

Design, Technology and Innovation
Prof. Anil Gupta
Founder Honey Bee Network
SRISTI, GIAN and NIF, CSIR
Bhatnagar

Lecture-15
Learning's from Grassroots Innovation

The context in which the content of our learning takes place, we spend a lot of time on what we do, but the context in which it is done and the context in which people may use what we do is some time more important than what we are doing. So, you have a line here and you are to shorten it without rubbing it. Do you know the answer? You draw a bigger line. Now, here begins the context of my story today.

So what has got changed here? The context. What did it change? The content. The same line became smaller. So, what are we trying to do? We are trying to change the context in which designers choose the problem and try to solve them, address them, scientists pick up a problem and do research on it. But very often or many times the context in which these solutions are going to be used, if it succeeds, is not as apparent as it should be.

So how do we do that? So one of the ways in which we try to address this problem for my own learning and learning of colleagues in the Honey Bee networks was to walk in different parts of the country. So the concept of voluntary suffering is very fundamental to what Honey Bee network does. When I try to find a solution which is addressing my own problem, I am not doing any favour to anybody, I am not doing any obligation to anybody else. That becomes *Samvedan Shilta* or empathetic innovations.

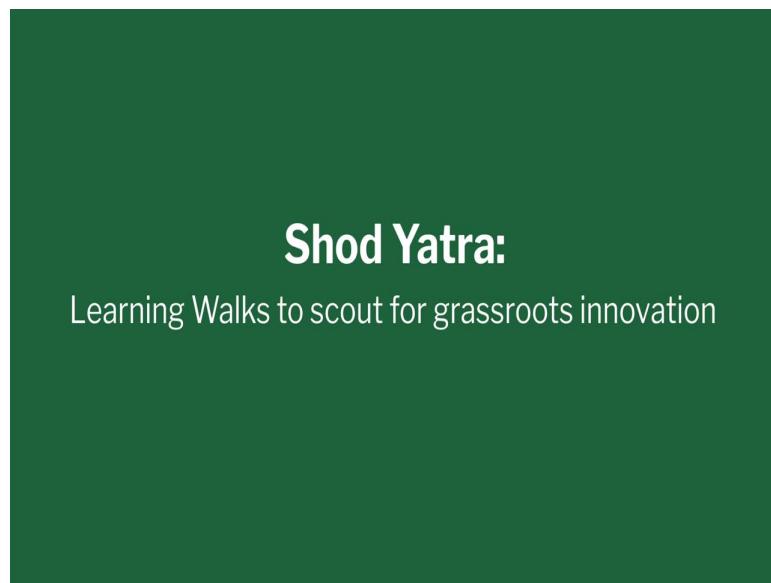
And empathy which is not equivalent to *samvedna* because *samvedna* is within, empathy is for others, helps us to identify those problems, those pain points which otherwise you might ignore, because they may not affect our life. So we have been giving Voice, Visibility and Velocity to the ideas of common people. If they could do so much for their own efforts, they could do much more with our sharing, joining hands with them. If people who do not have much material resources have to survive, what would you do? What will they maximize?

They do not have much material sources, so they will maximize their metal resources: Imagination, experimentation, innovation. So, innovation is imperative for them, they do not have choice.

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So we will discuss today first about 10 teachers from whom we learnt over the years through various processes of *Shod Yatra*.

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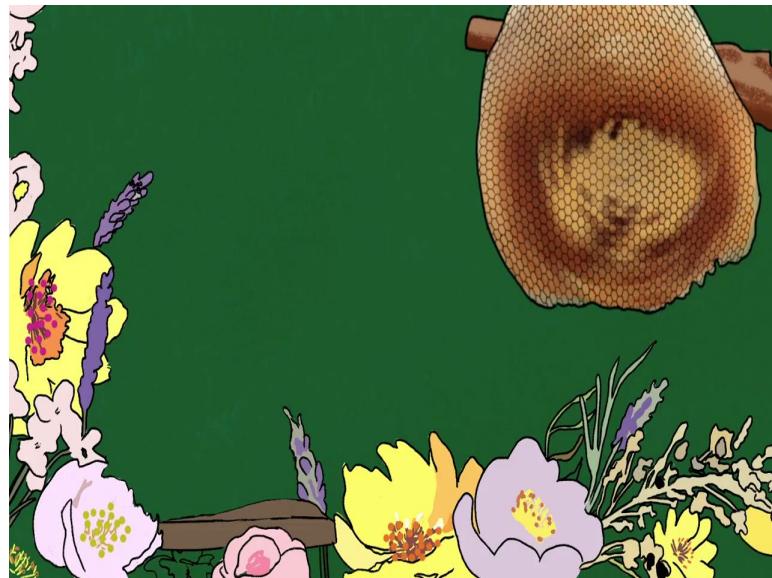
And these 10 teachers are accessible to each one of us. You do not have to come to me to find these 10 teachers.

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The reason why we call it the Honey Bee network is because honeybee does what we don't do.
What intellectuals like us do not do.

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Honey bees cross pollinate. The idea to connect ideas of 1 with another. When they take nectar away, the flowers do not complain. And don't keep all the honey with themselves. They share some with us. So when we take knowledge of people do we acknowledge them? Do they become co authors when the reports and publications? All the 1050 patents filed by the National Information Foundation are on the name of the innovators, not one of them has the co-inventorship of the staff or the scientist who have worked on them.

We said ok, when we write papers we can become co-author. Put the innovator and your name together. We do not mind that, but intellectual property rights, that will remain of that person. So the asymmetry that exists between knowledge producer and provider in the informal sector and knowledge producer and provider in the formal sector, we have tried to bridge that gap.

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When do great institutions, cultures and civilizations start declining?

One of the questions that bothered me is that many great civilizations sometimes decline.

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And they decline because they do not communicate much, they do not share much. They become self-contained. A professor does not talk to the next professor the next door. The student does not talk to the student in the dorm. They just become secretive. The more secretive you become, the

less feedback you get. It is only the criticism from the peers and from colleagues who know about our subject only can ask some strange questions which help our ideas to grow.

So, how do we create that culture of sharing and building upon shared ideas, that was one of the concerns that had.

