**Strategies for Sustainable Design**
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**Indian Institute of Technology, Hyderabad**
**Lecture 19**
**Thinking for Alternatives through Systemic Design**

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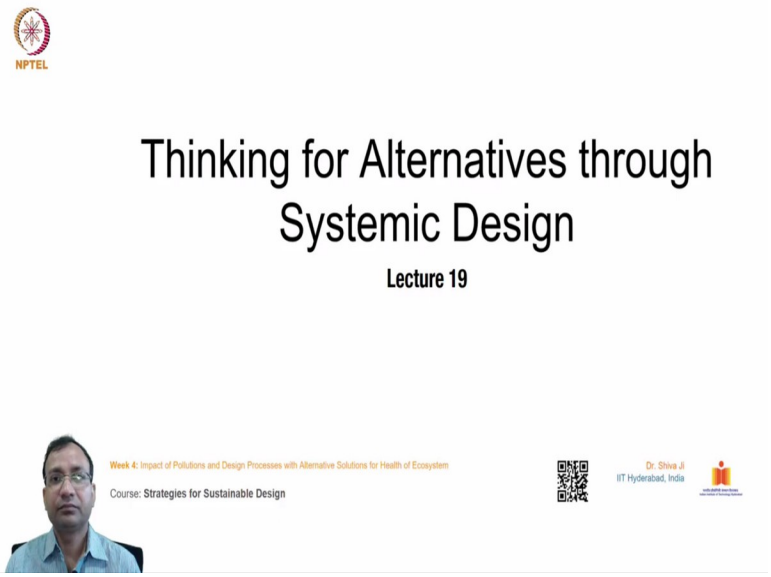


Hello, everyone. In this lecture, we will discuss about thinking for alternatives through systemic design. So, as we have seen, the sustainability scenario is getting worse by everyday by every year. So, is there any way out? So, the only holistic solution which considers the entire system of any product, because any product or any unit thing is not standing in isolation, that we have studied earlier.

So, for addressing any issue related with any product, we have to understand the phenomena which is going in and around that product and we have to understand all the stakeholders for their functionality and how they are doing it. Only with this kind of approach, we can actually work out for the efficiency of such exercises. So, let us see.

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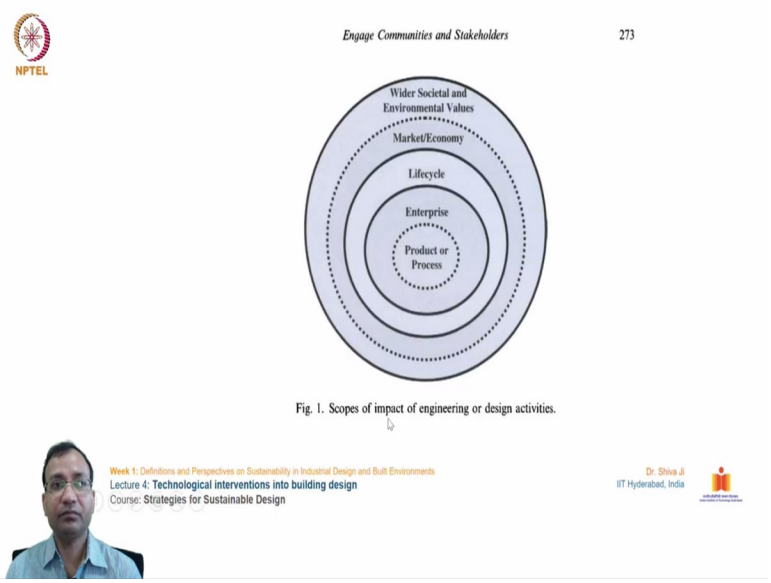


So, here if you see, this figure actually gives a scope of impact of engineering or design activities. So, here this talks about starts from products or processes, it goes to the enterprise level, it goes to the lifecycle level, then it goes to the market and economy, and then it goes for a wider societal and environmental value systems. So, this is how actually it progresses over a longer period of time. So, this actually engages the community, this engages the stakeholders, and this is how it progresses.

