**Social Innovation in Industry 4.0**
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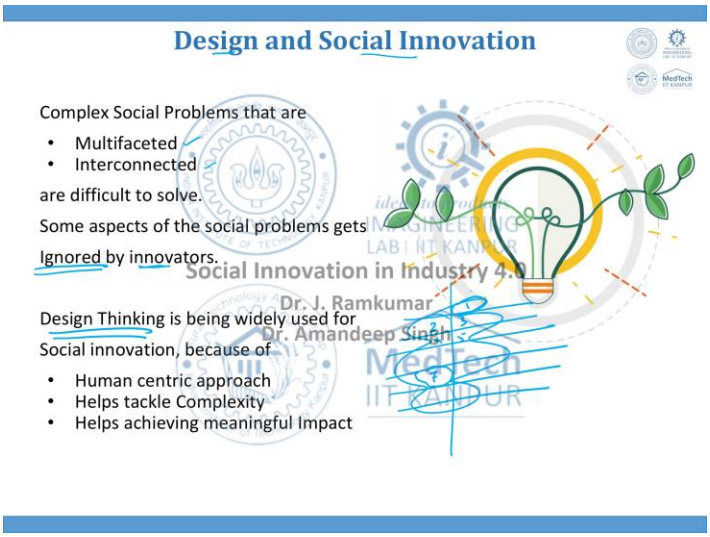
**Lecture 19**
**Design for Social Innovation**

Welcome to the next lecture on Design for Social Innovation.


In this lecture, we will try to have Content. We will be seeing Design and Social Innovation, Design Thinking for Social Innovation, Benefits of Design Thinking in SI, User Centric Design Approaches, Design in Social Innovation Trends, Design in Social Innovation Challenges and Ethical Consideration where in which we talk about Design in Social Innovation.




So, when we talk about Design and Social Innovation, it is a complex social problems, which are multi phase heated and interconnected. This has to be understood when we are start even thinking about Design in Social Innovation.

The problems are multi phase heated, it is not getting a solution to the problem. For example, if somebody falls sick giving a medicine, it is not like that it is multi phase heated, And, it is interconnected which is not so easy to solve, which is always difficult to solve. It is multi phase heated. So, where in which in a family of 4 or 5 members, you will have each stakeholder playing a very important role in the performance of the family, or in the influence of each other. So, you have to understand the problem because, it is multi phase heated.

And, it is not only economy, it is also economy, well-being, healthcare, then it is waste management, all these things are integrated into it. So, these two are very important points, when you are trying to look at Social Innovation, which makes this challenging as compared to normal innovation. So, these are difficult to solve. Some aspects of social problem gets ignored by the innovator. This is also very very important.

Many of the social innovators or social entrepreneurs, they start well, they grow well, but while going through that journey they get derailed and they fail. Why? Because they ignore, some of the subtle points which it is there inside the family, or inside a marginal society which has not been felt.

For example, if you do not do a proper empathy study, you will not be able to appreciate, each and every action of the marginalized community people. For example, their emotions are very high, their anger are very high because they live in a deprived society. It might be a subtle thing for us where in which we have not faced the problem.

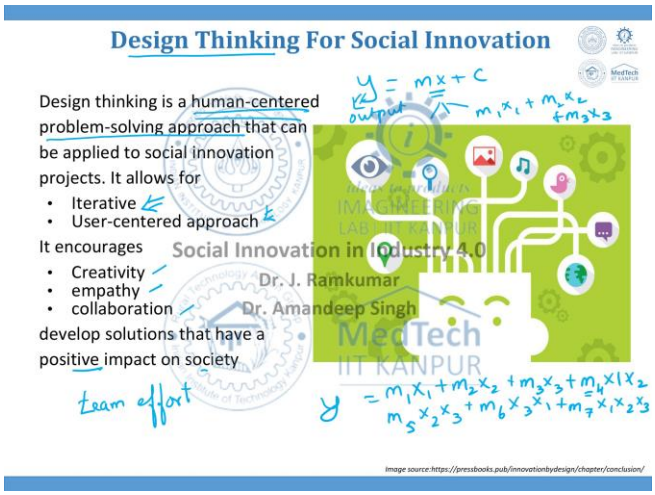
For example, if you ask me to live without electricity for one hour, I might say ok. If you ask me, to live without data for one hour, I would say ok. If you say I will not give you data for rest of your life, I will go crazy. I cannot even understand that, but those people who are there, they live without data. So, look at the feeling, look at their emotions.