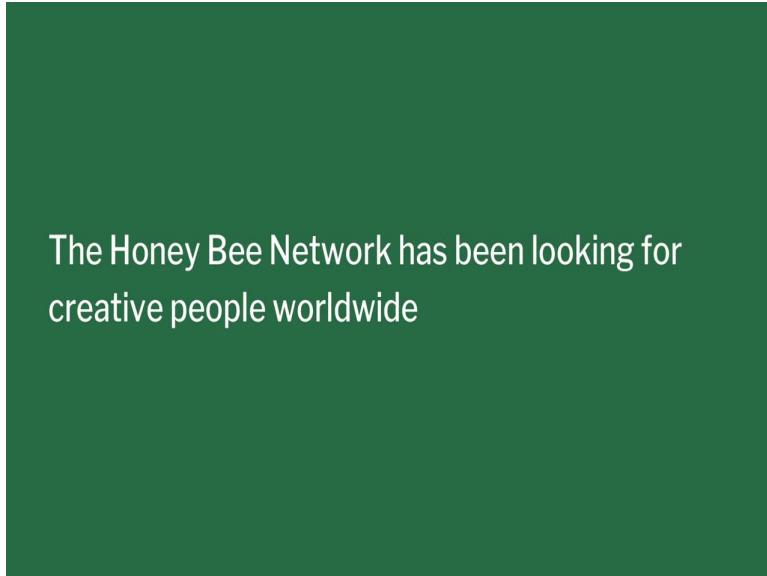
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How do we create turbulence of technological, institutional, educational and cultural creativity and innovation?

Because we did not want our society to decline. And how to do that?

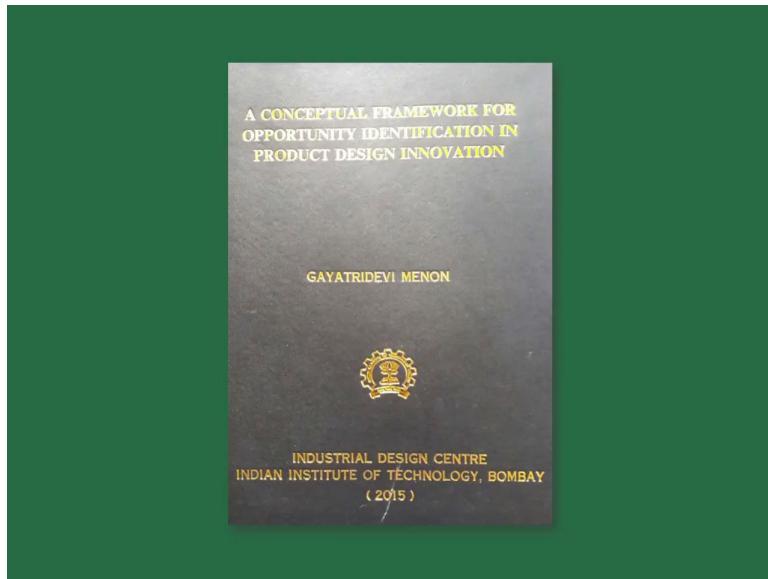
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The Honey Bee Network has been looking for creative people worldwide

So we realised that we are looking for creative people. Creative people are everywhere. Just outside of IIT Bombay, there is a person who often binds your thesis. Black cover thesis. And you know there is embossing done on that.

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Title of the thesis in golden colour. He designed a printer for embossing your thesis covers which will print whichever film you use, he will print with that colour and we thought he deserved to be recognized. He may not have studied much, he may not have been educated much but had creativity to design something. Outside the boundary of IIT. There are creative people all over. No matter which place we went, we have found creative people. In *Bargarh*, a district of *Orissa*, when we had a *Shod Yatra* there in summer. Very hot place.

Said to be a poor place, of poor people, but people may be poor economically but they are not poor in their mind.

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Mind on the margin are not marginal Minds

That was my subtitle of my book in 2016: Mind on the margin are not marginal minds. So this person had designed a loom where he wove a kurtha in a cylindrical manner all of it. Imagine the complexity of this task, as an engineer, as a designer. Just think of the complexity. Why would he do that? Not everybody stitches that. I have to do something different. I have to do something better. This desire to be different motivates this couple to design something that was unthinkable. Now our horizon has expanded. Now we can think of that. In sweater it was easier, because with this knitting you could do that, but in weaving? That was the first time.

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So, what are we trying to do? We are mapping creativity, we are tapping the innovations of the people who are solving problems innovatively and we want to cap the inertia. Some inertia is

inevitable of course we cannot change everything all the time. But some of the inertia in our society has been for too long.

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You have seen hand pumps. So if you have to drink water, what do you have to do with the hand pump? Single, you are alone.

Student: You pump and as soon as the water comes out you cup your hands and you fill it.

Sir: Then what happens?

Student: Then you have to keep repeating it.

Sir: Then you go back and some water spills over on the web in the time that you went there. We have so much water to waste? So what should be the design? He is saying you bring a pipe closer to handle? What else can we do? Quickly just tell me. Look at that first issue I told you is less material.

Minimum material & Maximum efficiency

We want Minimum material and Maximum efficiency. So this is the handle, how will you take it? This side? Correct? Pump it, drink it.

Student: Sir we can make the pipe the handle so we just pull down the pipe.

Sir: When you pull the pipe done, if you push it down, as a pump, you need much more pressure. It is a lever. Why are we using this long bar? To use it as a lever, you know. You know what lever does.

Student: Sir, if we make the pipe longer we inherently save material.

Sir: Now we have not added any extra material in this design solution.

Student: That way we will be removing material.

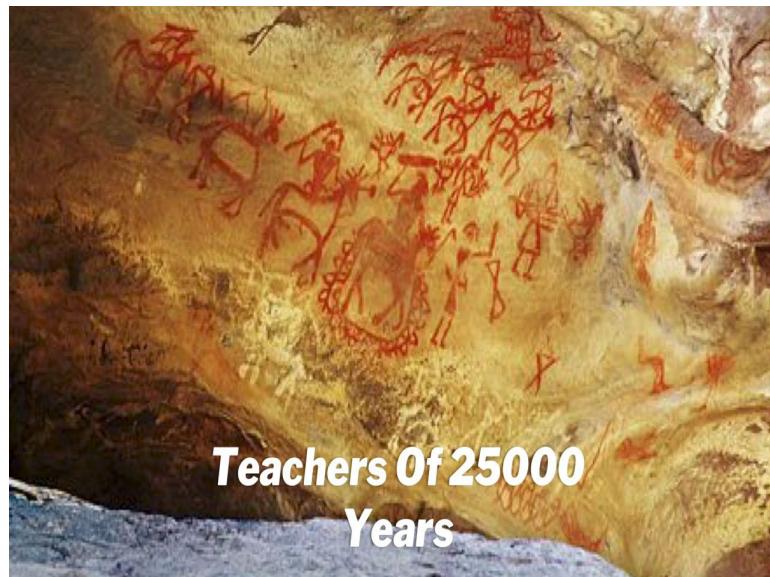
Student: I said if we could make the pipe longer.

