**System Design for Sustainability**
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**Week - 01**
**Lecture - 03**
**Sustainability and Sustainable Development – Pathway**

Hello everyone. Welcome to the 3rd lecture of this week. So, today we will be discussing about how do, we achieve sustainability through design.

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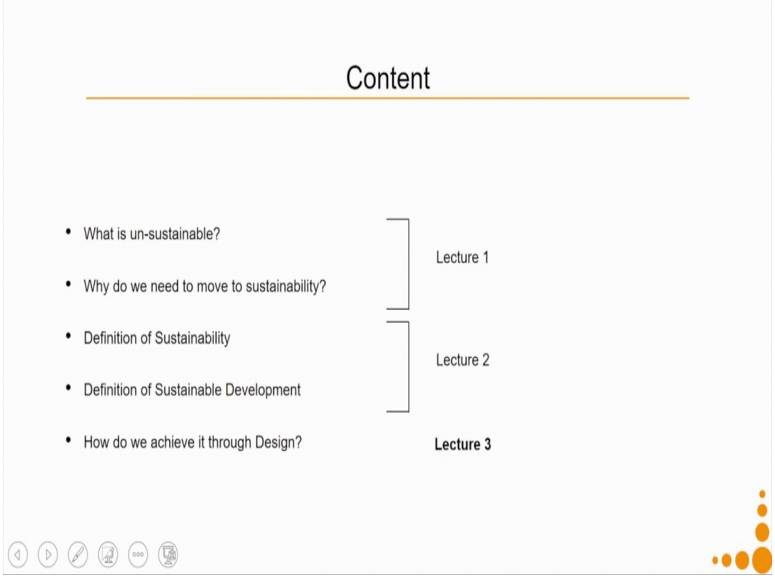

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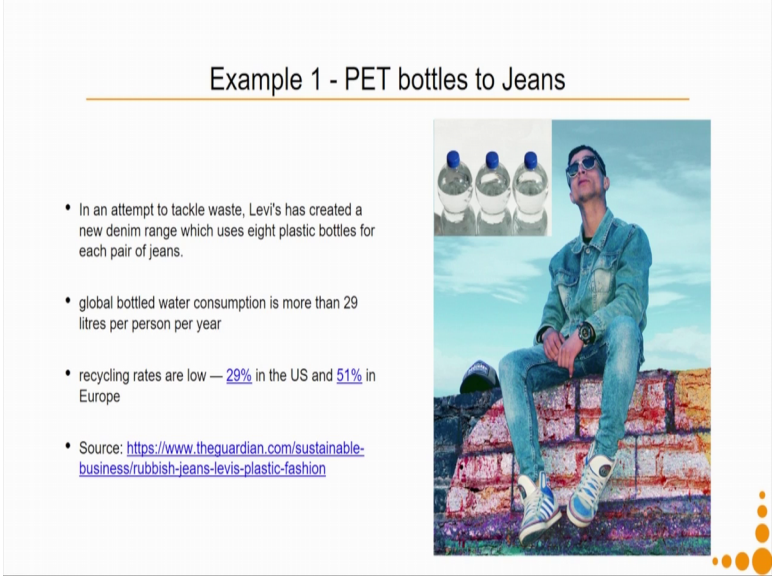


So, we will discuss this through some examples and along with that we will try to understand what that particular example implies in terms of design for sustainability. So, example 1 is about pet bottles converted to jeans. So, Levis came up with this idea that to tackle waste, they wanted to create denim and entire denim range. So, they came up with the jacket as well as the trousers that you can see in this photograph which can be made with one, trouser is made with 8 plastic bottles, the drinking water bottles.

Why this kind of a decision because, at the time when this project started, global bottle water consumption was more than 29 litres per person per year. So, you can imagine the amount of pet bottles. So, the plastic bottle, the transparent part of it is made up of a plastic which is called pet: polyethylene terephthalate and the cap is made up of another plastic that is polypropylene.

So, we are talking about the body of the plastic transparent in bottles. Recycling rates were as low as 29 percent in US, 51 percent in Europe for those bottles at the time the project started. So, it made quite a lot of sense that let us reuse the pet bottles which is otherwise going into landfills and ending up in our oceans into clothes, but doing that was directly not very easy. One has to do design interventions to achieve the same.

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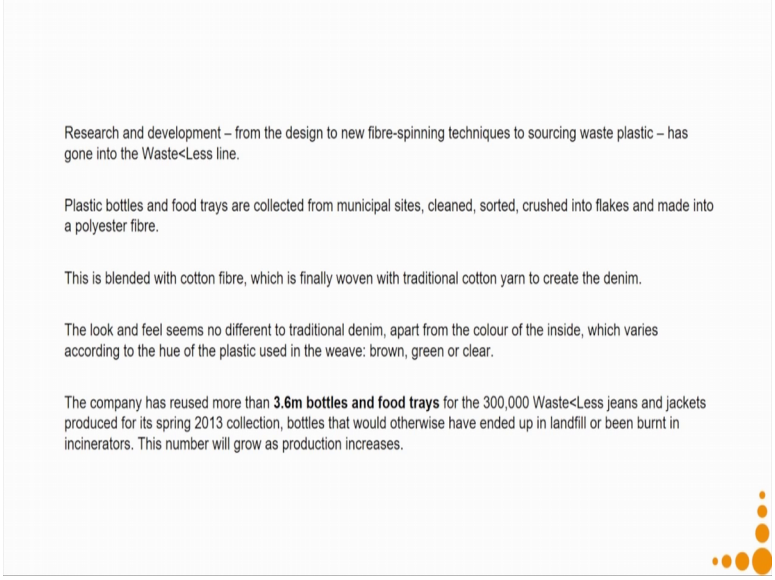


So, the design interventions which were done was firstly, research and development was done to identify how do we spin this new fibre from these waste plastics. The line was called as waste less line. Then, plastic bottles and food trays which are made of pet supposed to be collected from municipal sites, they need to be cleaned, then they need to be sorted into different colors or on other basis. Then they need to be crushed into flakes and made into a polyester fibre using the research and development that they did for finding out a technique for fibre spinning out of the waste materials.

So, you can see that levels also to figure out how do they do this collection from municipal sites. They also had to bring in a setup which can clean, sort and crush the flakes, another setup which can make the polyester fibre out of them. Then this polyester fibre will be blended with cotton fibre which is finally woven with traditional cotton yarn to create the denim.

The look and feel seems no different to traditional denim, but if you look into the jeans from the inside part, it might have different colours, streaks which because of the fact that we use coloured plastic bottles. So, the impression of the colour is only on the backside of the garment and not on the visible side of the garment. So, you might see use of brown, green or it might be clear in colour.

The company when this report was written by Guardian that was Spring 2013, the company had already reused more than 3.6 million bottles and food trays and converted

them into around 300,000 waste less jeans and jackets. These could have otherwise ended up in a landfill or they would have been burned or they would have ended up in oceans. So, you can see that design intervention, intervention in terms of development of new technologies for fibre spinning, development of new systems in which you set up a collection system to collect the waste trays and the food, new factory units or new machinery units which can clean, sort, crush them into flakes and convert them into polyester fibre.

And then advertising strategy, so that the message is conveyed on to people that this is a very innovative jeans, it is very environmental friendly, but at the same time it is equally comfortable and nice looking or look similar to traditional denim. So, this is an interesting example of how can we bring in sustainability using design, design into multiple phases of product development and reaching the product to the market. Let us go to the next example.

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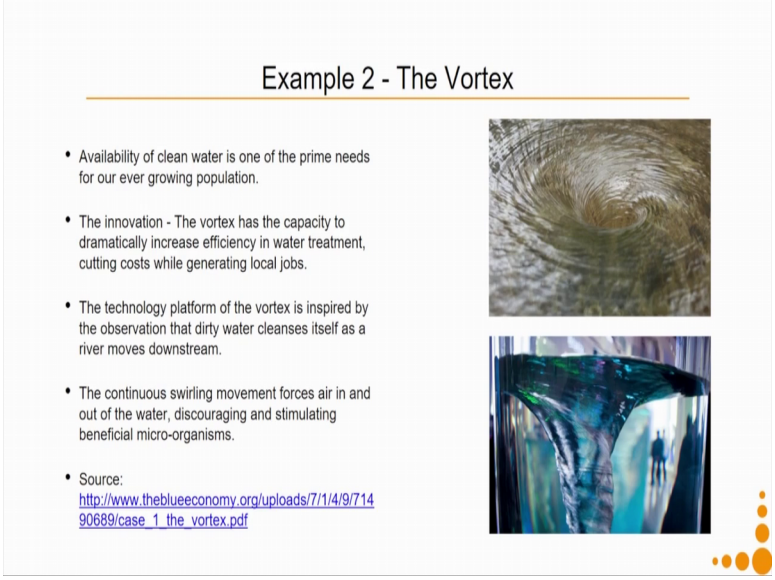


You might have seen a vortex. Vortex is nothing, but a spiralling movement of liquid. So, the first image shows you how it, a top view of that spiral and the second image shows you a side view of the vortex. So, all of us know that the shortest distance between point A to point B is a straight line which connects point A to point B, but not necessarily that is the lowest energy path. So, if you observe water, water always tries to travel in vortex because, vortex is the lowest energy path.