They have never seen data. So, they do not understand the importance of data. I have understood the importance of data. So, I cannot live without data. They can live with electricity, which I cannot live with without electricity.

So, it is very complex. that is why I said, empathy study is important. Try to do empathy study minimum 6 months, live with them, eat their food, stay in their place Whatever they do, spend time with them, enjoy with them, cry with them. Then, only you will understand what is their emotions. In Social Innovation all these things are very very important.

We ignore many of those things. Same with inclusive society people, they might feel it is fun, you might not, but until and unless you start wearing their shoe, you will not appreciate their fun. So, Design Thinking is being widely used for Social Innovation because of human-centric approach, helps tackle complexity. So, when I say complexity, it is like this. You have a very complex problem.

So, this complex problem has to be split into very small milestones. You will split section 1, 2, 3, 4, 5. Now, you will have smaller sections. Now, you try to understand what is this effect of the smaller section and what is its influence on this segment 7. You have user-centric design, tries to help in tackling complex situations, helps you in achieving a meaningful impact. That is why, Design Thinking is used as a boon for Social Innovation.




Design Thinking is always human-centric. It always goes around the human, goes around the society, and tries to figure out what is possible, what can we do. So, it helps in problem-solving. It is Multi Dimensional problem-solving.

In mathematics or in optimization what we do is, if we have a Multi Dimensional problem, first, what in order to make it simple, what we do is, we try to remove all the complexity, make it into a small functions, try to solve one function, make the other functions as 0, and then you try, to find out the values and keep playing around. But here, you can do the same, but each one will have its own weightages.

Each problem will have its own weightages as compared to that of the other. For example, if I wanted to put it in a mathematical form, if it is something like this, This is your output which is an impact factor, which you will always measure. This are the data points and there is a slope or an error, whatever it is you say.

So, here, if I want to split it up, I will try to split it up like this, m1x1 + m2x2 + m3x3. Now, I have made, x1 x2 x3 as split of x. Now, when I start solving the problem of x, you will see now there will be a new dimension, m1x1 + m2x2 + m3x3 + m4x1x2, then, m5x 2x3 and m6x3x1.

Now, you see you have an influence on this, and then later you will have, m7 which is x1 x2x3. Now, what is the weightage of individual with respect to the output you know, You can somehow solve it, but in reality what will happen is each one, will try to have an influence.

On the other, when you try to solve it that makes it non-linear, that makes it multi-dimensional. Here, emotions play a role. That is what we say, problem-solving approach that can be applied to a Social Innovation project is very very important. When you try to work on Design Thinking, iteration becomes a mandate. It is must, it is a mandate.

If you say, within one iteration, I hit the solution, sorry, it will never happen. If you try to say, you are not developing a user-centric approach, then sorry, your solution will not work.

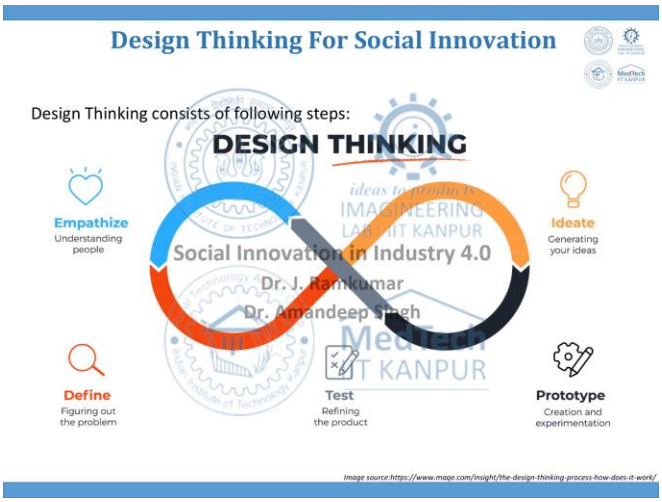
So, user-centric approach and iteration are two things, which are very very important, while solving social innovative problems where in which, Design Thinking approach is a boon. It encourages creativity, empathy and collaboration. When we start using Design Thinking, when we say human-centric, it always leads to a team effort.