Sir: No, but the question is: if I do not use anything extra.

First attempt is minimise use of extra material. If possible, reduce some. Because material creates entropy, correct? The question is for such a long time, for millions of hand pumps we continue to bear and live with inefficient design. Why is our society so tolerant of inertia and inefficiency? So, what happened then? Somehow we reduced the expectation from ourselves. We think our life is less precious. We think we matter less.

We do not deserve an efficient service or design. It is ok if as Indian I can live with inefficiency. Because we have somehow been taught to accept. We are a conformist society, we are a congruent society, we are a complaints society. We do not question enough. Every innovation is a response to a question.

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Now, I will show me some teachers from whom I have learnt and I am sure you can also learn. Teachers of 25000 years. You know, where this cave painting is? There is a place in Central India, *Bhimbetka*. 25000 years ago a design teacher was teaching us and at that time there was no language, there was no community, there was no simulation. It is all about 10000 year old. And the teacher is telling us, 'Ok, take 2 lines, make a cross, 1 line, make a double cross and the double line, put a head there, circle, 2 draw lines, and that is how you can make a human figure.'

Move them in different directions and you can make different actions. So we can see now these human figures on horse, simple design. It is the simplest beauty. Isn't it? It is possible to communicate. So well that there is no loss of information even if it is 25000 years.

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A teacher of 2000 years ago

- ‘Just’ a drop of water

Let us go to the next teacher. So 2000 years ago a teacher asked a student to bring a glass of water. Student brought a glass of water. The teacher took the water, gave the empty glass to the student. The student went and kept the glass in the kitchen. Teacher called him back, ‘So what did you do?’ ‘Sir, you asked me for a glass of water, I brought the glass of water and you took the water and I went back and kept the empty glass in the kitchen.’ ‘No, no, no. Tell me what did you do?’ And he will ask this question and the student will repeat this 5 times, 7 times, 10 times and obviously the teacher was not satisfied.

The student said, ‘Sir I know now what I did’. ‘Tell me, what did you do’, ‘Sir I went to the kitchen, when you asked me for a glass of water, I brought the glass of water, you drank the water and you gave me the empty glass. While going back I threw just a few drops on the ground’. Then he said, ‘Just a few drops, he got it then. He should have dropped those few drops in a garden. In a drinking water plate for the birds. Now 2000 years ago there was no shortage of water.

For the next 1950 years there is not going to be a shortage of water. Correct? Population was so little and there were so many lakes and rivers. Why is the teacher building a value of saving a drop of water 2000 years in advance. He anticipated the problems of our society so much early. Are we going to solve the problems of today? Who will solve the problem which will arise after 500 years,

1000 years, 2000 years? Who will solve that problem? This teacher is solving that problem. He made us conscious. We may not meet the consciousness intact that is a different matter.

But there are people who will not keep the tap open when you go in mornings and wash your hands three times with soap. The tap can remain open or you can close it every time, put the soap on your hand and then open it again, then wash, then close, then wash, then close. We can do that isn't it. Some of you might be doing it actually. Those who realise that this water should not go to waste. Some of you may not be doing it.

But the thought arises in the mind, 'Am I doing it right?'. That thought, the seed of that thought, this teacher has planted.

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A teacher of 20 years ago: 1998

- Encounter with a shepherd in a desert: who is literate ?

(FL From: 13:53 to 13:57) '*Bhai rukna zara baat karni hai. Bahut garmi thi, thak gaye the. Socha chalo thoda masti karte hai.*' (Please wait for a bit, I want to talk. It was very hot, I was tired so thought I'll have some fun)

So I waved the hand please stop, he stopped. I thought I am a professor from IIMA (Indian Institute of Management, Ahmedabad), management professor, very reputed professor, very wise. I may be asking very intelligent questions. So I said, 'if one of your sheep gets mixed with the herd of

another, what will you do?'. I was having a program of *Shod Yatra* in my hand. The shepherd heard me, he said, 'Please give me this piece of paper'. So, I gave him the piece of paper. He put the whole program in front of him. He said, 'For me all the letters look alike'.

You know it was a slap on my face, to me all the sheep looked alike. That is why I asked that question. It was one of the most foolish questions I ever asked in my life.

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A teacher of 20 years ago: 1998

- I was illiterate in his language of sheep, he was illiterate in my languages of letters, yet I was naïve to assume a superior education

And he gave me a slap almost. He said, 'Look, I am illiterate in your language. You are illiterate in my language. What is different between us. You cannot make out the difference between two sheep? I can, I know each sheep is unique'. Which is true. This teacher is accessible to all of us. That is what I am trying to say. Let me take you to another teacher. So there was a film being made by *Jayantibhai* from Indian Space Research Organisation.

So we went to *Karim bhai*, not Gujarat, near a forest, Balaram Jaiswal Sanctuary. On the fringe of that sanctuary there is this village, *Behrampur* was there. There was a stone, so we asked him to sit down there. I was sitting on another stone and he was setting his camera, and then he said, 'Sir, it would be nice if you had a twig of a plant or shrub in his hand, that will look nice. We are going to talk about herbal healing'. He was a potter but he used to heal the people.

A teacher who understands nature

- Fundamentals of frugality
- Why did you pluck this twig? Did we need it?
Asked karim bhai while we were setting the stage for filming an interview with him on healing

So I plucked a small twig from the roadside plant, a weed and gave it to Karim Bhai. And Karim Bhai got upset. I said, ‘What happened? Why are you upset?’ He said, ‘Did we need this twig?’ I said, it will look nice, that is what the photographer thought.

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A teacher who understands nature

- Then I could have sat near the plants on roadside, instead of plucking the twigs, But then, like a fool, I say, are not there so many of these “weeds” on the road side?

‘Then you should have told me, I would have gone and sat near the plant’. Like a fool I said, ‘But there are so many of these. If we took one twig what great has happened? Why are you so upset?’ He said, ‘What did you say? So many? In nature, there is never too many’. Can you imagine I used to pluck the blade of grass, put it in my mouth. If I was standing near a bush I would pick a leaf, crash it, that was my instinctive reaction? Now if I try to pluck anything, immediately Karim Bhai comes in front, ‘Do you need it?’ There is nothing in nature which is extra, everything is in place.