Now, talking about this particular example so, what does happen when we use vortex technology? So, vortex because of the wave, because of the spiralling motion of liquid, it pumps out air from the water into the atmosphere. In the absence of air, in air bubbles in water, microorganisms cannot grow in it. So, this technique can be used for cleaning water. This particular example that I am showing it comes from a book called "The Blue Economy". We will shortly discuss about the principles of blue economy, but to give you just what blue economy suggests is that you pick a physical phenomenon, identify an appropriate business model where you can put it and then, you get a sustainable solution.

So, in this case we know that naturally vortex helps reverse to stay clean, clean from microorganisms and as a result foul smell and so on which you will not find in a standing water body like a pond which becomes, really smelly after a point of time and needs constant cleaning. Whereas, for rivers we do not need to keep on cleaning it for biological matter because the vortex helps to clean it.

Now, imagine will you like to use this vortex based cleaning mechanism in for your water filtration at home; maybe not. Because now, we have got so much more used to water purifiers using UV treatment, RO treatment and psychologically it becomes very difficult to accept something which is vortex based. So, maybe that is not the most useful business case study.

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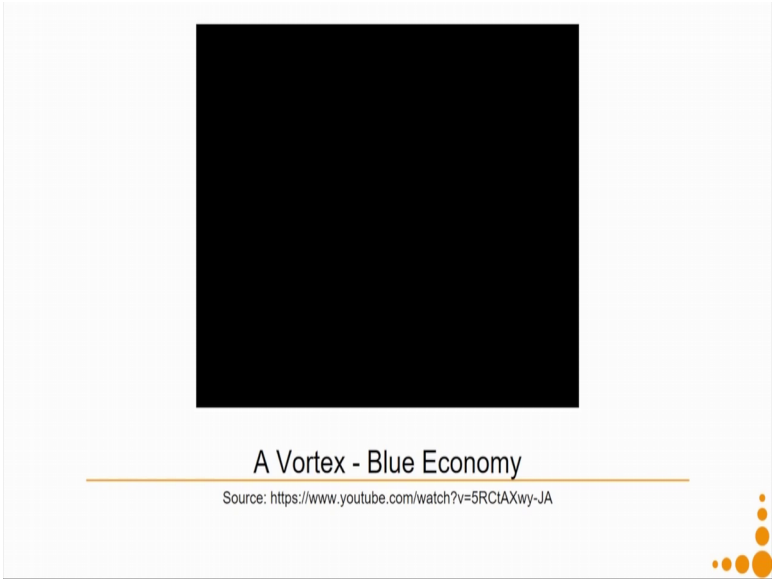

So, what can be a more useful business case study is, so I will first play a video which is by the author of this book Gunter Pauli and then, I will take you through a journey of very innovative business cases in which this vortex mechanism of getting water rid of air can be used.

Have you ever wondered how rivers cleanse themselves? Whenever there is too much dirt in water, somehow it turns clean downstream. Scientists have been puzzled for a long time. The Swedish development engineer and entrepreneur Curt Hallberg and his colleague Morten Oveson studied water movements and realized what others had observed.

Water never moves in a straight line; water swirls. Water knows a straight line may be the shortest distance between two points, but a swirl covers that same distance faster with less effort. The Austrian scientist Viktor Schauberger explained how this movement known as the vortex flushes air out of water and how the same can squeeze air back into the water.

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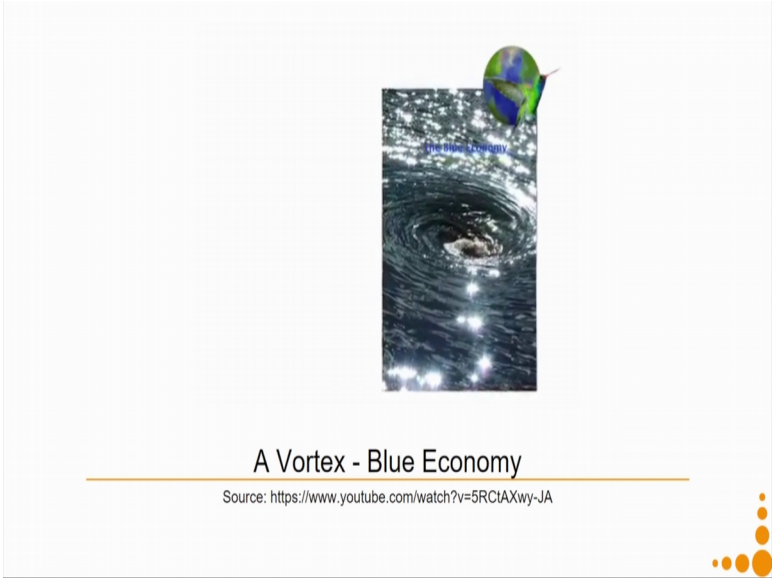


We all have observed this water swirls the flushing toilet and empties the bathtub.

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Remember seeing it?

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If there is no air in the water, then there is no dissolved oxygen, then bacteria cannot survive. However, when air is abundant then bacteria flourish the continuous shift from full to pouring air leads to the self-cleansing of water. The only source of energy to make this work is gravity; could not imagine the mathematical model underpinning the swirling movement and Morton mould of this into a physical structure that creates a vortex.

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What Rico, their start-up company in Sweden makes machines that generate vortex to freeze water faster and cheaper to replace chemicals that kill bacteria and to permit a higher advertising revenue since crystal clear eyes does not crack maintaining publicity visible all the time. This innovation saves energy. It eliminates costly chemicals and increases advertising income. These are just some of the opportunities ready for the market near you.

So, as you saw in this video, Gunter Pauli explains to you how the vortex works and how the machine was developed. So, you heard in the video how Gunter Pauli explained to you the physical phenomenon of vortex and its effect on water. So, once the machine was developed, the engineer started trying to think where we can place it, so that we can get appropriate cash flow. So, the first application that was found out was in making crystal clear ice.

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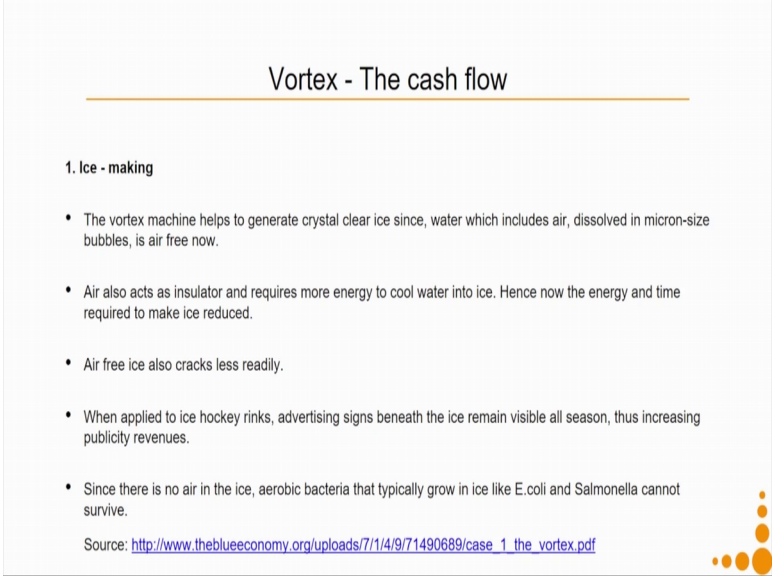


Since the vortex machine helps to generate crystal clear ice which happens because of the fact that air is expelled out, the dissolved air is expelled out. So, you do not get those very tiny bubbles of air inside in ice which are disrupting the visual look of the ice. Now, this ice is not supposed to be used for putting in our drinks or for such certain purposes. This particular ice is meant to be used in applications like ice hockey.