It is not an individual man's effort. An individual can be leader, leading a group of people for knowledge dissemination. But, if a product, or a process, or a service has to be done, the team has to work together in developing solutions.

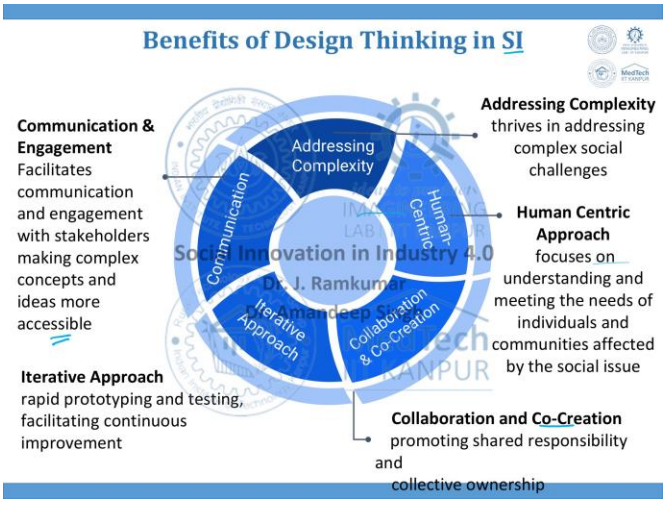
So, that is why, it is said as human-centric problem-solving skills, where in which creativity, empathy and collaboration are part and parcel of it. So, they develop solutions, that can bring a positive impact in the society.

Social Innovation means positive impact to society. I just played around, converting all these things into mathematics. Please do not think, this is going to be very difficult. I just try to explain and if it is math, it is easy to solve. But, it is not math, there is an emotional component added.

It makes the problem-solving difficult. And, why did I put all these things because, when we try to talk about Industry 4.0, Industry 4.0 gives you all the sensory data which can be used here, but emotional data, it is difficult.




Design Thinking steps, we have already seen it. Empathy definition, understanding people, finding out the problem statement. Then, ideating, as many possible solutions as possible, prototyping, develop prototypes which can be virtual, physical, whatever it is. And then, you try to test it, once you try to test it, it continues. You will try to do an empathy study, it is a closed loop. It keeps on going several iterations. At a particular gained velocity the solution exits out, and then you try to solve it.




So, the Benefits of Design Thinking in Social Innovation is going to be communication and engagement. It facilitates communication and engagement with stakeholders making complex concepts and ideas more accessible. There is a very complex problem, you have

to understand that problem. You cannot single handedly understand, you as a group will try to understand.

When you try to sit with the group, it gives you multidimensional perspective. And, by the way, I forgot to tell you one thing, when you try to do empathy study, you should have open mindedness.

When you do this, you should never have any critical thoughts. You should never have any pre-conceived lotion, you have to go with a fresh mind and spend enough time in understanding this. The same with ideation, you will not have any pre-conceived lotion, or you will not have any finalized solution in your mind, and then do the ideation.

If you do so, you can try this and see, if you do so, all the ideas will go around only with one single point. For example, if you see or if you think of it, all the people who are in the marginalized community people are illiterates. An assumption, if you go by their assumptions, then what you will try to do is, you will always think all the solutions of running a night class, giving them online education.

All these things you will try to think of, why? Because your basic point of assumption is, they are illiterate, but, today friends, they are not illiterate, they have an access to schools, they have an access to data, they have also been equally competitive like us, the only thing is they lack opportunity. Now, through Social Innovation you are trying to create that opportunity, that is what it is.

So, ideation open minded, empathy open minded. So, that is what I said, engagement with stakeholders making complex concepts and ideas more accessible. So, when you addressing complexity, thrives in addressing complex social challenges. Human-centric, it is focuses on understanding and meeting the needs of individuals and communities affected by the social issue. It can be flood, it can be earthquake, it can be political instability, it can be war, anything, but you be part and parcel of the community people.