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So there are teachers of all kinds. There is another teacher I met. In *Champaran*, we were in *Shod Yatra*. Out of 150 km of walk, there was one pen, a grand pen which was so beautiful like this. You can see that. Beautiful? Only one. So we asked the lady of the house, ‘Why did you make such a beautiful pen’.

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She said, ‘But that is the only way I know’. Oh my God. Excellence is imperative. ‘You are helpless? You do not know mediocre ways of doing things?’ ‘No I do not know’. ‘But everybody else has made those’. ‘Maybe, I know only this’. When you are helpless, you cannot do a mediocre job because you are helpless. Oh my god that culture can produce some much inertia. It is strange

isn't it. The same culture which produces, which generates context for people like Ram Kumari Devi also produces people like us.

We have become so patient with mediocrity, with something that we don't even approve of. Sometimes you do things which, from your own standard, it is not so good, correct? But you manage life, move on.

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She did not. Now look at another teacher, a teacher in paradoxes. Now the whole word is becoming paradoxical. The future belongs to paradoxes. In every discipline now we encourage students to learn paradoxical. That means you look at the contradictions. If there is a distribution. Look at the two tails of the distribution. All the time, a dialogue, an enquiry is not complete if it looks at only one tail of the distribution. By habit we should be paradoxical.

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A teacher in paradoxes:

- Inviting birds to stay
- Collecting manure to use it in the field

Look at this, this community in Jharkhand is attracting birds, correct? By hanging these pots. So that they can collect their manure in the gunny bags and use it in the field. The birds are producing fertilizer, the first fertilizer in the world which was taken into account was called guano. It was collected from Amazon and brought to England.

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Keeping birds away



Now look at what happened at my Institute. We are designers. We do not design products and services. We also design relationships. We design, and as we say as in this class, the last point is connections. We connect different world views with different parts of our life. Here, we are connecting or disconnecting. ‘Sir, they make noise, sometimes they make love, sometimes they do something else outside my window’.

(FL: 19:04) ‘*Are yaar, kya dikat hai?*’ (Dear friend, what is the issue?)

Love is the most beautiful thing in the world. Is that a paradox?

I teach, I want you to become sensitive to nature and I do this. You would not believe me then. You will say that ‘You are a hypocrite’. Of course this hypocrisy of the highest order. How do we learn from collective intelligence? This is one subject becoming extremely topical now. All over the world. *Gandhi ji* on 24th July 1929, gave a call, a global call for ideas. The award was 7700 pound at that time, 1 lakh rupees.

In today's currency to about 10 crore rupees. The award was for redesigning his spinning wheel and if we look at this announcement that *Gandhi ji* design, it gives you the boundary conditions of the final solution. He did not know what will be the final solution. But he said the count of yarn should be some much, the weight of the machine should not be so much that it becomes difficult to move it. The working of the machine should not make a woman tired in 8 hours of work.

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The idea is the same that we want to learn from strangers from people around.

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A teacher among the community

- Nurturing networks
- Nine grains, nine neighbours

So, this festival in Sikkim requires you to collect 9 grains on that day around *Raksha Bandhan* from 9 different grains from 9 neighbours. So, let us say the next door neighbour gave you a particular bean, sprouted bean and the next neighbour also gave you the same sprouted bean. You have to go further, till you find 9 different grains, which may mean you may have to go to 40 people or 50 people. What are you doing? You are renewing your social network? People whom you normally do not meet. That day, because the culture has created rituals, you have to meet all of them and say, ‘Hello’, and ‘How are you? Ok, what are you doing?’ and ‘Give me a bean’.

And everybody keeps these pots of sprouts with them. What a wonderful way of reviving the context. Making the community come to know each other, renew the connections.

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So we were walking in *Kangra*, we saw this tree and we went to the tree (**FL: 21:22**) '*Bhai kya hua*' (What happened here?), I asked the tree. The tree said, 'I am not supposed to branch, but by mistake I did so I did the next best thing. I made it a parallel stand.'

(**FL: 22:08**) '*Yaar kamaal hai*' (That is wonderful). That is great. So I said that is a very interesting point because when I am talking to you some cells in my body are going through mutation. Thank god they are not cancerous. So, I can continue to talk to you? What is my body doing? It is either repairing them or replacing them or by passing them or regenerating them.

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Autopoeisis at grassroots for inclusive development

- Capacity to redesign itself during the process of use

It is doing something which gives my machinery working without creating any problem. This capacity of a system to redesign itself during the process of use is called Autopoiesis. So when we design some product and services and during the process of its utilization, it can learn and that it can improve according to the needs, variable needs, changing needs of the users, that will be autopoesis of life.

Say if a knife after cutting things becomes sharper, there are knives like that because they are given a lot of temper. That is also autopoesis. It is repairing itself. It is healing itself. Challenge is a very difficult concern but nature teaches us this. Theoretically, not theoretically, empirically this possibility exists in nature. All of us are an evident proof of that, in our own body it is happening. Large numbers of compensatory pathways emerge in our life. In our neural networks sometimes some cells are in a problem and other cells' synaptic connections emerge in our network and they composite for the connections that were weak.

We can prepare, our body can heal itself. Doesn't it heal itself? Of course it can. How do we learn from nature therefore? So all of these teachers that I mentioned about, are teachers who help us to learn from the grass root level. They do not charge us fees. None of the teachers charged any fees to me.

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It doesn't mean

I will be honest. That does not mean that there are no fees due to them. I am in a debt of them. They taught me such useful lessons which I am sharing with you. And how do I pay that fee? By being more empathetic in whatever I do. By being more inclusive in whatever I do and by ensuring that I do not lead to exclusion of the community, of the nature, of the people, of the needy people in my research, in my design and in my activities.

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So we try to search, spread, celebrate innovations and sense the unmet needs. These are the 4 functions of every *Shod Yatra* invariably and aids. You could have an innovation club and that club would do the same thing. Search, spread in local language, cross pollination in Marathi, in Telugu, in Tamil and Gujarati, not just in English. Local community does not understand English

most of them. Then we are not sharing with them, you may claim that we are sharing with them but you are not.