So, what happens in an ice hockey rink is, of course it happens on top of a ice floor and the advertising is below that. So, now because my ice is crystal clear, I can get better visibility of the advertising also. The ice remains crystal clear throughout the season, thus increasing the revenues coming from publicity. Also, since air all of us know air is a good insulator, so I need to pump in more energy and time to cool down the water into ice because I am removing the air before cooling it down into ice. I need to sprint lesser amount of energy and time to make ice. Also, it is observed that air free ice also cracks less readily.

Another advantage is since there is no air bubble. Very dangerous bacteria like E.coli and Salmonella which grow in icy environments, they can no longer grow. So, no requirement of treatment of the water with chemicals to prevent their growth also, the ice is safe for a very long period of usage.

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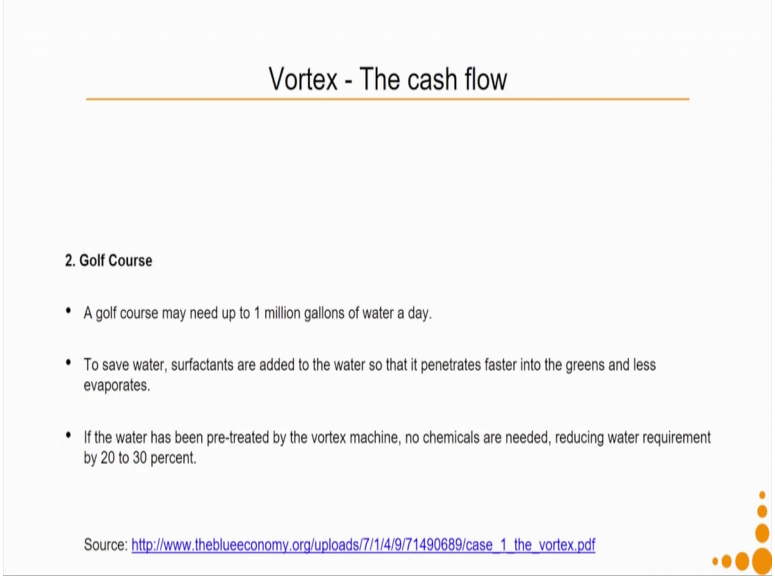


Next is Cash Flow. The next usage identified was in the golf courses. So, a golf course may need up to 1 million gallons of water a day. Just imagine the volume of water. So, currently what is being done is to save water surfactants which are chemicals are added to the water, so that the water penetrates faster into the lawn and it also evaporates less. Now, this is a chemical process. Its surfactants are chemicals, but it was observed that when water treated by of the vortex machine is used for watering these lawns, no chemicals are needed and it reduces the requirement of water by 20 to 30 percent.

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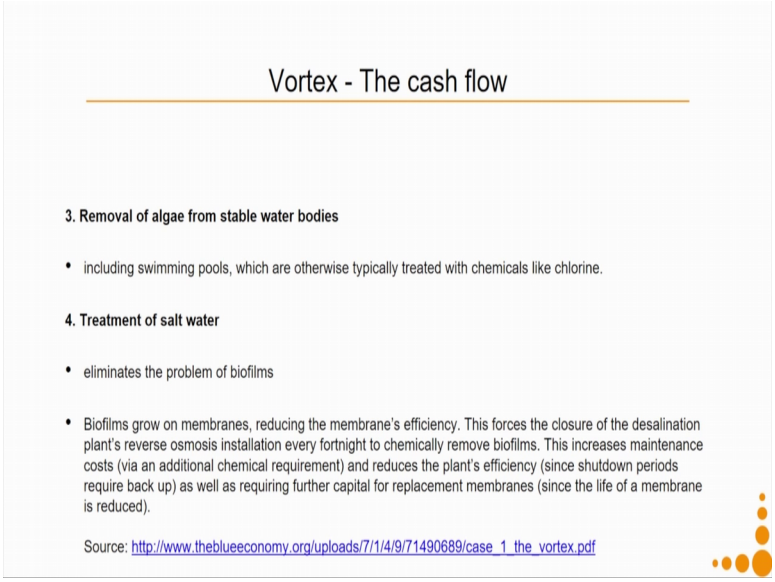

Next cash flow again because it removes air which means no dissolved oxygen, no microbial growth. So, it can also keep algae away from stable water bodies. So, stable water bodies like swimming pools which otherwise use chemicals like chlorine which is damaging to the environment, also damaging to the human beings who want to swim in that swimming pool, they can be kept free from algae if vortex machine is used to clean the water.

Fourth, cash flow in the treatment of saltwater plants. So, reverse osmosis is a process used for converting salt water into drinkable water. It is observed that on the membrane of the reverse osmosis plant, biofilm starts developing which is very obvious because of the air content and the microbial content of the eggs, the water which is flowing through it. So, every fortnight the whole plant needs to be stopped and the biofilm needs to be cleaned. It is a time consuming process as well as the cleaning is a chemical process.

So, they placed a vortex machine before the membrane and passed the water through this vortex machine. As a result of essence, the water does not have any microbial content and into it biofilm formation was stopped. So, you can see it saves a lot of time which is required for cleaning of regular, cleaning of the membrane. Along with that the chemical process could be eliminated. We can identify more interesting cash flows from this.

So, you can see in order to achieve a sustainable, so sustainability how does it bring in social sustainability because these are very small business and job generating activities, the cash flows. So, as a result social sustainability can come in and these are, these science principles and the machines are left open source, so that anybody interested in developing something of this kind can take it up and develop it in the application, they would like to have it.

An environmental sustainability and economic sustainability, you can already see. It does save lot of money, it also helps in earning lot of money, lot of chemicals can be eliminated from the processes. So, the principle of blue economy, the book goes by the title The Blue Economy: 10 years, 100 innovations, 100 million jobs.

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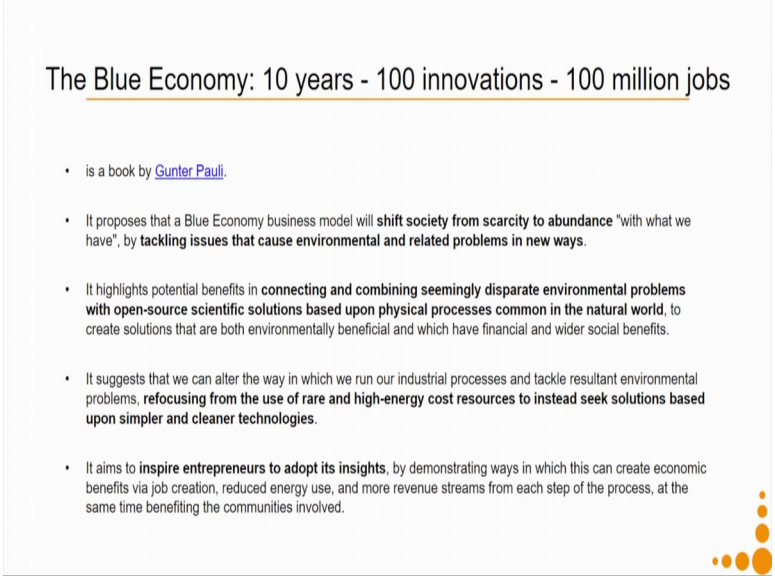


It is written by Gunter Pauli. It proposes that a blue economy business model will shift society from scarcity to abundance with what we have by tackling issues that cause environmental related problems in new ways. What are the new ways? It is by connecting and combining seemingly disparate environmental problems with open source scientific solutions which are based upon physical processes common in the natural world. So, rather than focusing on using rare and high energy cost resources, we refocus to seek solutions based upon simpler and cleaner technologies and we inspire entrepreneurs to adopt these insights and come up with new business models.

So, the open source technology helps many entrepreneurs also to adopt its insights and take it into any business in a model that they think will be useful. I will show you two more examples which will make the principle more clear to you. The book, it contains 100 innovations. Now, the bank has been grown further and it is at the moment 112 innovations all open source.