So, that is what, we say human-centric. Never sit down in your room, and try to anticipate, what will be the problem there, I try to develop a solution, no, it never works, you develop a solution, and then you have an hypothesis and go there, but you should be open for doing an empathy study and changing your solution.

You need to have hypothesis, even before starting this Design Thinking, have some hypothesis. And then, with that hypothesis, you go there and you start trying to do an empathy study. If you go completely with 0 stand, you will not be able to. So, that means to say, prior understanding of the society is very much required.

Understanding, do not go to conclusions, understanding. There are 100,000 people, and these 100,000 people have this problem, this is what, this is what, accessing is a problem,

they live in the very deep societies. When I was an IEEE volunteer, we worked for the Nepal tourist guides who are along the Himalayan truck. It is very interesting, these villages when come summer, they offset, and the whole community of people are only trekking guides. So, they try to shift and move a 5 kilometer or 3 kilometer above the existing one.

When come winter, they come down and stay in another place. So, basically, they use the place to stay for summer, it is for 3 months time. So, their job is to guide the trekkers and they also move along with them. They have to arrange food and keep going. Until I went there, I could not even think what they want, and IEEE was kind enough to allocate a project there, where in which we had to walk 10 kilometers to get access to that village.

It is a smart village project, we have to give a solar connect to it. We did not realize so much of pain, it was 10 kilometers walking took us almost 24 hours. And, it was all up and down, 0 electricity connectivity anywhere. Now, I have to give connection at that place, where they are normally staying, and they are staying at an elevated place. Cables cannot be laid, and there is a possibility you can think of small hydro stations, like hydro turbines can be run and through which you can try to do it.

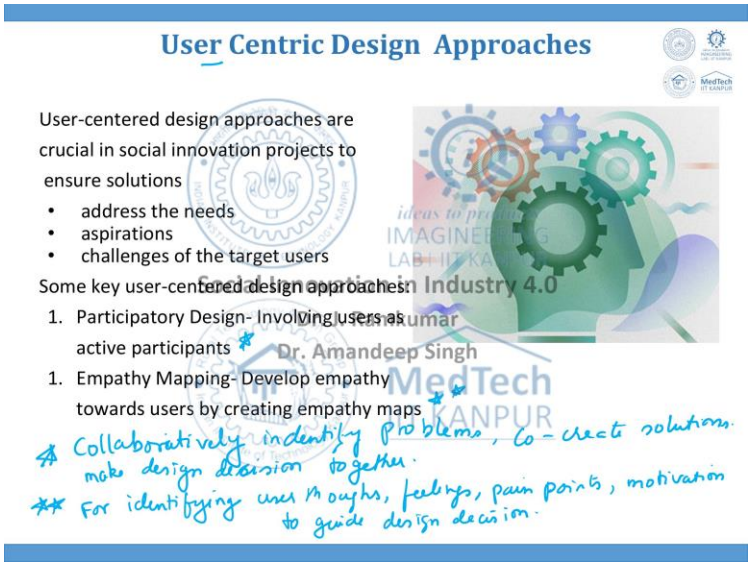
And, again maintenance becomes a huge challenge for it. The third thing is, you have to use solar, then you have to lift solar and go. The mode of transportation was using donkeys and horses. Until I went there, I did not realize it. So, that is what I am saying, understanding the human-centric approach is very important.

I thought you can take some cables, we will airlift it, drop it there, and then we will do assembly, and the topology was not flat. The biggest challenge was, how do I focus the solar panel towards the sun, when it is at an inclined angle. It was very hard for us to get a flat roof. So, those are the challenges, but whereas, here in our campus or in a flat plane, we do it time, and again within 1 hour installation it is done. So, initially, we thought of doing the installation in 3 days, but finally, when we finish the installation it took 10 days.

So, look at the challenge, this is the challenge we have. So, until and unless we go there. So, that is what I said, needs the individuals and community affected by the social issues. And, on top of all this technology, I thought it will be readymade, the people will easily accept it. The biggest problem is, the challenge what we had was, how do we convince the people that, this is not going to affect any of their personal beings.