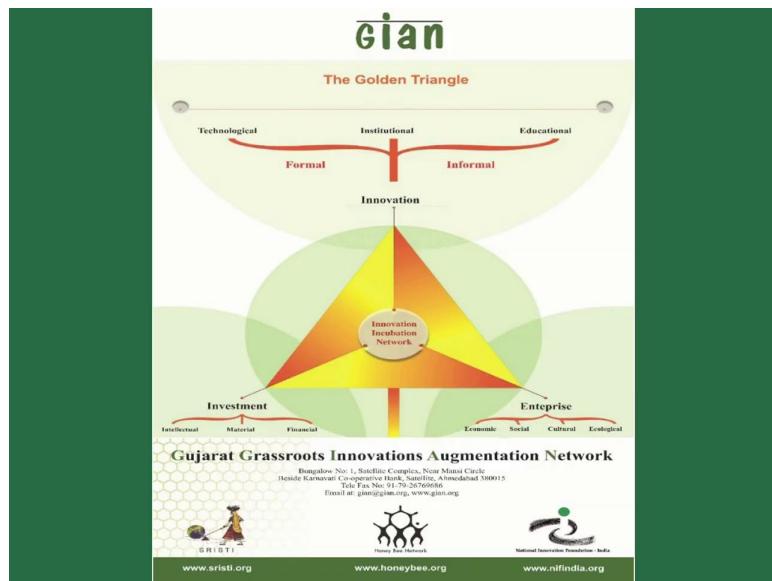
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Lecture-16
Learning's from Grassroots Innovation

You know what was your last week's upload to download ratio? Anybody whose ratio of upload to download was more than 1? Please raise your hand. Did you follow what I am saying? Anybody here who's upload to download ratio was more than 1? What kind of destiny this attitude is bringing, is breeding? I mean when my download is so high and upload is so little, What am I trying to tell the world? I am a consumer of knowledge but I am not a producer of knowledge, correct? Is that what our society should be all about? Is that why we are here?



So, when we set up Shrishti in 93, Gian in 97. Gian was the first incubator in the world. Innovation, investment, enterprise, this triangle. We were trying to connect and reduce the transition cost of the investor, of the entrepreneur. Such a triangle did not exist, at least not in the context of the Grass Root Innovation. And then we created NIF in 2000. National Innovation Foundation. Such a foundation did not exist anywhere. Not in this country, not anywhere else.

And we got a district innovations fund of 2 crores, every single district. 13th Finance Commission, Dr. Kelkar was chairman of the Commission, I told him, ‘Sir, cannot we do this much? You allocate 10's of 1000's of crores to different states and everybody, sir I'm asking for only 600 districts, 1200 crores (**FL: 01:38**) ‘*Kya badi baat hai sir*’ (What is the big deal sir). And it became a policy, so it continues, every collector has 2 crores, now maybe 4, 5 crores to spend on all in the district innovation fund.

But the fact is that it happened. So I was not only talking about innovations becoming product, which of course we were doing. But we were also creating an ecosystem which will make innovations of anybody and everybody go up. 10 innovators stayed as the guest of the President of India, because he wanted to give a message: This country cares.

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Sensing the unmet social needs



Area where we are is not so good is this one. Sensing the unmet need. There was a student group in one of his classes which is something of my very favorite project. When you go to an auto rickshaw, you have used an auto rickshaw. When you climb the height of the step is all right or is it too much or too little. Now what do you do when you put the luggage in the auto rickshaw, what happens next? If you have to enter the auto rickshaw, you have to sit on the seat, what do you do? You put the luggage. Then what do you do?

You push the luggage. Is it easy or difficult? So what should be done to make it easier? What this group did now think of it, and these are students like you. I am not talking about somebody from another part of the world or another planet. Similar course last year.

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And I happened to be there in the jury of that course and I like this idea so much that I cannot explain to you and the reason I am picking it up is it is beautiful because it shows that complex problems within our society have learned to live for such a long time, can be solved with such little effort. So, they put a small channel on this surface. So, the area of contact between the suitcase and the ground of the, of the base of the auto has been reduced, less friction, more easy to move. Simple principle is it not?

Is it not a nice idea? And a retractable step. They made a retrofitting step. These were the two things that they did. What they did not do and what some of you might like to do is to go and get it installed in. Is it exciting to take somebody else's idea forward or only or we should take our ideas forward? Tell me. This course is about that. You are only bringing people who have made their ideas go to the people.

So that is the crux of it. This question is the crux of this course. None of you would like to take their ideas forward, correct? That is the problem. You know, not everybody can be good in everything. Some of you may be good in ideating and that is fine, and some may be good in implementation. And you should realize that and you should accept it. What is wrong with that? This world would not have so many production services accessible to us if somebody did not scale them up and transport and make it available to us. Isn't it?

Are these not useful people? But the point is if somebody else finds a solution I can innovate in delivering it to the people. That is also an innovation, a service delivery innovation. Isn't it? We do not need only product innovations, we also need service delivery innovations. We also need financing innovations. We also need after-sales service innovation. We need a whole ecosystem of innovations, to make this country go forward or any society go forward. Should it not be? And

we have to solve this problem and we have to solve it now and here. So, think about it. How can we do that?

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So, we learn from teacher within, teacher around, teacher in nature, teacher among common people.

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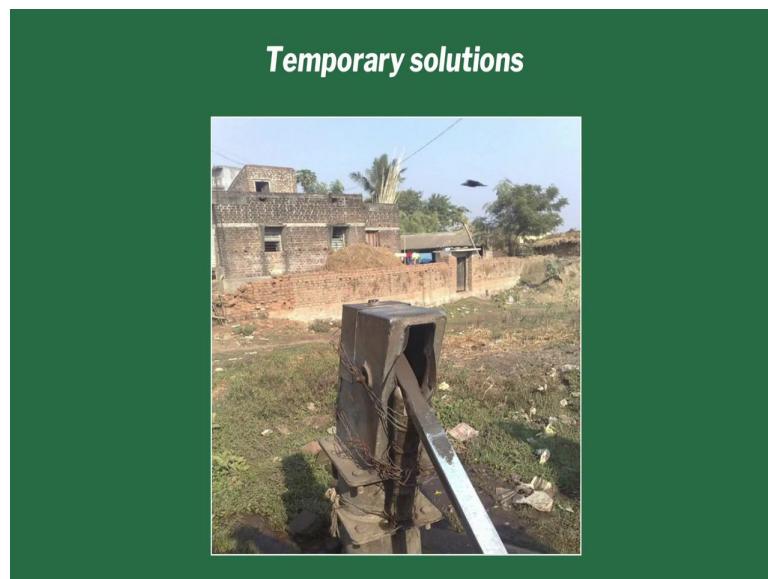
And let us look at a case study. So, this is a hand pump and it is in Rajasthan where water is very, very scarce. So, what is the problem here, water is spilling over, so we must find a solution.