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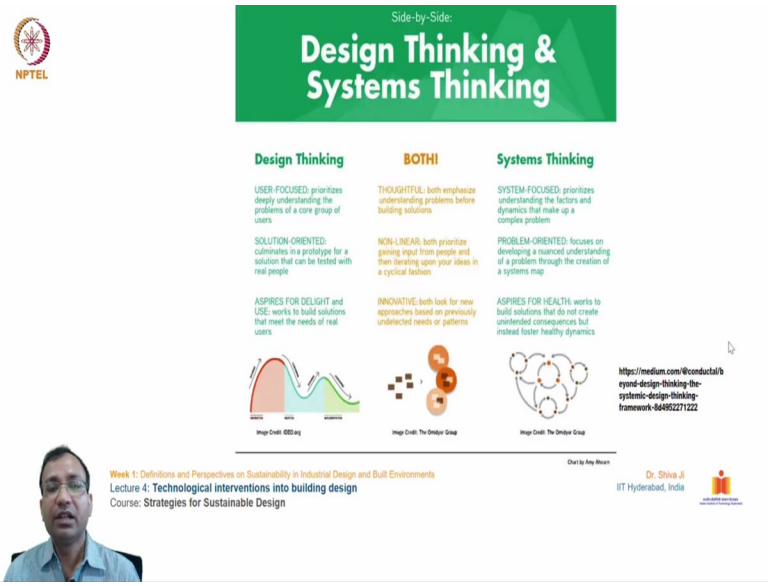

So, if we see, there are actually two major philosophies for designing products, for coming up with solution for any problem. So, one is the design thinking. We have actually studied earlier in our design courses, what the design thinking is. So, it always is user focused, it prioritizes deeper understanding of the problems of the core group of the users. It goes with the solution orientation in mind, it culminates in a prototype for a solution that can be tested with the real people. The user feedback can be taken up, and then corrective measures can be taken up and the product can be redefined.

And lastly, it aspires for delight and use. So, it works to like build solution that meet the needs of the real users. So, it involves the real users of the product and it interacts with them, it gets the feedback and then it improves the design. And that design satisfies the user. So, this is actually design thinking in a nutshell. This is sourced from like IDEO.org, you can visit this website for more details.

Further, what is the system thinking? So, the system thinking is actually a system focused exercise, which prioritizes understanding the factors and dynamics that make up a complex problem. And this is actually majorly a problem-oriented approach it takes. Focuses on developing norms, actually understanding of a problem through the creation of a systems map. It aspires for health, it works to build solutions that do not actually create unintended consequences, but instead foster healthy dynamics.

So, if we combine both of these philosophies in one, so how it will become? Let us see the middle column here on this slide. So, it talks about both. Thoughtful, both emphasize understanding problems before building the solutions, which is very important to understand the dynamics of the problem before coming up with this for the solution.

Non-linear, both prioritize actually gaining input from people and then iterating upon your ideas in a cyclical fashion. So, again, going back and improving the design, coming up with the solution, testing it, again going back with the feedback, improving the design and then delivering to the user. So, that is the approach which design thinking follows, which the system thinking also follows. So that can be combined and enhanced over here.

And the last one talks about innovative. Both look for new approaches based on previously undetected needs or patterns. So, this is innovative, so there could be innovative at any level of it, like the level of problem understanding, the level of solution giving, so it goes with this kind of perspective.

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Let us see this in too much detail over here, how a normal design exercise moves. It empathizes, it defines, it ideates, it prototypes, then it tests. So, this is how actually it moves. On the right-hand side if you see, this process on the left side is linear. The moment you make it a cyclical process, it goes back, it takes the feedback, it creates actually a feedback loop, and it takes the feedback, it improvisers the design solution and comes up with the final, a more suitable solution in its second cycle.

So, this is how actually it has resulted in the lower diagram, lower figure over here. The research of the stakeholders, defining the system. Then go mapping the system, choose leverage point, go for the ideating the solutions, go for the prototyping the solution, testing them and evaluating the result and finally supply with the solution.

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So, this is how actually design thinking principle works. So, we can see over here on this slide. So, what is design thinking principles over here? It works with the help of empathy. In the one of the previous lectures, we spoke of what is empathy.

Empathy is a phenomenon, is a process when we try to actually emotionally understand someone's feeling, the feeling of the user or feeling of our target audience. And we empathize with it, understand the pain point, understand the gain points, and rework and then provide the solution. So, that is actually a exercise which we know like empathy. So, in design, empathy becomes very critical, very important to give a fitting solution for the users.

Then going for invention and then iteration. So, what is it? What if? What wows? What works? So, these are actually some questions which we generally inquire upon any design thinking exercise. So, how it moves? With the empathy, if you see, a 360-degree understanding reframing the problem. So, with this we will be able to understand the deeper insights of the user and we will be able to reframe the problem in a more suitable, more understandable way.

Efficiency, disciplined process & tools; creativity like ideate, synthesize, complexities, visualized solutions; efficacy, like prototyping, testing, execution. So, here if you see, there is a big D and a little d, so strategy, system, service over here is defined in such a way that it overlaps

into several of the creative fields, for example, industrial design, graphic design, UX design, fashion, interior design, experience design, service design, planning, and obviously architecture.