So, it was a challenge. We spent 2 days in talking, negotiating and finalizing things. Then, collaboration and co-creation. It is promoting shared responsibility and collective ownership. Co-creation means you start working with the customer and try to develop along with them. So, he becomes one of your co-inventor, it is not you invent.

You say boss can you tell me some solutions for it, then they come out and they give some possible solutions we see. So, the benefits are going to be addressing complexities, human-centric, collaboration and co-creation, iterative approach and communication. So, iterative approach is whatever we do, time and again we test, and then we refine our idea. So, this is the benefit which we get by using design thinking approach.




What is user-centric design approach? Here, user-centric design approaches are crucial in social innovative projects.

It addresses the needs, aspirations and the challenges of the target user. So, some key user-centric design approaches are preparatory design involving user as an active participant. So, here what we do is, we collaboratively identify problems. You do not have to solve all the problems, identify problems, then co-create solutions and make design decisions together, user-centric approach.

Participatory design involves user as a active participant. So, you involve them, do not try to neglect them, you involve them. They will give you more insights because they are living with the problem. And, whatever solution you give, you have to get it vetted and accepted by them. Moment you do not get it vetted and accepted, they themselves do not accept it. For example, we try to develop a vein detector which can be used for healthcare, when we do pathology or when we try to do IV.

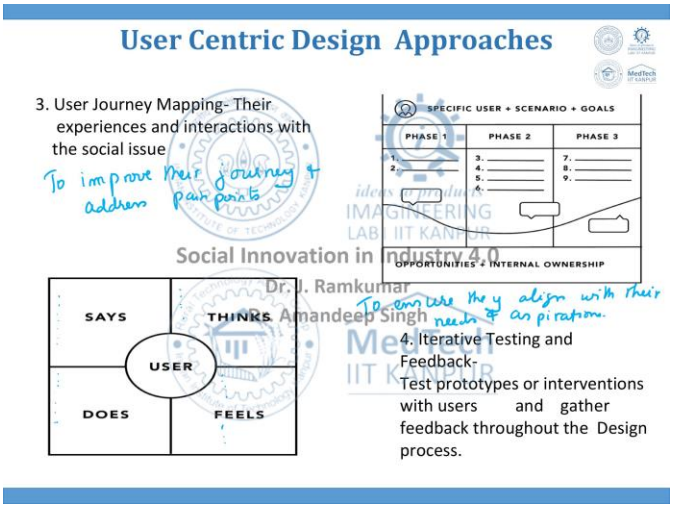
So, we always try to give it through the vein and when we are doing at rural places, the biggest challenge was, there was no electricity and the vein detection was always a challenge. So, we developed a vein detector through various technologies like IR, image

processing, and then we did back calculations, all these things we did, it was a wonderful technology. Where in which you can just scan it on your hand, and then you can try to figure out where the veins are? Then, you immediately identify the thickest part, and then you can prick your needle, and then start doing, whatever it is. So, during the time of emergency, doctors struggle to get it. The paramedics definitely struggle to get it, and when we are trying to do IV, it is also very important.

So, the paramedic also does it and if you are little healthy or if it is a baby, then there is lot of fat around the vein, and it is too difficult to find out. So, our vein detector was working fine. We jumped and we thought that this will try to give the best solution, but we did not tell the paramedic that this is going to be a fortune player for you.

Without saying it, we started giving it to the paramedic, and paramedic got a small doubt that we are going to kill his job So, moment he had a feeling, he came out and he said the instrument is not functioning, it is malfunctioning, it is not to be accepted to the doctors and finally, we lost the game. The biggest mistake what we did was, we did not involve the paramedic as part of our system, that is what, I am writing it here.

Many of the writing is my own learning which I did, when I did lot of Social Innovation with community. Then, the next thing is empathy mapping, develop empathy towards user by creating empathy maps. There are empathy maps, several techniques are there. So, this one is very important, creating an empathy map, and then trying to solve. This one is going to be for identifying user thoughts, then feelings, then pain points, then motivation to guide design decision. For this we try to do empathy map.




So, this is a user journey map. So, their experiences and interaction with the social users, they say, they think, they feel, they do. So, the user does, the user says, the user thinks, and the user feels. Look at it, user says, user does, these two itself are very different. Many a times we say, but we do not practice, we practice, but we do not say.