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This is the solution. Two grassroots innovators, *Vishwakarma* and one more person, a small pipe for drinking water, bigger one for filling the bucket and it costs only 100 rupees. Retrofitting. (**FL: 06:16**) '*Ek upar ka cylinder nikala aur dusra laga dia*' (They took out one cylinder and put another)

But this is not complete, if some water still spills over, it is inclusive, not just for human beings but also non human sanction. When you design solutions think about birds, squirrels, ants and animals. They enrich our life, they enrich this nature. So, they must be part of our solutions.

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So, in Purulia I noticed this. When you have this socket and you pump it every day, what will happen? It will strike against that base, doesn't it? So, this will get worn out after some time because

of the handle. So, this community what they did they have tied a wooden piece here which also has worn out after sometimes, you can see the groove here. Temporary solution (**FL: 07:12**) *hai ye* (this is). This is the mindset, not a very appreciable mindset, of providing temporary solutions.

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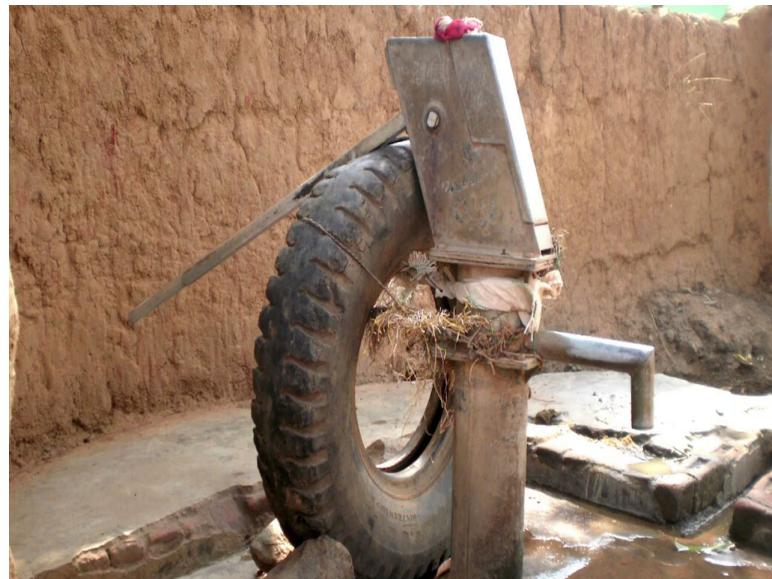
Now let us go to *Bastar*. We went there for *Shod Yathra*.

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So, this is one solution, so this will not allow the handle to go further down. (**FL: 7:32**) *Toh damage nahi hoga woh section* (then that section will not get damaged). But it will strike and hurt a little bit (**FL: 7:36**) *Theek hai na* (All right?). Every time, it will still hurt.

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How about this one. Conceptually, think about it conceptually, do not think or look at it only artefactually. It has, as we were saying, rebound, would not hurt, would not damage, correct? smooth solution? But the design of the hand pump has learned nothing from it. UNICEF has not learnt anything from it. Now the challenge is how do we bring about change in these designs everywhere so that as a society we become more efficient.

So, we have to overcome 6 kinds of exclusion. Exclusion over space, mountains, flood prone areas, drought, deserts. Exclusion over sector so for example, this handloom sector, the kadhi sector is very neglected. Hardly any innovation has taken place for the weavers and for the spinners of the yarn.

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Six Dimensions of Inclusion/Exclusion

- Spaces
- Sectors
- Seasons : stable to fluctuating
- Social segments
- Skills and knowledge
- Structure of governance

Seasons, currently in Bihar, in parts of the country the whole region is flooded. How do we deliver milk and medicines to the people who are living in the settlements which are marooned? How many amphibious vehicles do we have in this country? Isn't it obvious that we need it? The exclusion takes place in certain months of the year. We have been in Spiti, we went there for Shod Yathra after Rohtang pass was closed in October and November. For 4 months it is cut off and we do not have helicopter service.

So it is excluded. Certain social segments are excluded: Dalits. Sometimes even women are excluded from the designs. Skills of certain kinds get excluded. And the structure of governance, structure of governance means the norms by which you design exclusion. So, let us say you have one health worker per 1000 people. Now one health worker per 1000 people in an area where population density is 1000 persons per square kilometer versus where it is 50% per square kilometer does not make sense. It is a designed exclusion.

By design. As a designer your job is not just to design a product and services. You have to also design policies, the processes, the system, the institutions which will make sure that the value of that desired solution that you have desired reaches the people who it is meant for, isn't it? So, this was the triangle which we developed in 1997 GIAN, for converting these three together. Economic enterprise, Social enterprise, Cultural, Ecological, Investment of time, Energy and Finance.

Not just money, connections. He can open more gates for many of you or I can open more gates for any of you than probably another person because we know so many people. That is investment of our social capital in your learning, in your growth. The kind of people you are bringing, they are all part of your social network. Remember you will have to serve with the social capital. Tomorrow whether you invest it in someone who deserves it but cannot desire it is, it is your decision.

Someone who deserves it but cannot desire it. In the previous batch in this class if they had not looked at the problem of the auto rickshaw driver, the autorickshaw driver cannot come to you and ask for the problem to be resolved. They cannot hire a faculty of IIT, IDC as a consultant. But they need their problems to be solved.

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Look at this, you have an innovation playground. Inside out, high low, means outside in, high low. If both are low that means you do not want to learn from outside and you don't want to share with outside. You are an ostrich, doomed. Many companies dissolved, disappeared, they did not learn enough, they did not share enough. You want to learn a lot from 'outside', 'inside out' is 'low', 'outside in' is 'high'. You want to get 'in' function from 'outside', crowdsourcing.

P and G, Johnson and Johnson, they asked for ideas, they gave some \$10,000, \$15,000 awards. They do not tell you how much they made out of that solution. Do not give me more money but at least tell me my idea was worth 200 million dollar. I do not mind not being paid extra, because

that is part of the context, but my worth, my self-esteem will go up if you told me that actually my idea helps you to make 200 million.