So, this is how this design principle works. I will read quickly these statements over here. The appropriate blend of qualitative and quantitative thinking, with the goal to produce positive change that responds to the needs of the consumer; produces comprehensive visualization of future alternatives, allowing for interaction and feedback from stakeholders early in the process; reduces the potential for unintended consequences; helps companies and culture evolve thoughtfully blending continuity and change. It is inherently interdisciplinary in nature.

So, these are some of the properties which we quickly saw about design thinking principle, that we can apply in our exercises. So, this can become one of very effective strategies to go with the design solutions.

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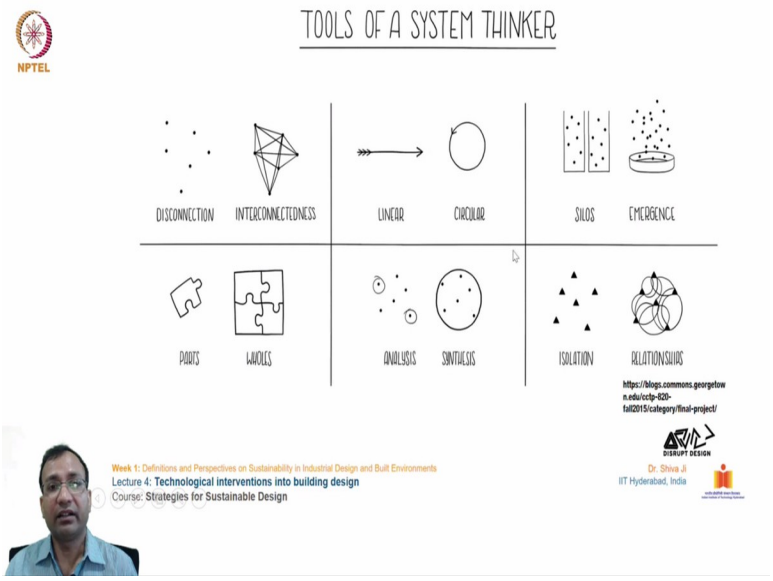


So, these are the elements you can see over here. These are actually tools of a system thinker. So, how a system thinker actually thinks is very nicely illustrated over here through these sketches. So, if you see, like any normal system these are always kind of a disconnected, but a system thinker actually interconnects and sees the whole picture out of it. So, this interconnection, connecting the stakeholder, connecting those dots, connecting those gaps and understanding the overall scenario is very important for any system thinking exercise.

On the second sketch, you can see over here a linear process compared to a circular process. So, advantages of circular process we have seen several times in our design exercises, like how with the help of a circular design exercises we can go back to the beginning stage of the materials and the components and we can again come up with the iterations. So, the same circular function follows in the design exercise also, when we create the feedback loop, when we take the feedback of the user and we improvise our product, and then we deliver the product.

In the third sketch you can see, the people who are working in silos, so how to bring them in a very emergent scenario and understand them in the totality. So, this is also one of the skills of a system thinker for a system thinking approach. In a normal situation, things are scattered in different parts, various parts. So, a system thinker actually thinks and sees them in a wholesomeness.

So instead of seeing them in the parts, we must see them in their wholes, like how they are part of the bigger whole, so this will give us an outstanding picture of the situation. And the next one if you see, analysis with the synthesis. So, the unit analysis are always okay, but combining them together along with all the analysis to draw the synthesis will always result into the positive results.

And the last one, standing into isolation and seeing them with the relationships. So, this is always like we saw over here. So, when we connect them, we can understand what is going on, what are the activities happening between the two different stakeholders, and what are the reasons, what are the causes, and what are the effects. So, with this, we can actually understand the system in a much better way. For example, if you are going for a solution for this particular node over here, so if we know the entire system, we may be in a better position to help actually this note.

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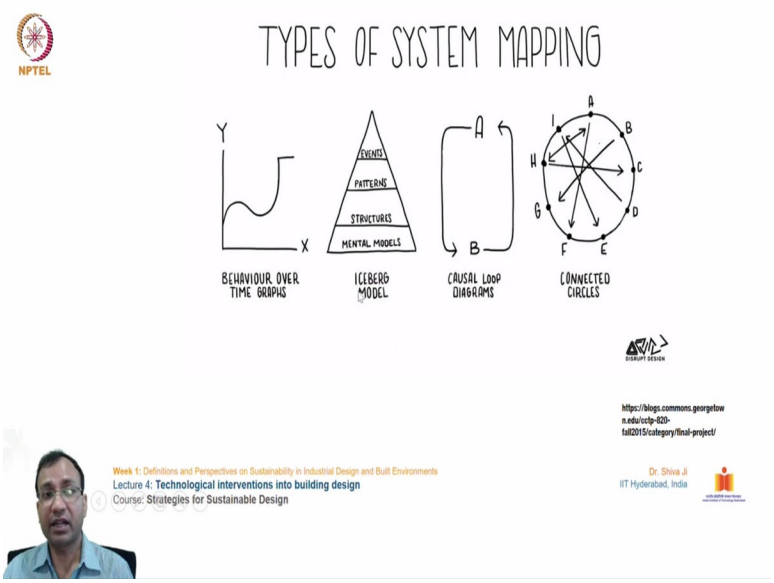