So, user does, user says, user thinks. So, here, it is your speculation that he is thinking, and his speculation that you are writing. So, think and his feeling, feeling is very important. By touching a surface, by looking at a color, I say wow, feeling. So, thinking, thinking is while he does a job, he did not respond.

So, I thought maybe he thinks like that. So, that is what it is. So, this is a journey map. You are supposed to look into this. The issues, so, to improve their journey and address pain points, we use it. So, iterative testing, here, what we do is, we try to ensure they align with their needs and aspirations.

This is iterative testing and feedback. So, you can see here, phase 1, phase 2, phase 3. Then, you talk about opportunities internal ownership. So, then the iterative test and feedback, the test prototypes are interventions with user and gather feedback throughout the design process, we do it. So, there are maps like this and you are supposed to use those maps and what you do is, you logically write down the steps, what do they think, and daily you have to note it down, and many a times you cannot keep the sheet of paper in front of them and do it. You have to first establish a confidence level, you have to bring them to your plane, or you have to go to their plane, to first accept you.

Moment they see you an outsider, coming and sitting with them, they always feel little difficult in conversing with you. So, you have to spend some time, understand, and try to have some connecting points. it can happen through you to them or through an agency to them. So, you have to start, and then you start writing it and every day you have to start

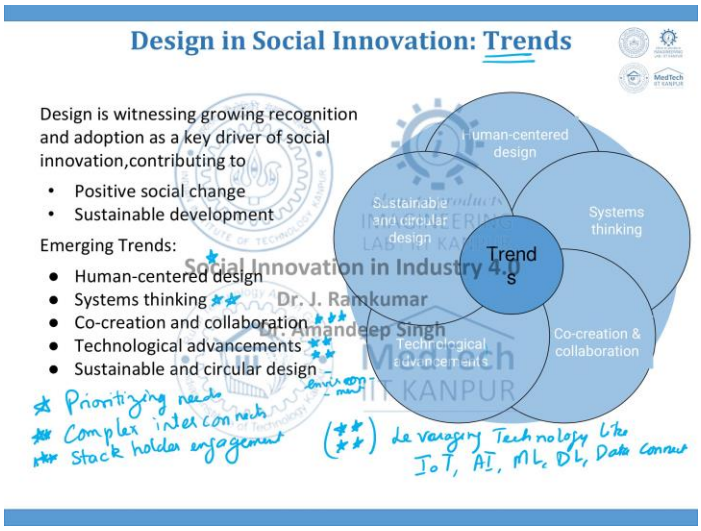
writing the sheet. May be at the end of 1 week, 10 days, 15 days, you try to see between those sheets, is there any commonality? Day 1, what was your feeling, day 2, what was your feeling, day 3.

And, after some point of time you will see saturation will happen. Your feeling, your all these points what you write will always be same, the difference will be very less. And, many a times subtle points have to be noted down, very subtle point. If a very subtle point is noted down, then that makes a big difference.


So, here, Ethical Consideration and Design in Social Innovation. Designing for Social Innovation requires careful attention to ethical consideration ensure responsibility and impact outcome.

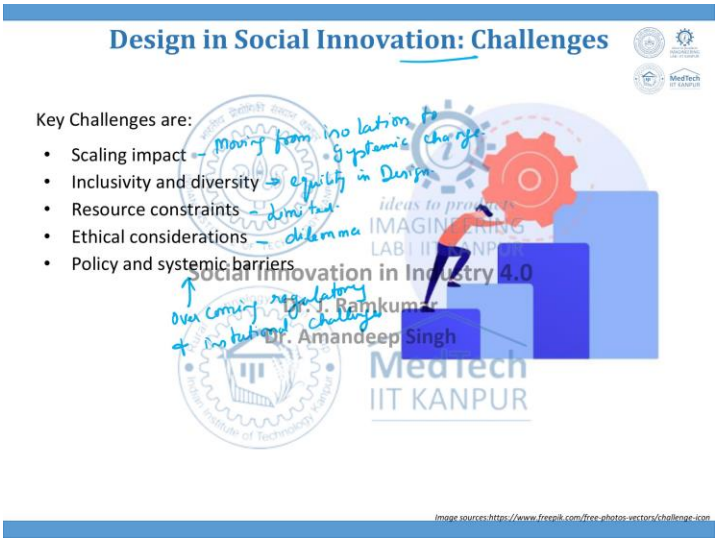
So, plastic produced more. Today we do not know what to do. Ensure responsible, who takes the responsibility. So, the person who found out polymer. We are responsible for it. So, impact outcomes are very important. So, some key ethical consideration as empowering and autonomy, that is what I said, in Industry 4.0 also we talked about decentralization.

