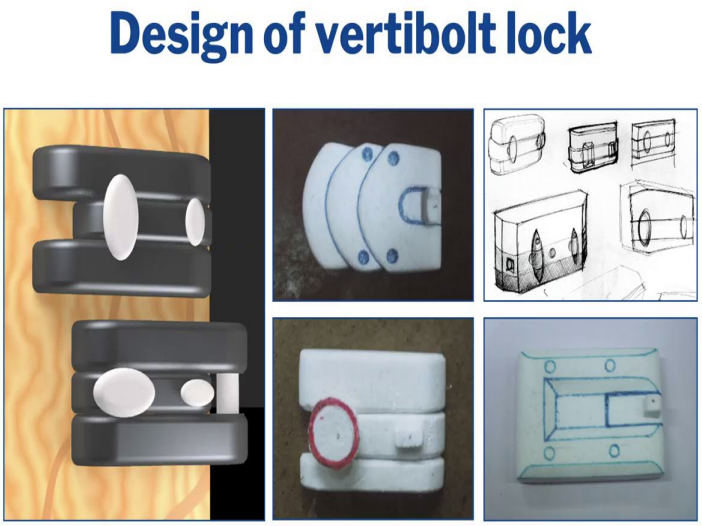

And then the fourth model was the lock for Godrej. Again Godrej said, 'We want a lock, we are the largest lock company but we are threatened again by foreign brands coming in with low cost. So we make a vertibolt, which is 50% of the cost of the current product'. So again the same phenomenon of making a lot of ideas.

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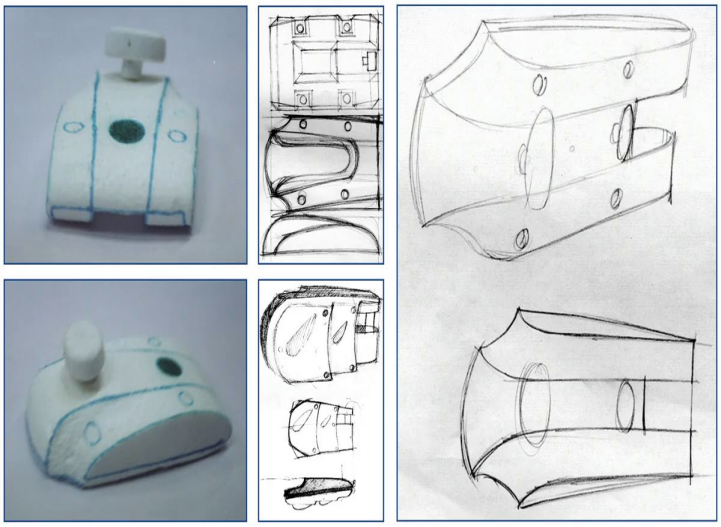

Choosing one idea which could be an integrated design. Because, what is the best way of reducing the cost? You reduce the number of components right. And then this student actually did shadowing of a lock repairer in Bombay. We actually went behind a lock repairer, worked with him for 3-4 days. Then he came and told me, 'Sir it is really unfortunate that the lock in Bombay, because of the breeze, the door closes and if the vertibolt is on the lock breaks.

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The lock breaks inside because it is made up of aluminium casting. The inside part is made of aluminium cast. And because of impact, they can break. So he was saying that even if the repair

guy comes, he has to replace the lock rather than repair it because everything is broken inside. So, that was a big learning from the user study.

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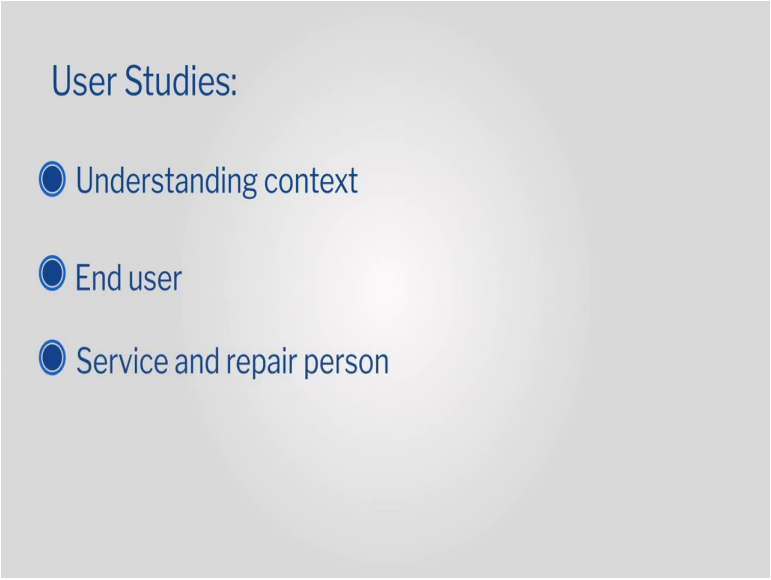

The Uses study became a very important domain of learning from a design point of view. So the user study became critical. Understanding of the people, understanding of the end user, understanding of the people who service your product. All that became very critical. So with that we did this whole journey. And here you can see this vertibolt lock.

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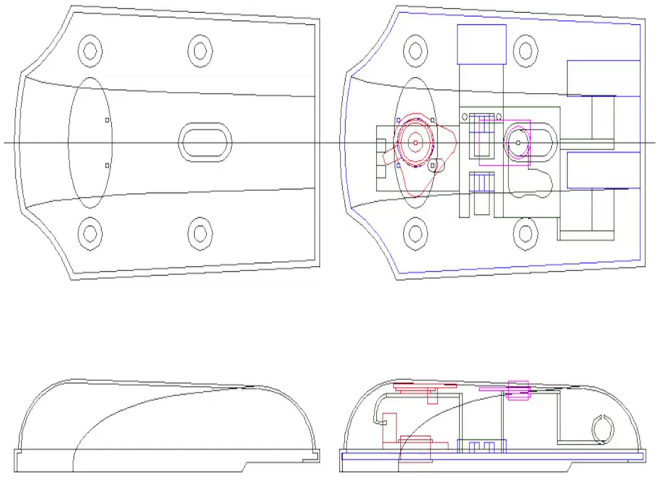

And the best part of this was again collaboration, between the teaming of Godrej locks division as well as the teaming at IIT Delhi, who are specialist in sheet metal manufacturing.