Here ‘outside in’ is low. They are so ahead of the curve they do not want to learn from you ‘outside’ they want to share. Tesla made all their patents open, (**FL: 11:59**) *Logon ne kaha ‘kya kar raha hai yaar’* (people will say what are you doing).

Other people will compete with you. ‘By the time they learn to make what I have already made, I will make something better’. Yeah, that is the confidence that is what innovators do, they remain ahead of the curve always.

They produce competition, they generate. By sharing he wanted more people to get into the battery charging business. Because if there is more competition I will be agile otherwise I will become complacent. If I have no pressure then I will not learn faster, I will not experiment, I will not learn. Innovators have to do it all the time. As the teacher I have to do that all the time. This is the one where both are high DB DB (**FL: 12:34**) ‘*Dil bada, dimag bada*’ (Big heart, big brain). Only those who have big hearts and big minds can learn a lot and share a lot.

So we have a database called **techmedia.in**. It has information of 200,000 dream projects including chemical engineering by 550,000 students. Why did such a do it? Why did the Honey Bee network do it? Because we did not want any student of our country to do what has been done before and I cannot expect you to go to the website of 7500 colleges of this country to find out what has been done before. Even to expect you to go to all the IITs will take a lot of time.

Your time should be used in developing those solutions and then we have made another database with the help of two students who are going to come today to meet me, Jaigam and Devika.

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The screenshot shows the GIANastre website interface. At the top left is the GIAN logo. On the right is the GIANastre logo. The main area has a sidebar titled "GIAN West" with various links. The main content area is titled "HBN database of abandoned and expired USPTO patents fr social, ecological and industrial applications by start-ups, entrepreneurs or researchers". It features a search form with fields for Title, Abstract, Year, Patent No., Application No., WIPO Sector, and a "Search" button. Below the search form is a table header with columns for Sr. No. and Patent List. A message says "No matching records found". At the bottom are navigation buttons for page numbers (1, 2, 3, 4, 5) and links for "Previous" and "Next". Below the table are logos for BIRAC, IIT Gandhinagar, and GIAN.

Now in the last 4 months, 5 months they have put together: **gian.org.patent.php**. It has 0.43 million abandoned US patents available for free of charge to anybody and everybody. Nobody else has, such a database does not exist in the world. These were all granted patents mind you, they had gone through the sieve. They were screened, they were granted and when the time came for renewal, the inventor could not pay the fees.

So they are valid, useful pieces of knowledge available to use in your projects and research without any restriction, only attribution is required. I want your projects to be high-value products, because each one of you is precious. Only one of your kind, and if you do not spend that precious life on something really precious, really valuable then we would not get more value out of you. As a teacher, as a part of the ecosystem, we are trying to innovate in creating an ecosystem, so that each one of you becomes more efficient, isn't it true?

So, we want to share a lot and this database is accessible to everybody in the world, not just Indian, not just IITian, anybody. Open access, no password required, no user id required, open access. So, this is a power of open knowledge. These are some examples, very simple examples.

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Leaders are empathetic

Modified walker with adjustable legs



All over the world the walkers that people use do not have adjustable legs. In the United States of America, in Japan, in Europe, nowhere. This girl sent an idea and the team of NIF designed this solution. It could be better, of course I can agree.

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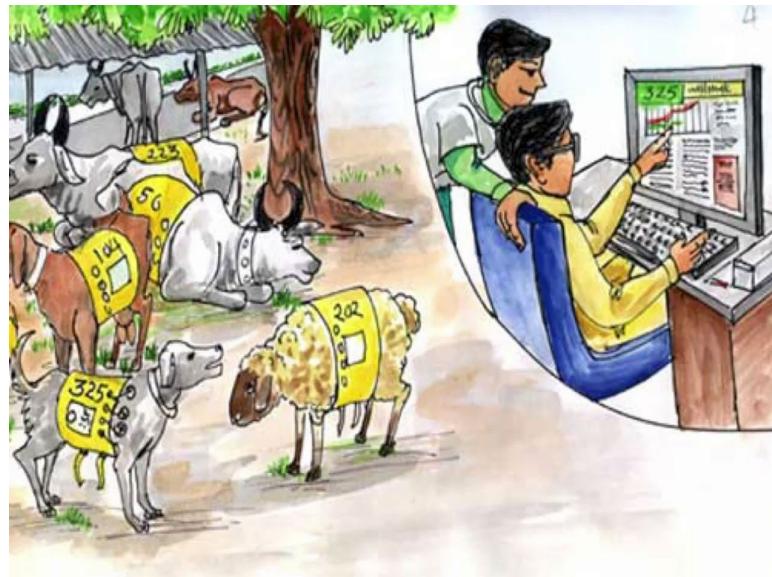
Modified walker with adjustable legs



It is not as sleek as it should be. For example, one of the, when designing, our students did an audit in NID Gandhinagar campus. They found that, ‘Look, we do not put pressure equal on both the hands, left and right, so the balancing should be taking care of that’. We had not taken care of that. Very simple problem. Where should I hold it, in the beginning of the bar, middle, end? What is best? We had not optimized it.

So, there were a lot of problems with this design. I am not saying it is an ideal design but it breaks the inertia. It makes it possible for us to think that yes walkers can be of this type, correct? That is the purpose it has served.

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Look at this. A little girl sent an idea, ‘Sir, my pets get stressed when I am busy with my exams’, *Deva Sharma*. I said, ‘Yes you are right, my parents also get stressed when I do not call them. My plants also get stressed when I do not spend time with them and I don't water them when I am traveling’. So, pets, plants and people, are these things? They are beings. so ‘Internet of Things’ is not the right phrase for capturing communication among these beings.

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Grassroots innovations don't merely improve upon existing practices, but also trigger conceptual advances.

Internet of things to Internet of things, thoughts, feelings and beings.