Same way here, you have to also empower and give autonomy at every level. Then, privacy and data protection is very important, then social impact and responsibility. The last one is environmental sustainability. These are some of the key ethical considerations which we have to do in Design in Social Innovation.



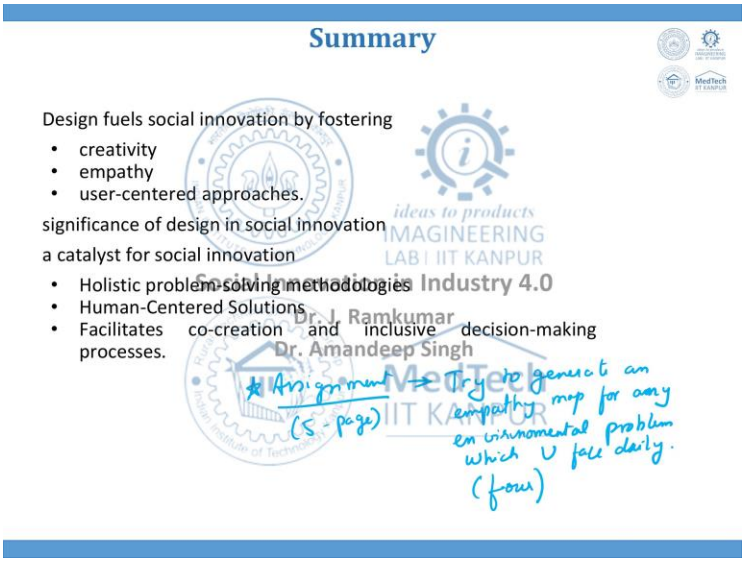

So, the Trends are design is witnessing, growing, recognition and adoption. As a key driver of Social Innovation contribution to positive societal change and sustainable development. The emerging trends are going to be human-centered design, system thinking, co-creation and collaboration, technological advancements, and sustainable and circular design. So, this is what, we have been seeing, time and again. The same thing we have put here. So, human-centered, system thinking, co-creation, technology, sustainable and circular designs.

So, human-centric will be more prioritizing needs. System thinking will be complex interconnects. The third one is engaging stakeholders, stakeholder engagement. The fourth one is leveraging technology like Industry 4.0. whatever IoT AI, ML, DL, data connect, all those things, and sustainable is more towards environment.




So, now, when we start looking at Design and Social Innovation Challenges. The key challenges are going to be scaling impact. So, that means to say, you are trying to move from isolation to systemic change. This is a major challenge. Equity and diversity, where we try to make equity in design.

So, the other thing is challenges in resources. Resources are always limited. We have to try to use it judiciously. Ethical, this thing is, there will be lot of dilemma, the ethical consider, the dilemmas. So, where in which we have to try to solve it. And here, we always try to overcoming regulatory and institutional challenges. These are going to be the Challenges for Design in Social Innovation.




To summarize this lecture, design fuels Social Innovation by fostering creativity, empathy, user-centric approach. Significance of design in Social Innovation was covered which acts as a catalyst for Social Innovation, holistic problem-solving method, human-centered solutions, facilitating co-creation and inclusive decision-making processes are very important. So, these are some of the references where I have used in this particular lecture. Before I conclude, I would like to give an assignment. So, try to generate an empathy map for any environmental problem which you face daily, and it is a 5 page assignment.

So, read, write or take the empathy map, and then start writing with the empathy map, and do it, for do the empathy map with a group of 4. That means to say, do it for 4 people or you guys a 4-4 member team doing it for 4-4 groups or something like that. So, then you will try to understand the empathy map everything with that.

Thank you very much.