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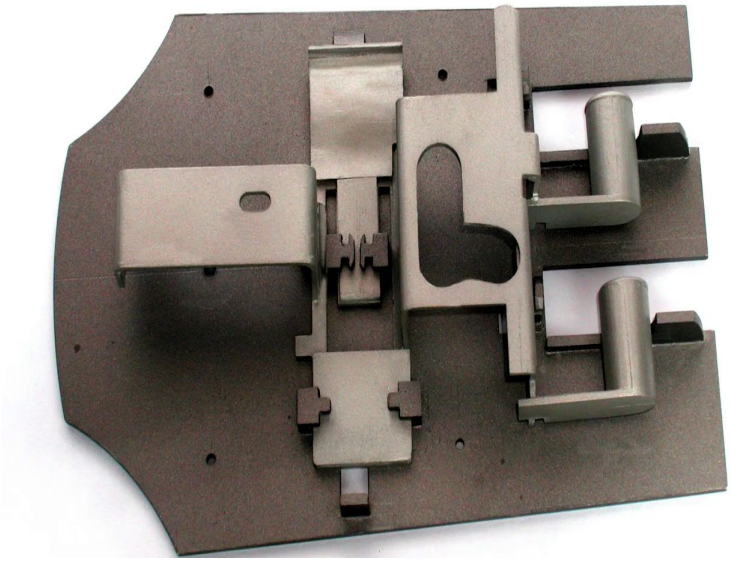

You can see here, this whole thing is one piece. Because the whole thing is in one piece, it became extremely low cost and that was using alloy sheet metal and this alloy sheet metal would, you know, really give you the complete, sort of, one single shot mold.

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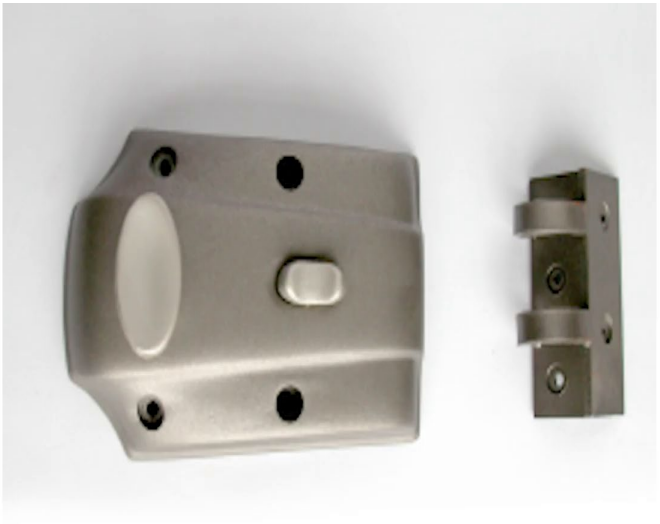

Here the product cost came down by 50% of the total journey. So this is the final product.

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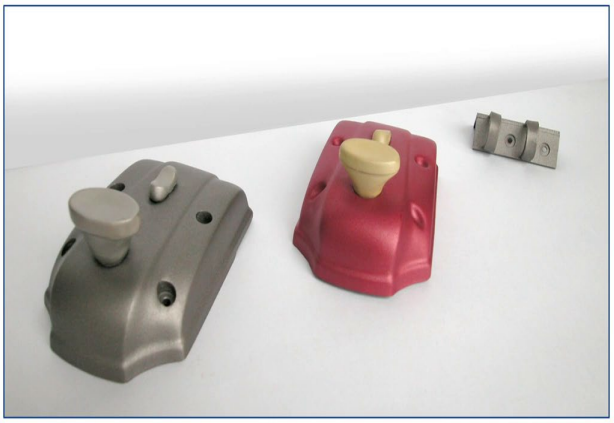
Final models



Again, Godrej also was fully excited about this project and we submitted the project to them and we, you know, did all the work forward. So the fifth one was the most interesting one for me, because I think some of you will ask some of the questions with the fifth one. So out of the 5 projects we took as the live projects, we wanted all of them to become innovation, right? But our journey in research was to come over the initial sector of the innovation journey which was the seed, the innovation idea, right?

The idea is also as important as the total journey which takes forward, I think by now you know because of the other case studies.

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So here, for example, this company, completely, sort of, out of the market because of the L&T petrol pump and they wanted to come with a new product with new systems and new services. We built the same type of teaming, with the student, with the experts, with the company people. We build this whole pump.

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You can see here this was inspired by a mobile phone. This is an old Nokia mobile phone inspiration.

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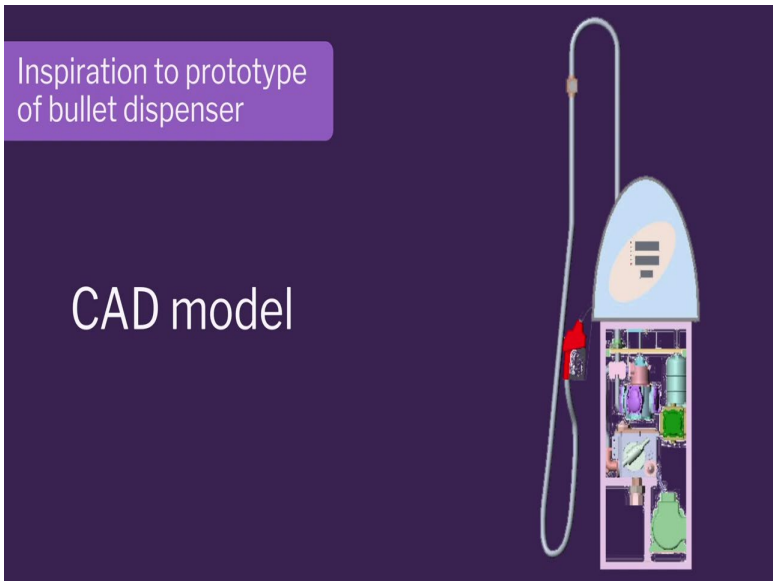

An interesting thing was that the hose was coming from the top because of that inspiration.