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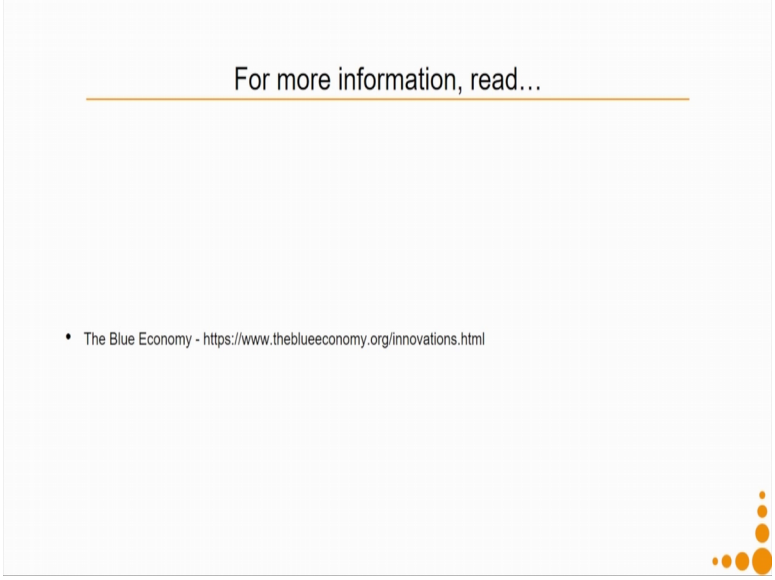


You can if you are interested in knowing more about them, you can go to this particular website and read through some of those innovations. Each innovation is described in 2 to 3 pages. Have we ever wondered why there are flies? Whenever there is dirt, flies are abundant. Many are convinced flies are a source of diseases, some think differently. The Nigerian social entrepreneur Godfrey Nzamujo observed flies and realized they eat rotting leftovers.

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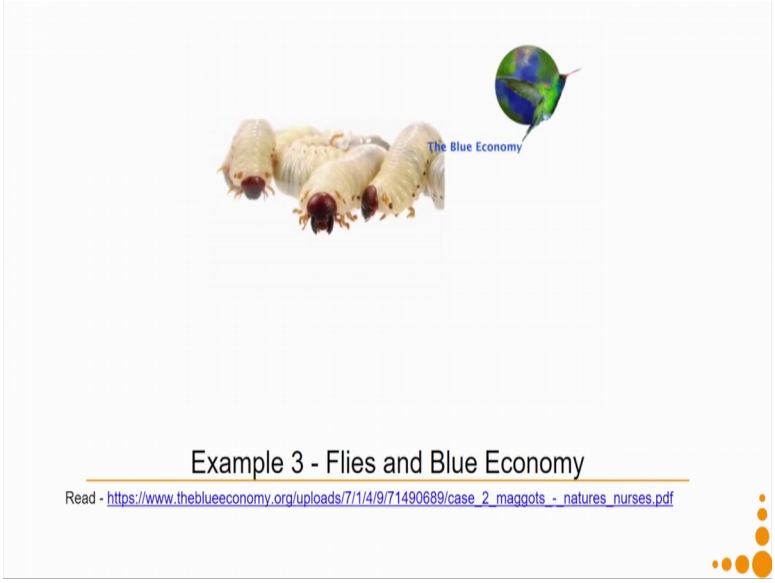

When food is rich, they quickly lay eggs and before long maggots from the freight. Maggots are rich in protein and favourites of fish and birds. The British scientist Stefan Rickman, study the age old successful tradition to treat open wounds with maggots and offered in solid science. While we have heard about it, few of us fancy the idea of having maggots around. How do you feel about it?

Godfrey Nzamujo created a special zone at the Sanghai centering or (Refer Time 20:46) many were slaughterhouse waste were offered to flies under strict conditions. He calls it the Maggot hotel.

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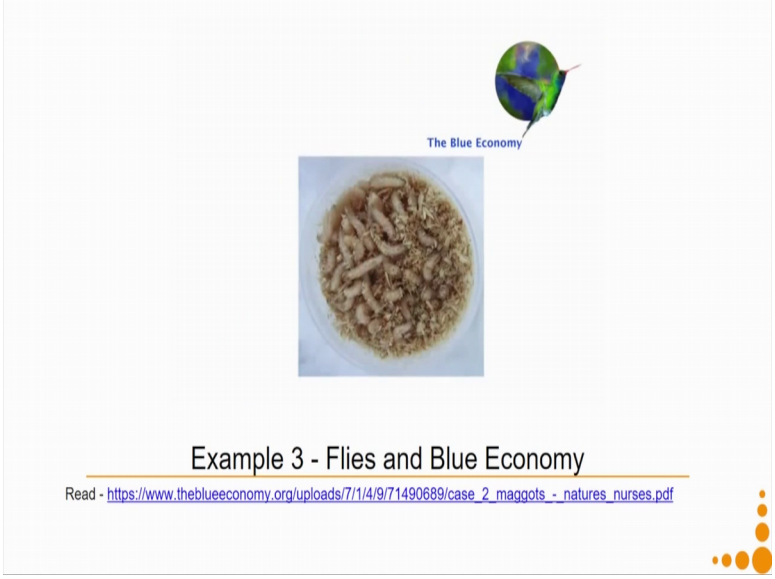


Maggots fed to fish and quails cutting costs generating food, this system offers a breakthrough for Stefan Rickman who created advanced gel technologies in Bradford, Manchester Leeds. The US British governments have approved wound treatment by maggots, but costs remain high, however when maggots are made to vomit simply thrown them into salt water, then the enzymes can be collected, purified and sterilized at a fraction of costs. This innovation converts wastes into quality products, substitutes antibiotics and increases income while generating jobs, providing health care at low costs and relieves patient of the sight of crawling maggots on their limbs. These are opportunities for entrepreneurs around the worlds.

So, in this video Gunter Pauli is talking about technique of treating wounds in which live maggots can be left on the wound and they eat away the microorganisms and help to treat

the open wounds much faster. That is a very expensive process and it is also not very great to see maggots crawling around open wound. So, the technique that they developed is, take the waste away from the place where a community is living, put it into a separate place far away from the community. All the flies will be attracted to that particular place. Now, the human settlement stays away from flies which means away from diseases.

The flies when they are eating all the biological waste, they consume all the biological race as and they lay eggs which has sown into maggots. These maggots can then be put into hot saltwater, they vomit out the enzymes which is required for treatment of the open wounds and the maggots can then be used as fish feed. So, multiple economic channels coming out from food waste or other kinds of biological waste which were till date a big source of problem. I had to always go into a landfill or we had to think about how do we compose it which is also a great idea to deal with it, but this is a very inexpensive and very effective solution brings in multiple ways of earning money.

Have you ever wondered how much coffee from the farm actually ends up in your cup ? From the biomass harvested at the farm in Colombia, Zimbabwe 0.2 percent is ingested and the rest is simply left to rot. The Chinese scientist Shuting Chang demonstrated in his lab in Hongkong that coffee serves as an ideal substrate for farming mushrooms. The Colombian researcher turned entrepreneur (Refer Time: 24:28) documented in over 20 articles that coffee is not only an ideal substrate for tropical mushrooms, it generates jobs income and food security.

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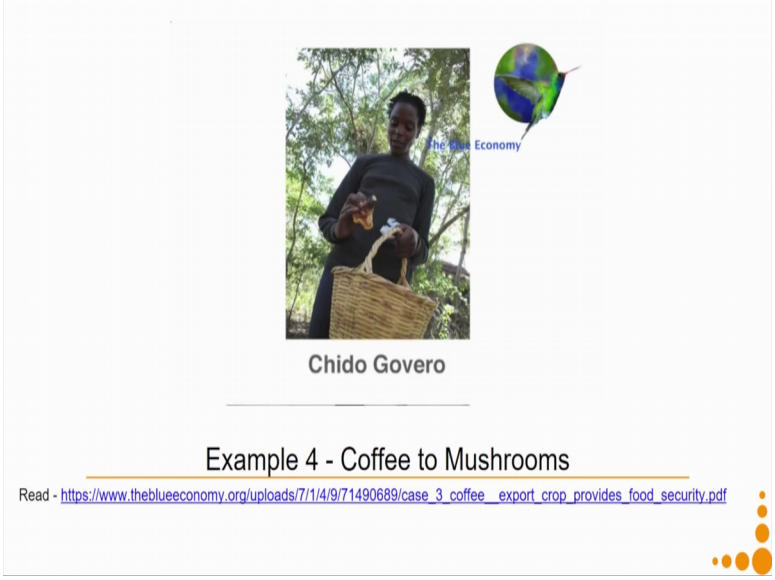


Chido Govero from Zimbabwe, an orphan who lost her mother at the age of 7 turned into a wiz in farming mushrooms. She became the head of a small family nucleus including her little brother and near blind grandmother and went on to demonstrate in spite of abuse and poverty that the next port crop like coffee could provide food security in Africa. Does this seem like a new business model in the making? When she doing comments that visited California in 2009, a couple graduates from Berkeley University listened to the projects in Latin American, African and concluded that they could collect a coffee waste from the coffee shops and grow mushrooms in the inner city providing competitive and high quality food.