Different types of system mappings over here. So, there are 4 types mentioned, behavior over a time graph, how things change over the time and how things change with the difference in the behaviors. This iceberg model we have seen, you may be aware of these models, like mental models, structures, patterns, events. Drawing like a causal loop diagrams, what causes, what is the cause-and-effect phenomenon.

So, these are actually one of the several tools of a system mapping and, again, the connected circles. So, here we draw these systems map and here we draw these connected circles and we try understanding the activities and causes and effects in a bigger picture.

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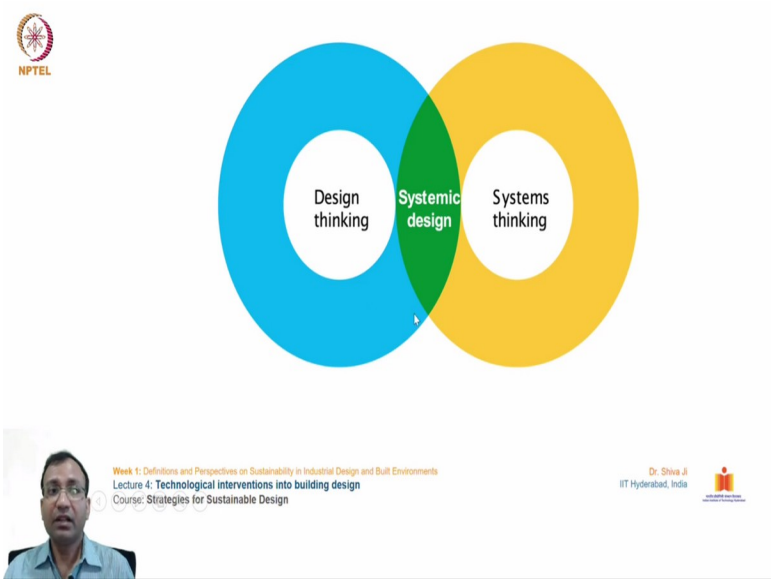


So, wherever these two domains of design thinking and system thinking overlaps, there comes the systemic design. So, systemic design is one of the strategic approaches with which we can actually deal with this sustainability related issues.

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So, system thinking, it involves lots of nodes, lots of branches, and there will be a bigger picture, we need to see and understand the bigger picture, we need to understand the whole perspective

of any given system. And understand that complex environment, like how we can understand, how it is connected, what are the interconnectedness and how the relationships are.

Then we come with the futures thinking. It helps businesses to probe a range of plausible features, link to the present and apply a strategic intervention. So, this is where actually we apply our strategic intervention, innovative ideas, and we actually come up with the solutions. In the next one, if you see, this represents a design thinking, it is like a creative process that designers use to solve complex problems. It is human-centric, and relies on prototyping, testing to explore design challenges of all sizes.

So, this is how actually this whole process behaves and this is how this whole process moves, from exploring, to metallizing, to understanding, then again actually exploring, materializing and understanding. So, it follows this cyclic system.

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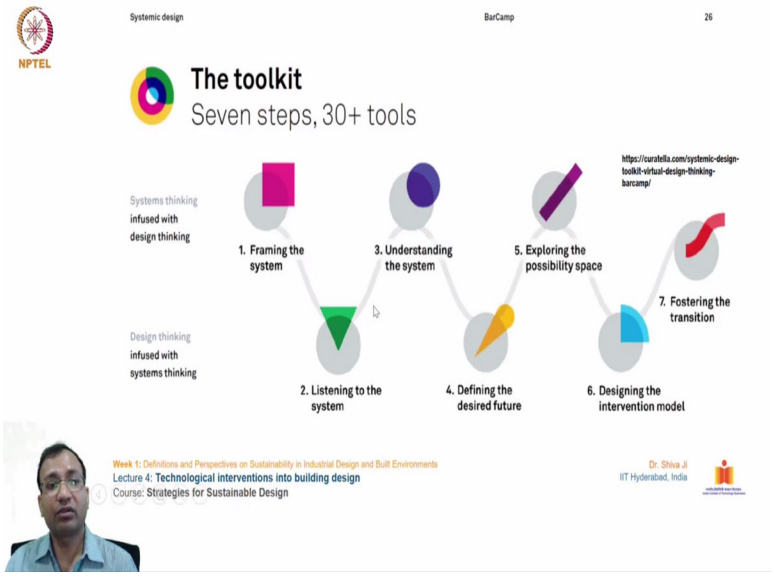