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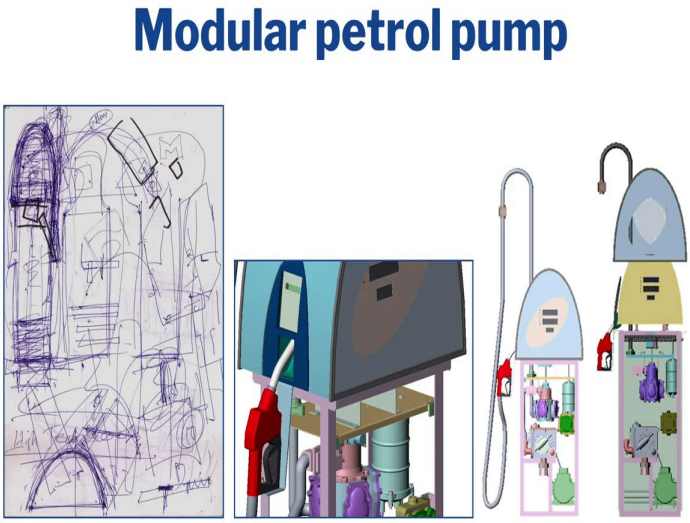

And that became a very big USP (Unique Selling Proposition); a Form inspiration became a unique selling proposition for this product because this product was able to deliver more petrol per minute than any other product because of very smooth flow of petrol from the top.

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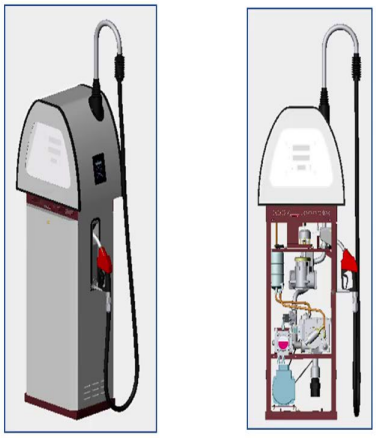
Modular petrol pump



Again because of the use of contemporary materials, contemporary technologies, contemporary idea generation and collaborative team, we could come up with the prototypes.

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Again, within a year the prototypes were built and were installed in Bombay.

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The customers, who were the oil companies, were extremely glad to place orders.

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And we became a runaway success,

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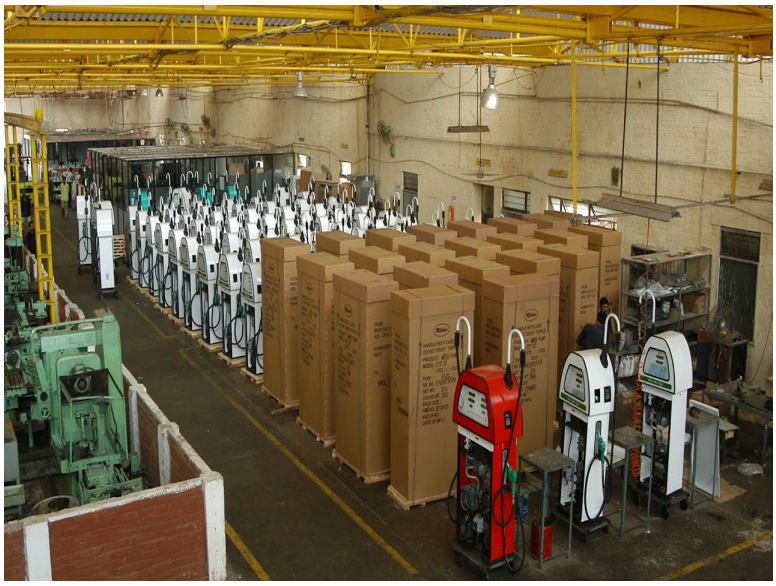

and became the largest selling petrol pumps in the country during those 3 years of its production. So, here we have one case out of all our 5 cases which saw the light of the day.

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Learning from real case studies

- Resulted in clear understanding of effective functioning of the collaborative model.

What is the learning from the real case studies? We got a clear understanding of the effective functioning of the Collaborative model. We built a Collaborative which is rough. How do we need to collaborate with everybody? Because if you take a project here in IDC, when you do projects. What do you do? You are the only guy who is working on the project. At the most you go to the guide to get your inputs from.

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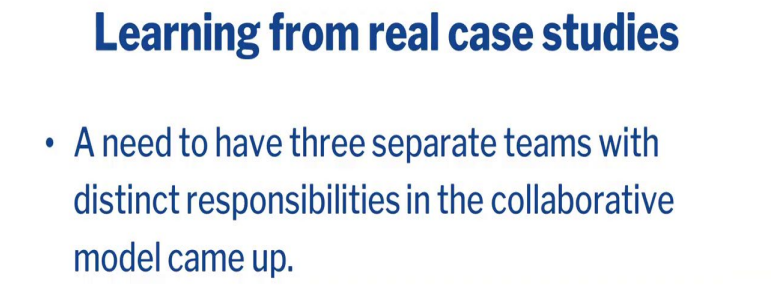

Then you need to have, we very clearly came up with three separate teams with distinct responsibilities. We realized that there are three teams of people working.

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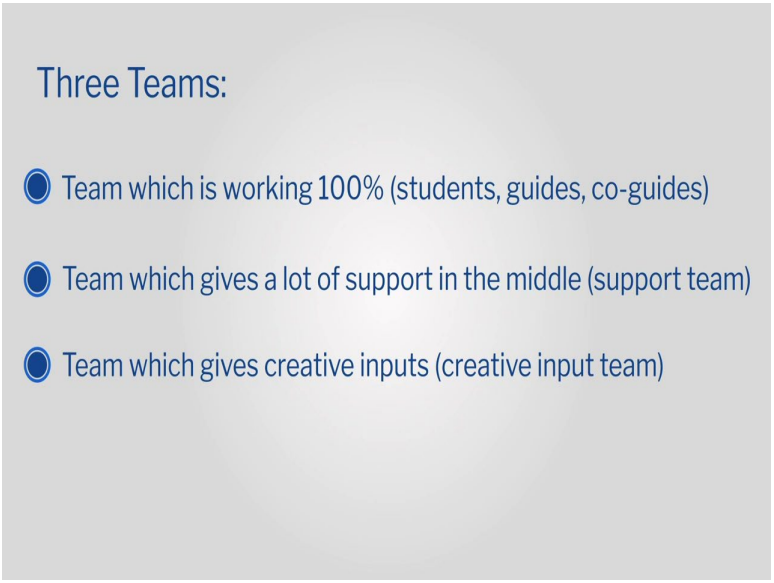

There is a team which is working hundred percent of the project, like I told you, the student and the guides who are 100%. There is a team which would give a lot of support in the middle. So the support team was very important. And finally the team which would give a lot of creative inputs to the whole journey, was the creative inputs team. So, that was happening with the three teams.