While generating jobs, Alex and Miguel have proven their business model in hiring staff. Wherever in the world people far more drink coffee in the city or country side, waste part can be converted to protein. There are 25 million coffee farms in over 50 countries and 100,000 coffee shops everywhere. We are talking about potential to generate 50 million jobs creating quality food out of something that had no value what are you setting up the business.

So, from all these three examples that you can see, the design philosophy of blue economy says that take a physical phenomenon from the nature, identify appropriate business models where it can be used, replace this will in turn replace use of harmful

chemicals, will reduce wastages and also generate income and jobs because of the new channelization of the waste or reduction in the use of chemicals.

So, this is another approach for sustainability. So, if you compare the first approach which was converting the pet bottles into garments and the second approach identify different physical phenomenon and convert them into appropriate business models to achieve sustainability, you cannot say that example 1 was absolutely one technique which can be used in every ways. You cannot say the second method; the blue economy method is one technique which can be used in all contexts. So, depending on different contexts, we have to apply design fundamentals in different manners. Design has to come up in different parts of the value chain of a product and at different life cycles. We will see more examples.

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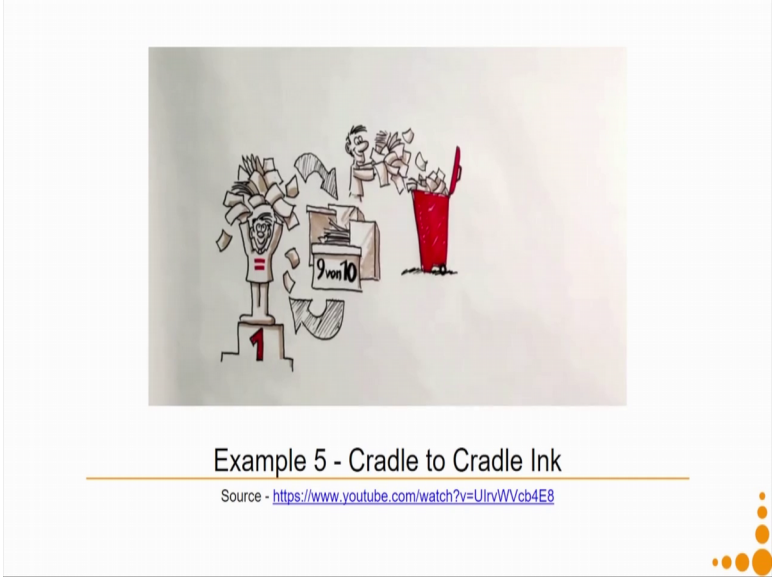


Austria is world champion in paper recycling. Already 9 out of 10 newspapers and 9 out of 10 cardboard boxes are made from recycled paper which is great because it shows how many people here are ready to do something to protect the environment.

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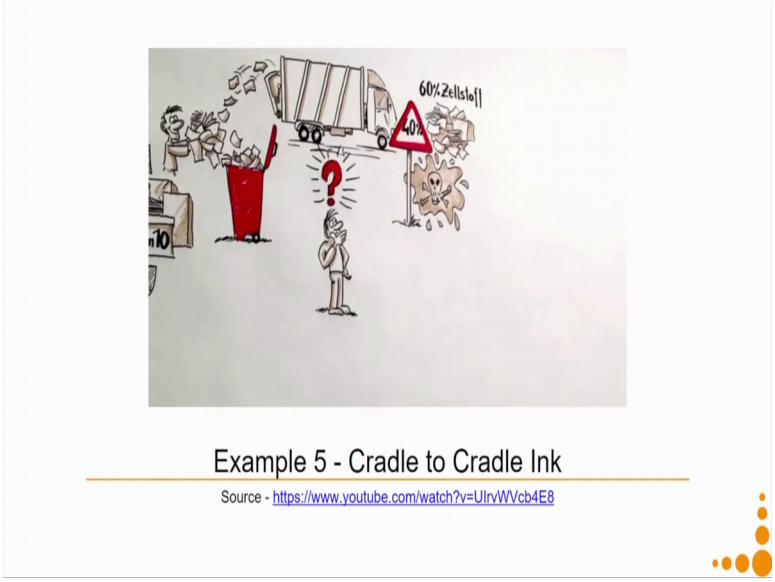


Most people do not know, however it is that even in the recycling process lots of resources are still there because only the pulp can really be recycled which is about 60 percent of the total volume. Up to 40 percent mainly ink and filler material is separated from the pulp and is left over after the recycling process has more or less poisonous sludge. This poses the question whether it is really environmentally friendly when of any product, only 60 percent is really suited to recycling.

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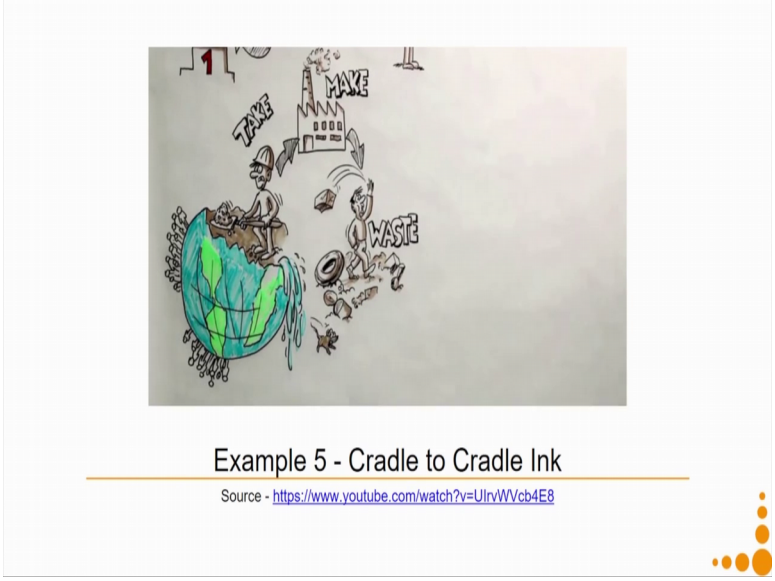

Since the beginning of the industrial age we produce things which end their lifespan on a rubbish dock take make waste, but if more and more people use more and more products, then eventually we will run out of the raw materials needed to make new products. Already today we consume more resources each year than the earth can regenerate. So, simply consume less unfortunately now. In that way we can at the most delay the depletion of our resources and not prevent it.

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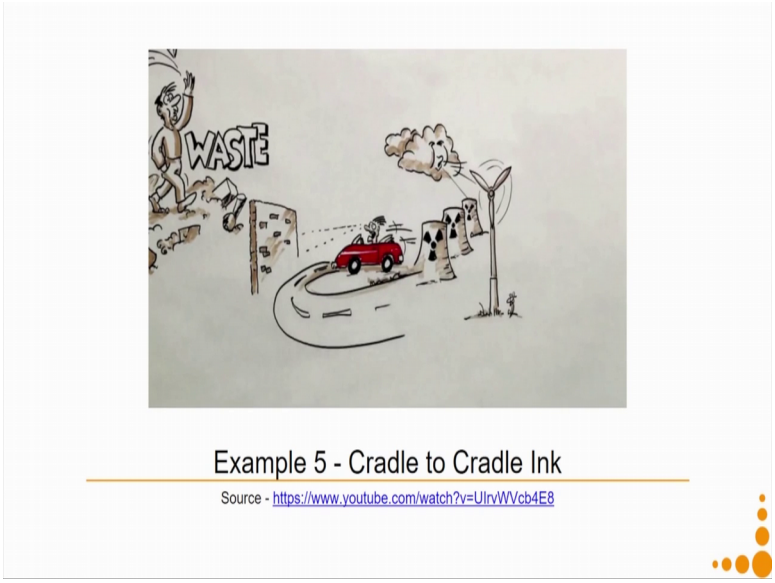


We would then only be driving more slowly, but still in the wrong direction. It is about taking the right turn because damaging behaviour patterns do not become positive or useful if one does them less, but that is exactly what the issue is today to design products, so that they are useful and not merely less damaging.