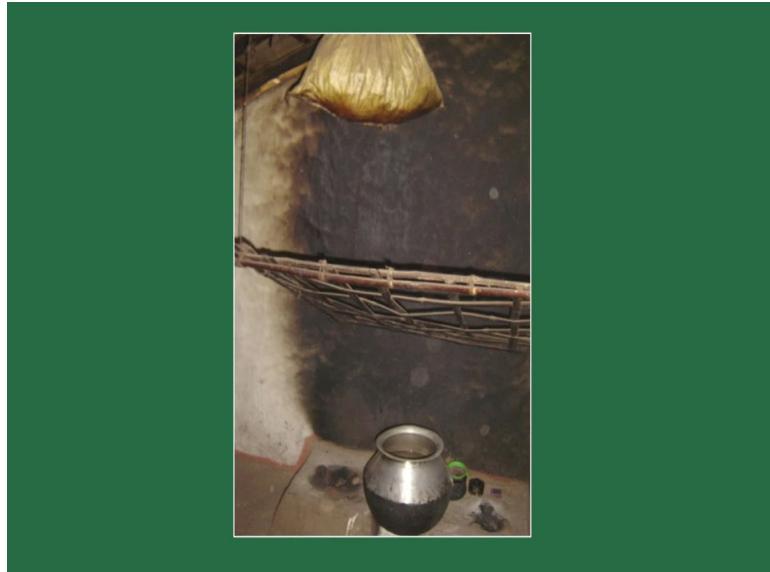
So, why don't we change the concept, 'Internet of Things' to 'Internet of Things, Thoughts, Feelings and Beings'. If a concept does not capture the essence of my being, my consciousness, my responsibility to my children, my parents, my pets, my plants, then it is not a useful concept, I will change the concept rather than become indifferent to the needs of those people, correct? So, I will have to use the concept and technologies in a manner that I can also sense their tensions.

So that I can be responsible to them, concepts have to be transformed. My point is, 'which cannot be just a consumer of categories of thought, that people will create in the world'. We will fill our aspirations and our design potential in those categories that people have created. Unless you challenge the concept, come out with a new category, a new way of classification, a new way of categorization of data, of information, of ideas. I am telling you in a very practical sense. We must create that expectation.

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The essence of knowledge is exogamy, classification. These are ladies in Meghalaya, Mizoram. Cooking is the first layer of harnessing heat. These ropes which are used for trolleys that they build on mountains, these ropes become stronger when it is heated. The wood curing is taking place, you understand? Firewood because it is a high rainfall area, Cherrapunji. They are being dried, meat, cheese for preservation, is being dried.

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And on the top there is a seed bag where seeds are preserved. So, what is happening now?

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We know that there is a different temperature gradient as the smoke rises. Do I use this concept in my everyday life? I waste, dissipate so much heat. Last time I came here, I showed an example of a student who did a work on a refrigerator, where the compressor produces heat, correct? And the refrigerator is used for keeping things cool, that fellow put a heat chamber alongside the compressor. Took the heat, made a hot chamber.

Now this compressor works less, uses less energy and delivers me two more utilities. Now I can keep food warm and I can keep food cool.

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This is an example of how the ecosystem is created. We came across this beautiful bridge of tree roots, my favorite example, in Meghalaya, Nongriat village. So, we asked them, ‘Why did you make such a bridge?’ Bridges can be made of wood, iron, steel, concrete, whatever ropes. ‘Sir, we want to do something different’. Culture was the first culprit, culture creates questions. Culture of what culture you create in your class, in a department, in your institution. That is culture.

Culture creates questions. Let culture create discomfort, culture is about shared belief. If all of us agree that we have to do something different, something useful, something meaningful then we will do that. ‘All right, then what did you do next?’ ‘Sir, then we saw these roots of the tree on both sides of the river. They look like ropes so we thought why do not we use them. But, sir it required collective action, so we needed cooperation of people, so you needed technology, you needed institutions, rules for collective behavior and you needed culture, which is Thesaurus’. It takes 50 years to make it last for 500 years.

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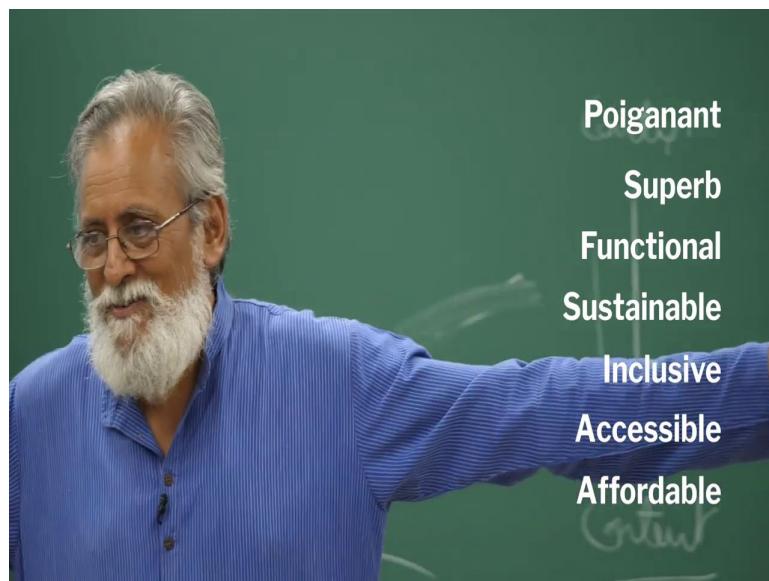
Three pillars of sustainability

- TECHNOLOGY is like WORDS,
- INSTITUTIONS are like GRAMMAR and
- CULTURE is like THESAURUS

What kind of culture would be there where two generations make it, and 20 generations use it. It is practical. It is happening in our country just now. It is possible in this country to design for long term sustainability. **(FL: 19:38)** *Kuch bhi to waste nahi hai isme isme entropy hai.* (There is no waste in this, there is entropy).

The roots of the trees are weaving around the stones, **(FL: 19:44)** *Stones gir jayenge nadi me, utha lenge fir se.* (The stones will fall into the river, then we will pick it up). Extremely poignant example of sustainability.

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A design which is superb, functional, sustainable, inclusive, accessible, affordable. **(FL: 20:00)** *Saari conditions puri ho rahi hai.* (Every condition is being fulfilled). It creates a benchmark. I am

not saying every design can fulfill this condition, but at least it makes it possible that you can think that way. It widens the horizon of thinking.

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So we were walking in Purulia, we saw this beautiful terracotta horses under a tree. So we asked the people instead of the potters, ‘Why did you keep such beautiful terracotta horses? Somebody can break it, somebody can make it’, ‘Sir, we have not kept the beautiful ones, we have kept the best ones’. ‘Why did you keep the best one?’ ‘Sir, don't you see this is a path? Our children go by this path to school every day in the morning. They should know what the current standard of the best is. They must do better’.

This is the culture of this country, this creative culture, it springs from valleys of this kind, which challenge the young people that you must do better. What we could do is what we could do. This is what is the best we could do. Now please kids you take it forward. Thank you so much. That is the challenge to you all.

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