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Learning from real case studies

- Roles and responsibilities of the teams in the idea generation process could be ascertained.

And the roles and responsibilities of the teams in the idea generation process had to be specified and ascertained. So, we will show you the models now, from the learnings.

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Proposition 1

A collaborative network working on new product idea generation with members from diversified areas would lead to innovative ideas.

Mock	Involving experts across disciplines helped in cross fertilization of ideas.
Sheet metal bicycle	Expertise from external sources aid in generation of new product ideas.

So each of these learning, like you know, as I was showing you the case studies, built up some proposition, like for example, the collaborative network, you know, can work on idea generation. So if you have to build up a collaborative network, you must have experts and people from diverse areas to lead to innovative ideas, so that you can come up with innovative ideas.

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Proposition 2

Dividing the idea generation process into steps would lead to better control over the various stages of idea generation resulting in identifying and nurturing of innovative ideas.

Mock/Real	Thorough situation analysis provided new insights for idea generation steps, especially that spending time on initial steps helps in later stages.

The proposition too is, you have to divide your idea generation process into steps that will lead to better control in the process as well as generating and nurturing ideas. So when I say steps you cannot say that I need one idea you immediately go back and build a model. You have to have a lot of ideas, you have to build concepts. Out of the three concepts you have to choose the right concept by the stages, and after choosing that you need to refine the concepts. So those types of steps become very very critical and that is a part of a design process anyway.

So that step by step process, when you have a step by step process, what happens? You can actually get very good inputs from your Collaborative team. You can get inputs from your industry. You can get inputs from your partners' very effectively. Otherwise you won't get inputs. Because if you show the final result, how do you build their inputs into your results? It's not possible to build their inputs. So that becomes very, very critical.

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Proposition 3

Visual representation of ideas would lead to effective interaction between the various members of the network resulting in evolutionary development of innovative ideas.

Mock case studies	Visual representations of generated product ideas resulted in very effective communication

Proposition three, remember I was talking about, visual representation of ideas. You remember the step through bike, where because of the sketches, we could get a lot of creative inputs from all the partners in the Collaborative team. Let it be the industry partners, let it be the marketing partners, let it be the partners-IIT professors. That was happening in a very, very strong way and that resulted in evolutionary development of ideas.

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Proposition 4

Flexibility at different levels of interaction in the collaborative network would result in the generation of innovative product ideas.

Sheet metal bicycle	Selectively involve experts for their inputs at the right time in the idea generation process Accept ideas across the stages of idea generation assessing the ideas qualitatively The freedom in expression of the core designers in all cases

And the fourth proposition was the flexibility. You have to be very flexible in your idea generation stage where you should be open to ideas and open to the changes in the design process. So, those changes are also very critical.

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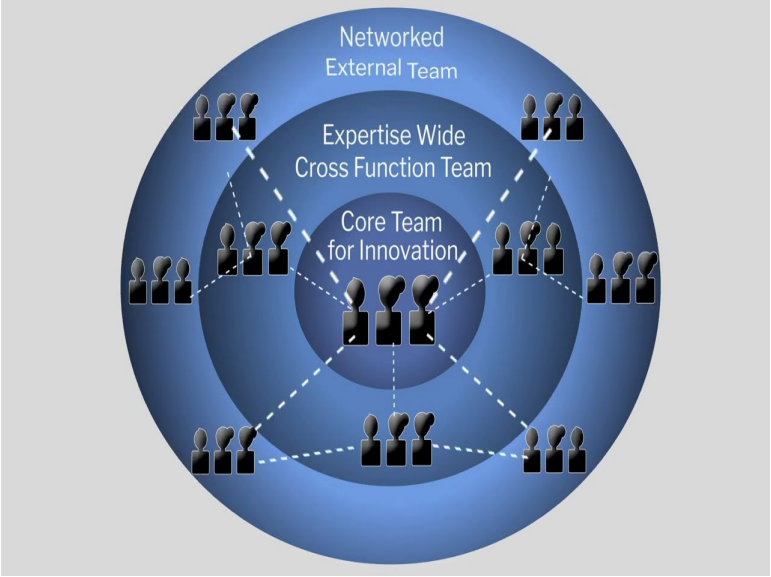

Let me now show you the model which is generated out of all these case studies. So this is a very very simple model, called the Collaborative model for a new product innovation.

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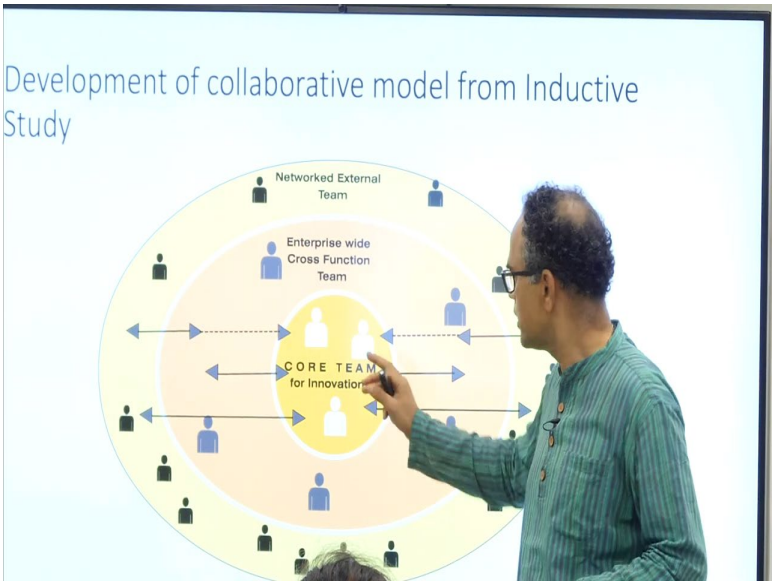

So in this model, you have the Core Team who has the full responsibility of innovation, that is they are working hundred percent on the project. If you are doing a design in a company, the core team would be like the team which is working 100% time on it.