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The most beautiful examples of this are provided by nature. A cherry tree produces endless blossoms. Once the cherry blossom season is over, the petals fall to the ground where they do not become rubbish heaps, but flow back as nutrients into the cycle of nature. All resources remain intact and can be used again and again.

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The Cradle to Cradle design principle works exactly the same way. The goal is to lead more and more materials into cycles for these products must be conceived from the start in such a way that at the end of their life cycles, they can flow back into biological or

technical cycles. In the meantime, many products have been reinvented specifically for this from televisions to sofa covers and carpets to shampoo, T-shirts and toilet paper. New to this circle are cradle to cradle printing products for which all constituent materials have been examined for environmental or health risk factors if necessary replaced and now paper inks and additional materials have manufactured, so the complete recycling is finally possible.

Now, not just the pulp can return to the cycle in the future, even the sewage sludge may be used as fertilizer or for humus generation and if this humus does not go straight onto a farmer's field, then maybe the trees will grow from it which will then provide fault for new paper. Cradle to Cradle printing products could even be directly composited and when burnt, the ash is good for the vegetable garden. With cradle to cradle, we can close the cycle.

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Now, with gugler you too can print as nature would print. Off we go let us make an end to the destruction of resources and let us begin the next printing revolution together. So, in this video you come across a new terminology called Cradle to Cradle.

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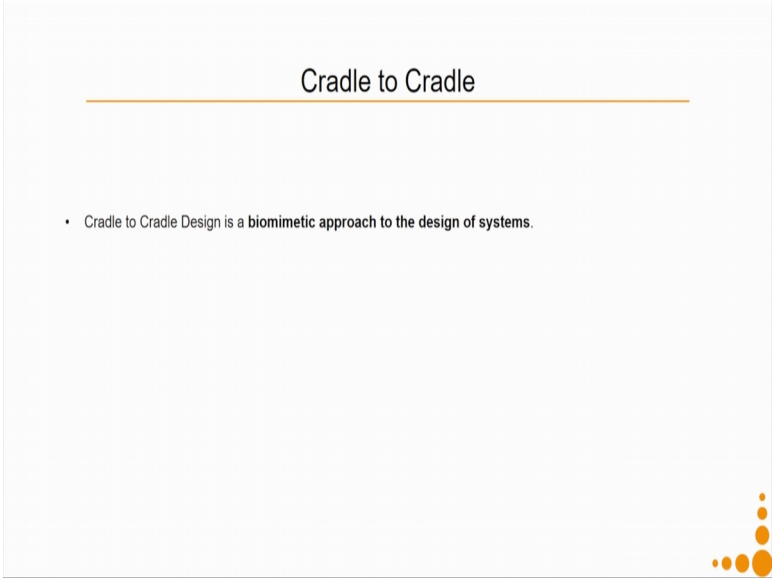


So, what is Cradle to Cradle? It is a biomimetic approach to design of systems. What do we mean by biomimetic approaches? You mimic how the biological world works. How does the biological world works? So, nothing is the waste in a biological world; we have everything cycling. So, tree takes its nutrients from the soil.

When the leaves of the tree or flowers or other parts of it which are decomposable, first onto the soil, they return back the nutrients to the soil and these keeps on happening in a cycle. You might have read about carbon cycle and nitrogen cycle and oxygen cycle in your school. So, biomimetic approach means design systems in the way nature designs it, so that everything goes in a biological cycle. Now, say plastic cannot go in a biological cycle. So, taking inspiration from nature we develop two cycles in cradle to cradle. Part 1 is the Biological Cycle.

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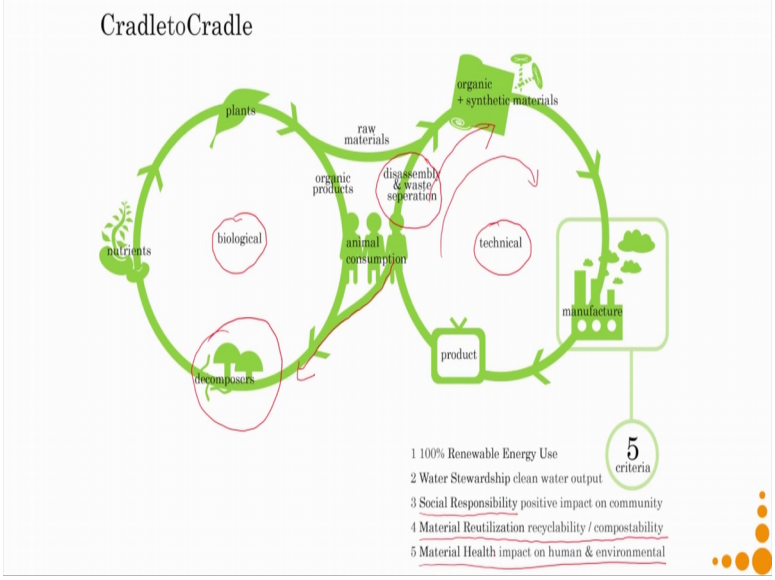


So, you can see over here the biological cycle and part 2 is the technical cycle. What it implies is your product might be made up of couple of components, the components which can go in a biological cycle, that is they can decompose like you see decompose. They can after the end of life, they can go into a biological cycle if say for example, paper. Paper can decompose. So, it can go into a biological cycle, but we can also recycle paper. So, at that point of time you can see I have an option over here that I can either take it back into my technical cycle or if it is no longer recyclable, say a paper can be recycled maximum up to 6 times after which the cellulose chains become very tiny. So, you cannot make good paper out of it.

So, in that particular case, the paper which is no longer recyclable can go to the decomposition cycle which is the biological cycle. In case it can be used back, it can again go back into the technical cycle. When we look at this in this particular cycle, plastics are not actually very bad because what we can do is we can collect back the plastics which implies you have to have a collection system, sort them out, grind them out and again reuse them which means it keeps on going into the technical cycle. Again and again same happens with metal.

So, say aluminum needs to be retrieved back and again go into the cycle. What cradle to cradle also adds upon it is while doing this whole process, we should use 100 percent renewable energy which might come from solar energy, wind energy, tidal energy, then it

also emphasizes water stewardship clean water output which means the factory whichever is making these products, they should ensure that they minimize on the consumption of water as well as the water which is released out of its factory premises is clean water.

The third one is social responsibility. So, the community it should have a positive impact on the community with respect to social aspects of the community. Then, fourth one is material reutilization recycle ability and compostability. So, not only that you make the product out of particular material which is recyclable or compostable, you have to also put in place systems that you can collect back those materials or you can enable your consumers, so that they can themselves do the recycling or composting.

The fifth one talks about material health impact on human and environment. So, it also as very important criteria, it also mandates that a product should be made up of components or a products component should be made up of materials which do not have any hazardous impact on the human and on the environment. What it means is say for example, some paints, they might have a effect of leaching some chemicals or say some plastics.

They are not food grade, but if those plastics are used for making toys for babies, babies will automatically put their toy into their mouth and the toy is not food grade. So, it can lead chemicals into the baby's mouth. So, it ensures that a person who wants to go for cradle to cradle certification should also ensure that his product is made up of material which has no negative impact on human and environmental health.

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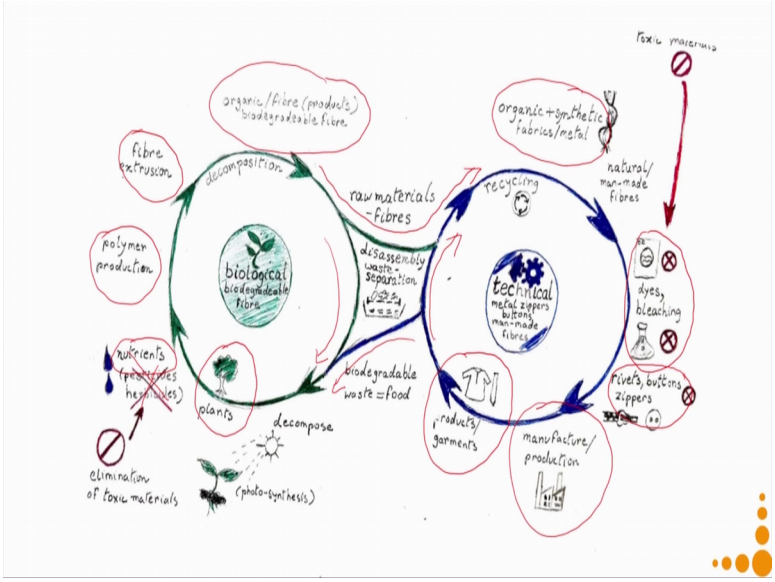


So, I will show you one example. In this particular example, this is an example from the fabric industry. So, you can see my fabric grows as a result of photosynthesis done by plants. So, this might be cotton say for example. Then, I have to ensure because as I told you I should not have used any kind of material which has a bad impact on the human and the environment. So, a big no two nutrients which are based on chemical pesticides and in herbicides, but any kind of nutrients which is a natural nutrient or an organic nutrient can be used for growing these plants.