So, again, further it is elaborated in this sketch over here. It starts with a framing the system, then it goes on to listening to the system, understanding the system, defining the desired future, then exploring the possibilities, then designing the intervention model and fostering the transition. So, this is how actually it progresses in these many steps.

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So, here if you see in this particular diagram, systemic flows. So, if you see, it starts from one place, so how it is connected to the different other stakeholders. For example, this baby. So, this baby is related with the excretion and urine and feces. Then this will go into 100 percent biodegradable diaper. And this diaper, which is biodegradable, will go causing like a fermentation process, it will turn into a compostable packaging, it will help grow microorganisms, it may produce other organic material, it may give birth to a fungi, and yeah.

So further it will move to vermicompost, there will be worms, and there it may lead to the terra preta. And then further this will be taken over by trees and flowers and plants, which will actually generate bioplastic, which will go back again to making, manufacturing this product. And from these trees, this will serve like vegetables, fruits and other like edible materials.

And that fruits will be again eaten by this baby, this food will be taken by the mom also, the mom will further feed to the baby. This tree will give us supplies such as wood, that wood will be used for carbonation processes, from there we can draw some energy. That wood can actually turn into charcoal also.

Well, so if you see in this particular illustration over here, it is showing the cyclic nature of a material, like how the matter actually transforms from one material to energy, to another material

to energy, to another material to another material, and things like that. So, it is a very complex system of transformation of material from one form to another.

And we have to understand, when we are trying to solve the problems of like toxic waste and all, so as I said in the previous lecture, toxin or pollution is actually an item at the wrong place. So, how we can channelize that item into a right place in order to minimize actually the toxicity and the harmful effects of that, so that we can understand from there.

So, what we need to divert that material, which is sitting at the right place, becoming like a pollutant to the right place in a right way, so that it exerts a minimal impact, plus it becomes useful, plus it becomes a raw material for some other kind of products and processes. So, this is how we have to understand, this is how we have to understand the whole scenario with the systemic approach, systemic design approach and we have to channelize our resources.

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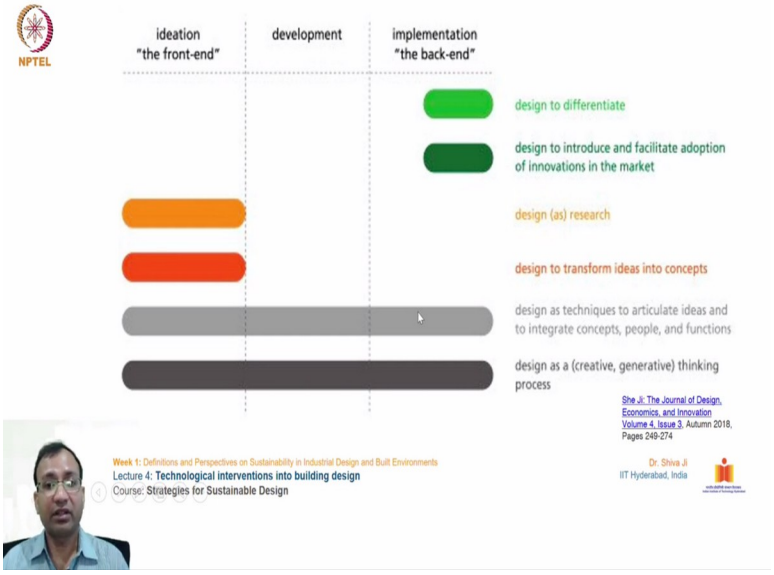


So, for ideation, you can see from here this is actually a shot taken from a journal like She Ji. So, at the ideation stage it talks about the front-end, and it talks about design as a research, design to transform ideas into concepts, then it moves on, it goes to the development stage, design has techniques to articulate ideas and to integrate concepts, people and functions.

Design has a creative and generative thinking process. Then it ends up at the implementation stage, at the back end it becomes like a design to differentiate, design to introduce and facilitate

adoption of innovations in the market. So, this is how it ends. And this is how the cycle actually progresses. So, with this, I would like to bring an end to this systemic design lecture for today. Thank you, everyone.