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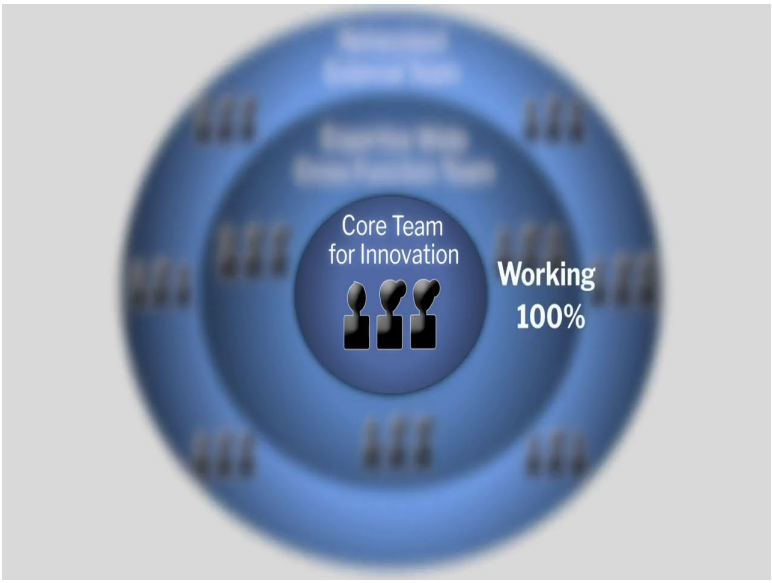

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The enterprise wide team would be the team which will be working around 20-30% of the time they would spend on the design.

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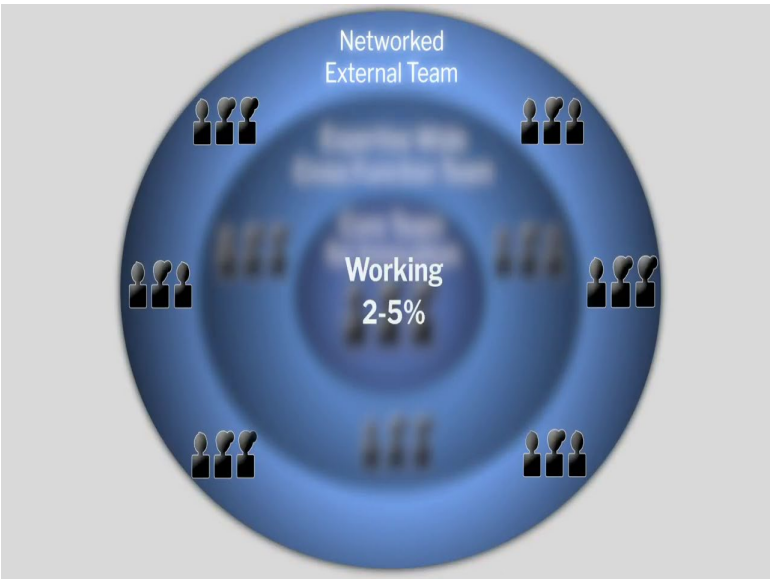

And the network team would be the ones who just give you simple ideas, they would be just spending 5% or 2% of the time. They will be just available for your meetings.

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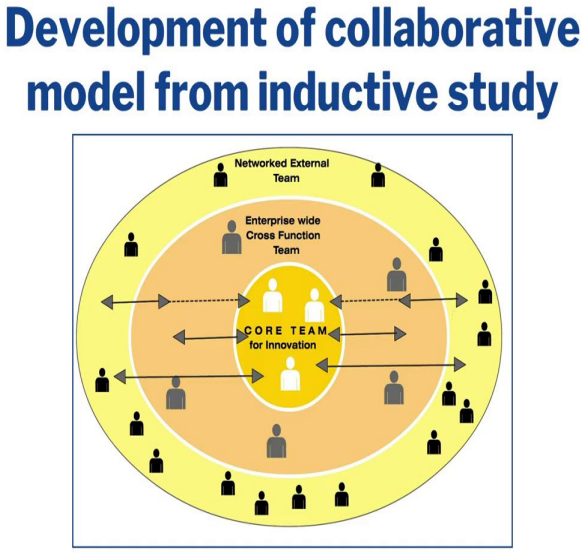

They will be your vendors, they will be your technology providers and all that. So, these simple ideas of dividing your processes into 3 teams can lead to, you know, a successful innovation.

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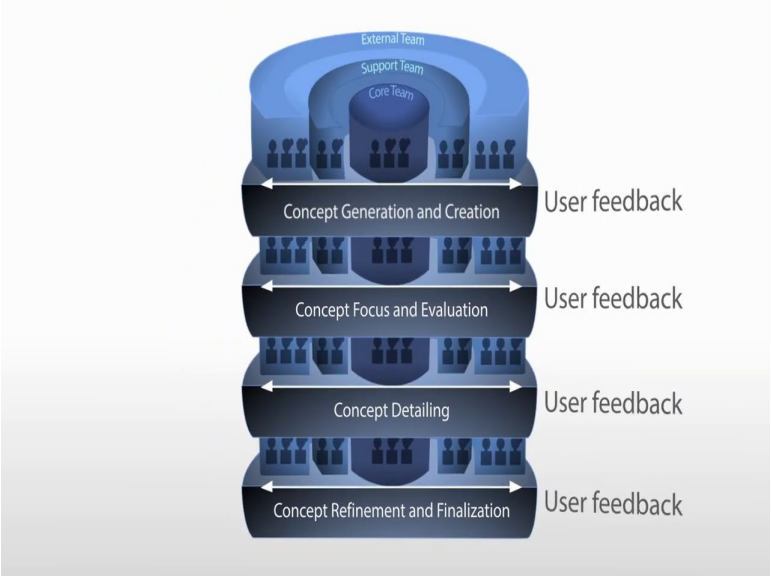

Remember I was talking about the stages in the process. So you have the idea generation here. Then you have the concept focus. You have multiple concepts here, three concepts. You can do the concept detailing, and then you finally do the refinement. So, when you have these stages. You can get inputs from various members very, very effectively into the team.