These can be this, then go into a polymer production process which again goes into a fibre extrusion. Thereafter, what I get is organic fibre products or biodegradable products. These products can be directly used and after usage, they can go into decomposition phase, but say for example, if I want to combine it with my pet bottles and create denims or there are also fabric because of the kind of requirement from, technical requirement from the fabric, I might need to mix other raw materials which are synthetic raw materials.

So, then my organic materials enter into the technical cycle where I add the synthetic fabrics as well as metals. So, metal in the sense like zippers, plastic buttons or metal buttons and other decorative items again dyes and bleaches which are chemical based is again a no because they are toxic to the environment and to human beings. So, we are supposed to use natural dyes and non-harmful and non-toxic dyes.

Then, we or add on to rivets buttons and zippers as per requirement or any other decorations. Finally, my garment will be manufactured in the manufacturing unit. I have to take care of the fact that all these processes happen using renewable energy. I optimize on to water usage as well as I ensure that the water leaving out my premises is clean water. Finally, I get my products and garments.

A part of these products and garments after usage can go into the biodegradable waste chain because it can be biodegraded and rest of the components like the buttons, the zippers or even the synthetic materials which has been added to it should go back into the technical cycle. Me as a manufacturer will also have to ensure that I device a entire mechanism in the marketplace where I enable my consumers, so that they can do the biodegradable activities or the technically recycling activities

So, cradle to cradle tries to achieve sustainability by mimicking natural processes of things going in a biological cycle or things going in a technical cycle. It also have a certification process and when you design products, you can get certified by cradle to cradle.

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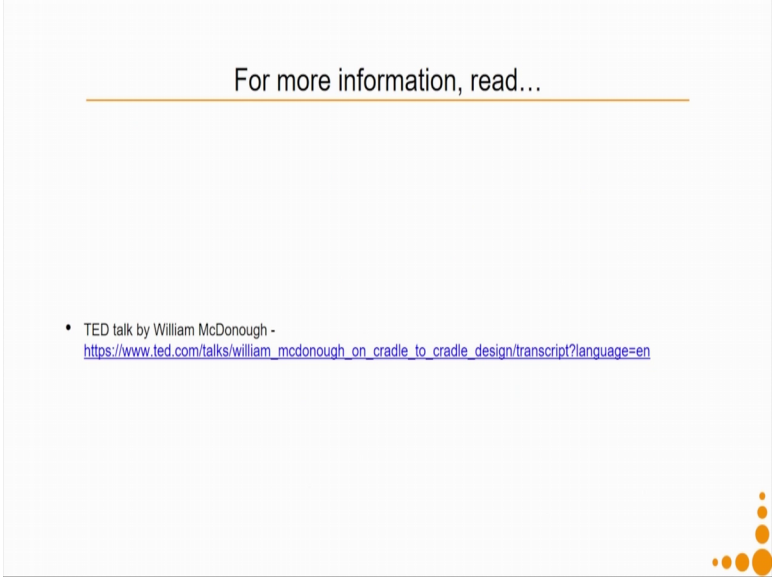


To know more about the process, the author of the book on Cradle to Cradle has a TED talk. So, you can go through his TED talk. You can also read the book on Cradle to Cradle for more information and inspiration on those lines.

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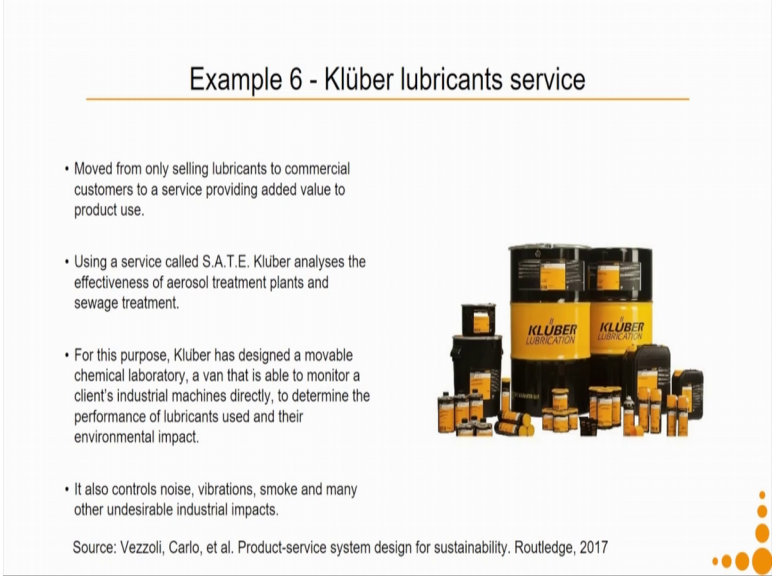


Now, coming to another approach for design for sustainability so, this is an example from a company called Kluber lubricant services. So, Kluber they sell lubricants to commercial customers in the sense industries and factories. So, lubricants are required for their machines. So, these are high end lubricants.

So, earlier their business was to sell lubricants. So, they came up with a new idea. Lubricants are a big source of chemical hazard when industries are using lubricants because me as an industry, I might not be an expert in knowing when my lubricant needs to be changed. I might either change it before its expiry period or I might change it after its expiry period. If I am changing before its functional life is over, then I am wasting precious resource as well as my own money.

If I do it after the timeframe, I am causing more wear and tear to my machine which also might mean that my machine is consuming more energy and I am spending in more money in repair of my machines because me as an industry, I do not have expertise in lubricant management. It might be also very expensive for me to hire a full time lubricant specialized engineer to manage that for my industry. So, they came up with this idea and it is a service plus it is called as S.A.T.E Kluber. So, what this service does is, they analyze the effectiveness of aerosol treatment plants and sewage treatment plants, they design a movable chemical laboratory which is mounted in a van and this van goes to the industries which have subscribed for the lubricant plus service.

Does constant monitoring of their machines and the lubricant over there determine the performance of the lubricants and their environmental impact in location and after doing the test, it determines whether it is the right time to change the lubricant or not. They also have additional services like they also try to see that there is noise control, vibration control, smoke control and any other undesirable industrial impacts.

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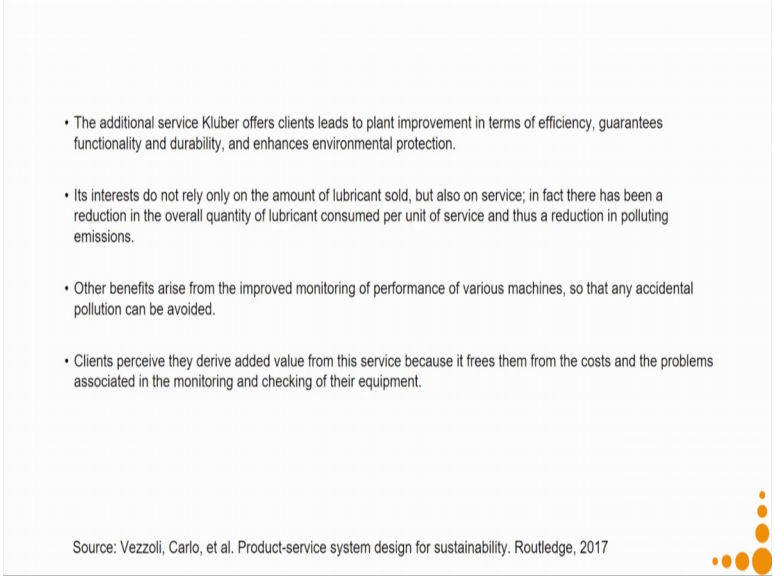


After bringing in this service they observe that their sale of lubricant has reduced, but that does not mean their income reduced. Their income increased because of the service part of it. The industries, the clients became very happy because they clearly could see increase in terms of efficiency; guarantee of functionality, durability and it also enhances environmental protection which is a plus point for the industries because they have to generate environmental reports at the end of each year.