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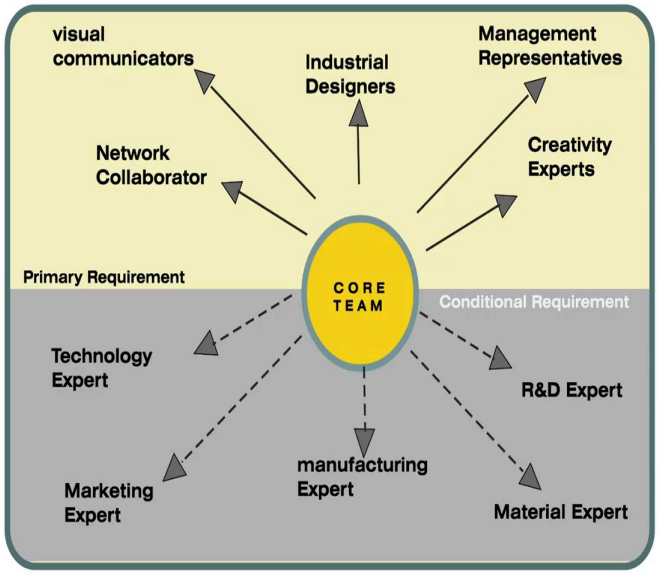

And here we have the core team. The core team has people who can be in the core team. It can be designers, R&D experts, management representatives, creativity experts. Depending upon your project. You can choose the type of people who will be in your core team.

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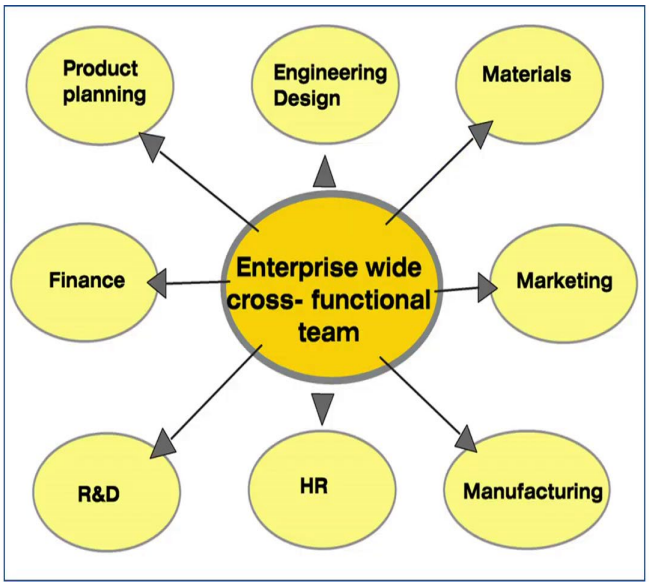

Similarly, in the enterprise-wide team, you have finance, because finance is a very important aspect of it, right? you have to make tools, you have to make processes. You have product planning people. Your engineering design people will be, you know, part of your enterprise wide, your manufacturing, HR, R&D. So, depending upon your project, you can choose the type of enterprise wide cross functional team, which will be there with you.

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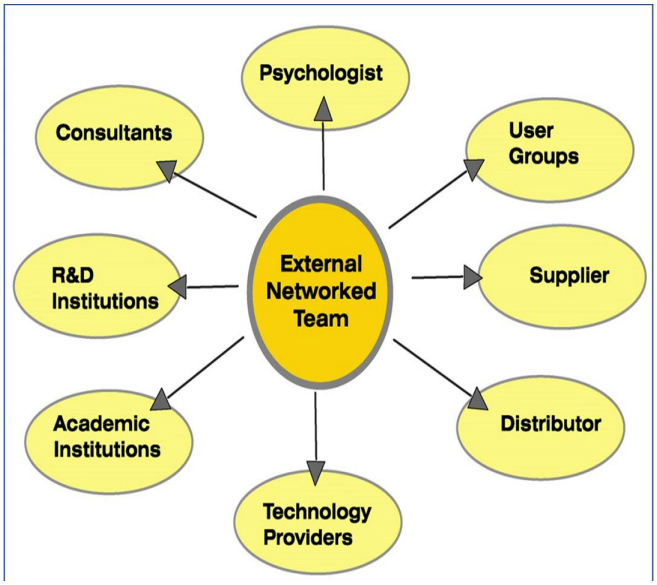

And then of course the most creative inputs came from the network external team. Remember I was talking about the dual chamber bottle where the pet manufacturer gave us a lot of interesting ideas about material. Similarly, in the issues of the bike, we went to a, sort of, Maruti which was

manufacturing deep drawn parts, to give a lot of input to the parts, so that becomes very, very critical. And then there can all be, you know, technology experts. They could be academic institutes to do research in the areas. They can become your very, very great source of innovation, innovative ideas.

So this is the composition, all put together. See, these are all the people and here you can see this cross at every stage, you are meeting everybody. At every stage of your design process, you're actually collaborating with your enterprise wide team and you're getting input from your network external team because of those inputs your design would map much much more carefully.

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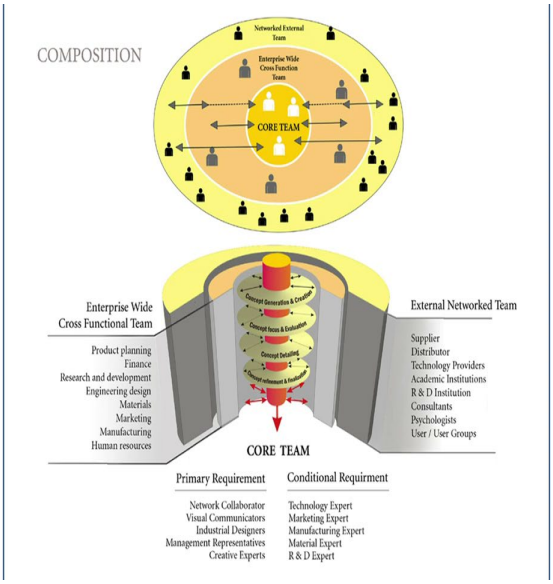

So in the Collaborative model, now putting all the slides together, we, we see how the composition works. So here we have the core team, and the core team is represented by this pipe over here. Then we have the enterprise wide team, which is this, this colour over here and then the external team here. So there is a complete network across these teams and the functions of each team is mentioned over here.

The composition here is the supplier, the distributor, the technology provider, the institutes which are giving you various inputs, the R&D institutes, the consultant, the psychologist and the user groups which help you to build your model. And the enterprise wide team would be the part of the team which is within the company. The product planning, the finance, the R&D team, the

engineering team, the materials team which will support you with new materials, the marketing, manufacturing, human resource.

The enterprise wide team is very critical in the design phase because you should do what type of company synergy is there, because without the company's synergy you cannot do innovation, and they are the ones which, because they are part of the company, they will give a lot of support for the innovation to go forward. So, that is a very interesting team, and of course we talked about the core team with all the designers and collaborators in that. Once the composition is their, a very important aspect is the function. What should each team function?

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So the core team, these are all the core team functions.

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The core team has to conduct creative workshops across people.

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They have to capture good ideas across the various teams.

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They have to nurture ideas, once you capture ideas you have to make sketches and nurture those ideas and create value. Then you also have to evaluate ideas. For example it is very difficult for idea generation across the team and when you generate ideas, what type of ideas will you select and reject is a very important challenge here.

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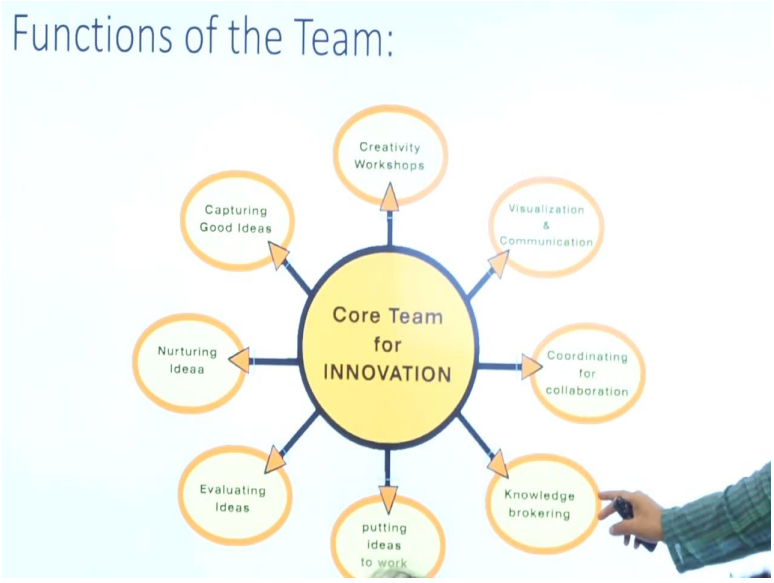

Then you have to make ideas work, you have to do knowledge brokering, bring knowledge into ideas, you have to collaborate with other team members, that is a very important function. And of course visualisation, collaboration is part of the functions of the main core team.

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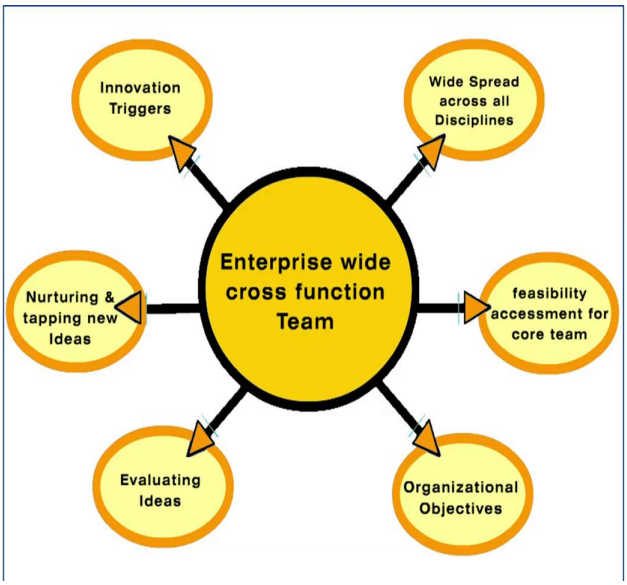

Then you have the enterprise-wide team. We also behave as innovation triggers because, see enterprise wide team is within the company, they have a lot of problems in the current products which they can become like an innovation triggers, 'Oh! The cost should be low, or the product should be more user friendly, the product should be lightweight'. So all those innovation triggers come from the enterprise wide team.

There are, you know, across the disciplines, they look at the feasibility very closely. They will help you with the feasibility. And of course, they will help you with evaluating ideas, which is very, very critical. And then we have the external team, they provide you with beautiful ideas and various inputs for coming up with the creative ideas. They act as a knowledge broker. There is also a user group which is your external team. They will evaluate your product and tell you how your products will work.

And of course, there will be a lot of people who would be material suppliers and other materials and new manufacturing for their ideas to sell their materials to you.

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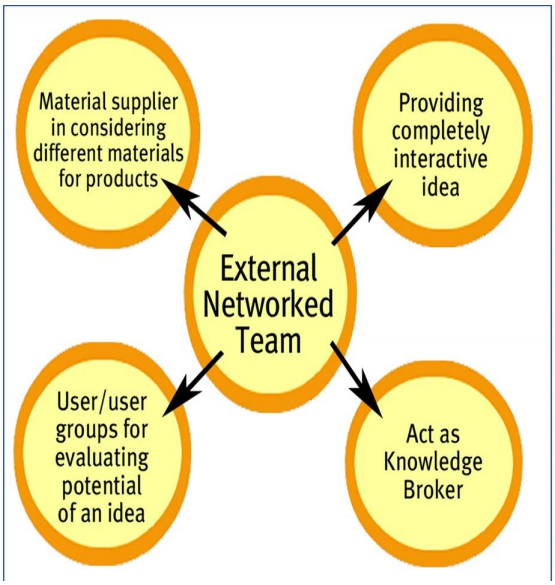

But they give you a lot of input to build your functions. So, these are, you know, by putting the functions now into place, you again build your, you know, the whole model. So we have a model for the composition and your model for the function. So putting these two things together, we have done a lot of projects.

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And these projects have been very, very successful. Remember I was telling about the postbox project.

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We exactly used the model and our letterbox became successful.

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We did a *Palki* design for *Vaishno Devi*. Now, 100 *palkis* are supplied in *Vaishno Devi*.

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That became very, very successful. So we have been using this methodology and we also did this methodology training for companies like Ashok Leyland and for outside sources. And they have also used this model and considered it effective. The advantage of a model is that you can actually year mark and pin point and take care of all the steps so that innovation can happen in the best possible way, because they are involving the CEOs very early in the phase what's happening is, and because of the success stories now, people have much more confidence in using a model to take things forward in the right direction if you have come with new innovations in the field.

I think one of the questions which was asked was out of the five projects, which of them went into the market. So as I told you the petrol pump, the bullet petrol pump did very well in the market because the company management was very, very keen in spending the extra resources on tooling and taking the product forward. Whereas the other project for example, we didn't see so much traction from the company side. After the project got over they never followed up with us to take the project forward.

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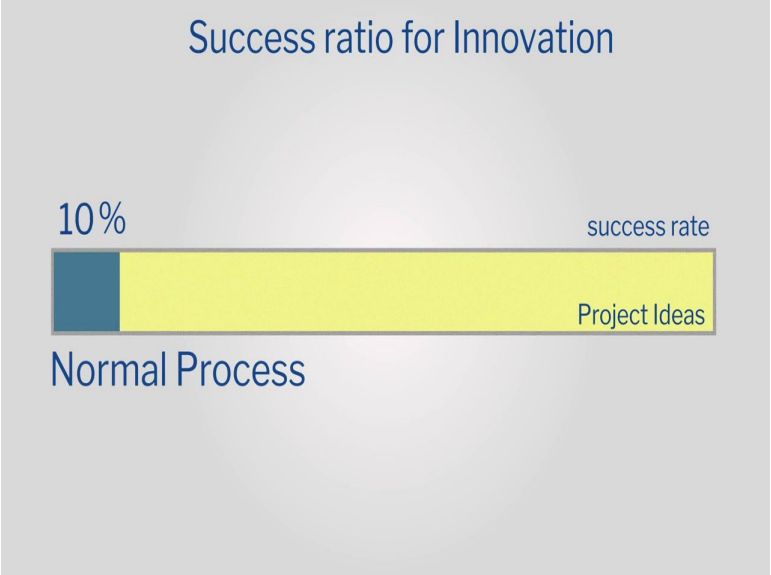

But we were happy with the type of progress because generally across the domain they say that, generally there is 10% success out of, out of an innovation journey.

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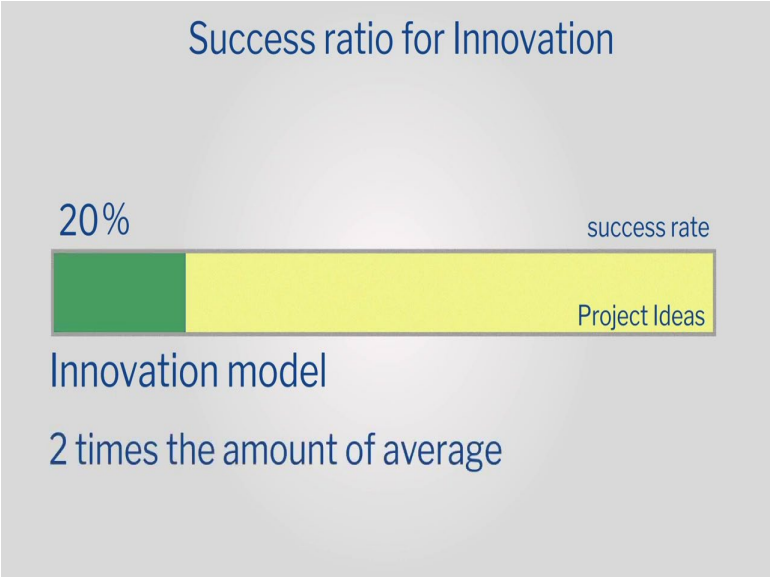

Here we have achieved, in this, while we worked for the model, we achieved 20% success because one product became a runaway success, a very good count in innovation success. **(Student Professor Conversation Begins: 16:58)**

Student: Why is it like that some companies, even after knowing it's a very innovative product, why do not they take it up?

Sir: Very, very good question. In fact that is a big challenge that we all know that this is good, they know that it is going to give them a good market but the biggest challenge comes to, what

happens to the current line? What will happen, and then the biggest challenge is, what will happen to the investment which we gave? Because it is a new product right they do not know the market. They do not know whether it will sell.

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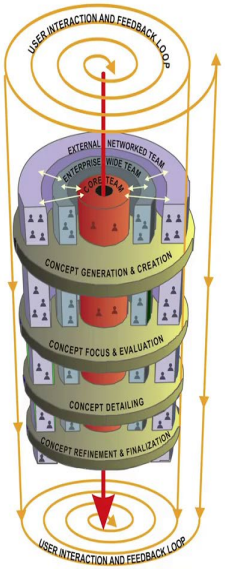

That is the reason why we were saying that the collaborative network should help us to link with the users very early in the phase, so that the uses become part of my journey. So, for example, in the Hero Cycles, clearly it was a risky proposition. See, innovation is always risky, right? So, the risky proposition, they were not ready to spend the money, but they were ready to spend money on their current welding robots, for example.

So, these are the challenges which we face when we take the innovation journey, but where as very clearly, when you look at the Nano story, top management like Ratan Tata said, nothing doing. this car should be a car, but it should be half the price. Then things can go forward in an effective way. So, you really have deep pockets to take in the innovation journey forward.

Student: Can you explain more on the features of the bike you made?
Sir: This bike was very interesting. This bike, the main features of the bike was that they gave a lot of style requirements from Argentina.

They said these are the types of bikes which are running currently. They should be like one of them. If you make something completely drastic then nobody will use it. That was the major aesthetic consideration and then other considerations was that you needed to have utility which will not hamper the aesthetics. For example, if you put a basket to carry vegetables but the bags should be hidden inside the bike. All the bags which were coming out or jetting out, which were flexible bags were hidden into the flanks of the bike.

So if you use the bike normally it will look beautiful and then when you are carrying vegetables, they are, the bags are pulled out of their hiding and you can put things. And especially the rear view mirrors, all of them were stylized. They want every component to be stylized in a way to have impact in the market for the rider. And the step through was an important component of Argentina. Step through was a popular concept there and they put a dove tail into the step through concept by taking our product over there other, otherwise most of the products were from Japan, OK? Come then we will head to our class, thank you.