So, now it became in the interest of the client as well as Kluber to be more and more sustainable. Why? Because Kluber if they do a better job in good lubricant management and reducing the environmental impact and other undesirable impact in the clients location, they are able to make more money out of this service aspect of it. They sell less lubricant that is the environmental benefit. It is in their economic interest to be environmentally friendly. They will be also more encouraged to make better and better lubricants for a longer life which means their service will be even more valuable then in that case for the clients, for the industries. It is again a very win-win situation because.

They are insured of the efficiency, they know now they have to spend less time on maintenance of their machines. There is someone else to do it who is more specialized into doing it, they are releasing less environmentally damaging effects which is a plus point in their annual audit report. So, it is in the economic interest of all stakeholders involved to be environment friendly in this case.

So, this can be another approach to design where it is in the economic interest of this stakeholder to go into more and more sustainable processes. Now, coming to an example which is closer to home India so, this is called as Provision of Urban Amenities in Rural Areas, short form PURA.

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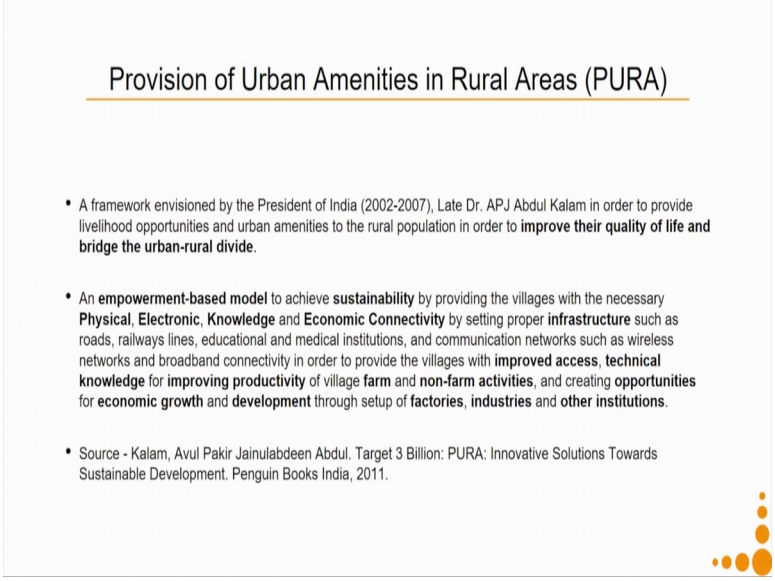


So, it was a framework envisioned by President of India. The example that I will show you; dates back too way much before time that it is called as a Warana Pura. Warana Pura started its activities in the late 1930's. So, this framework was envisioned by the President of India Late Dr. Abdul Kalam in his book Target 3 Billion.

So, what it envisions is to improve the quality of life and bridge the urban rural divide is the next calling for us in order to achieve sustainability. Why it will give sustainability is, when the divide between urban and rural is reduced, there will be lesser migration of people from rural areas to urban areas reducing stress on the urban environment on the requirement of resources.

It will also ensure better distribution of population, better distribution of different economic activities with more and more people migrating away from rural areas. Yeah people in the agricultural sector, the places where food is being produced reduces. So, when we provide them, so it is called as an empowerment based model for sustainability. What we do is, we bring in physical electronic knowledge and economic connectivity through infrastructure such as roads, railways, educational and medical institutions, communication networks such as wireless networks and broadband connectivity in order to provide the villages with improved access technical knowledge for improving productivity of village farm and non-farm activities and creating of opportunities for economy growth and development through setup of factories, industries and other institutions which are close to the activities which happens in rural areas.

So, I am not talking about setting up a steel industry over there, but setting up industry. So, I will tell you, show you a video of Warana Pura which will make it more clear like when we want to set up factories, industries and other institutions in rural areas, what kind of we mean. So, if you are interested in knowing more about this particular approach, you can go through this book on Target 3 Billion.

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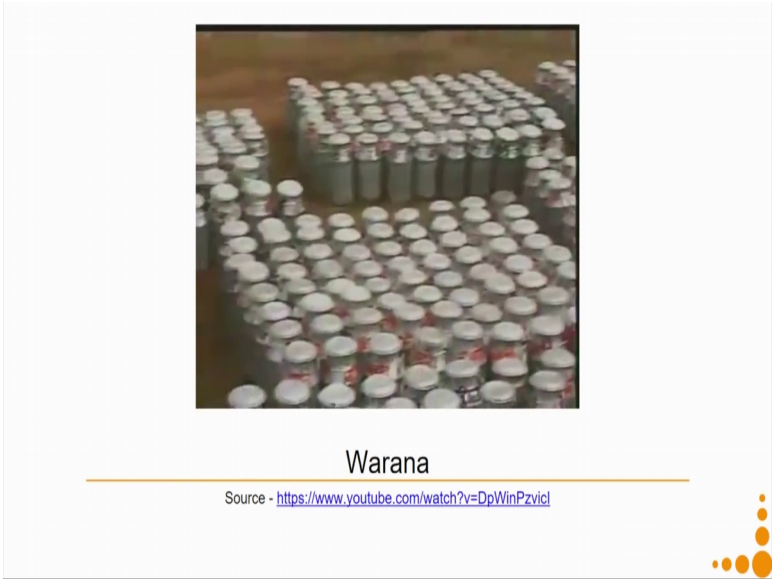


So, this is an example Warana Pura. Warana is district in Karnataka, Warana valley in Maharashtra a land of depravity, of poverty, illiteracy and cry, land that has wasted away in neglect that people but, were often robbed of even that. Yet from amidst this clue,

there emerged a few young men Vishwanath Rao Kore, KD Patil and Yashwantrao Chavan of transforming this waste planet to a Vande Mataram. These youngsters left into the struggle for India's Independence a war the nation was (Refer Time 49:26) the nation was (Refer Time 49:27). This was moment of realization for Vishwanath Rao Kore. He returned to his native village Corelli to fight the enemies at home first. Young Vishwanath Rao Kore was poised to chart a historic course as he serve the expanse of Warana Valley. As his visions crystallized a movement for renaissance, our revolution was born.

He started his (Refer Time: 49.52) with the setting up of Corelli High School. End of british [FL], brought many new freedoms and opportunities for the farmers. Traditionally the farmers always process whatever little gain they had into jaggery. If instead cane was made into sugar, it would add value and earn more, but the farmers had no means to set up a sugar factory and that is when Vishwanath Rao Core hit upon an idea what if the farmers formed a cooperative. Convincing the farmers to be members, telling them of this vision of Warana valley was not an easy job, but convince he did. He saw strengthen togetherness prosperity in cooperation. Finally, Tatyasaheb as Vishwanath Rao was now called, began a cooperative movement for sugar cane farmers.

The Warana cooperative sugar factory was set up. This brought dynamism to the one slumberous added Warana Valley. 80 determined villagers led by Tatyasaheb Kore crossed all hurdles, perseverance and confidence. The sugar factory grew in size and soon had the largest gain crushing capacity in India. Along with the sugar factory, the farmers of the Warana cooperative built 5 dams. The dams improved irrigation facilities and the yield of sugar cane rose dramatically. Sugar brought prosperity and it gave the farmers and their families a new lease of life.

Finally, Tatyasaheb Kore's dream of a farmer’s cooperative was realized. To improve the economic condition of landless labourers of the Warana Valley, Warana dairy was started. As an on the side enterprise of the cooperative, the Warana bank was founded to help the cooperative for financing new venture. The cooperative bank provided loans and necessary for cattle purchasing etcetera. The side business flourished and grew rapidly. Today it has a state of the art milk collecting and processing plant with 3 lakh litres daily capacity. The Warana cooperative diversified by setting up for manufacturing humans to

produce milk products like shrikhand, ghee, skimmed milk powder, lassi, cheese and butter.

Today its shrikhand and lassi are market leaders. The women of Warana valley joined hands to form Warana bhagini mandal and contributed to the revolution. They have (Refer slide: 52.54) themselves from the drudgery of household work. Tatyasaheb Kore's vision was to achieve a revolution, economic and intellectual. Thus, Warana Vibhag Shikshan Mandal was born, the schools and colleges both in humanities and sciences was set up. Tatyasaheb's battles against poverty and illiteracy was slowly and surely won. The famous Baal Vidya Vrind became the voice of Warana Valley, world ever Tatyasaheb Kore military academy was founded with the objective of nurturing young boys to become a physician soldiers and citizens of the nation. Men, women and children, all have been transformed by it. There was no looking back after that and the other ideas followed.

The Warana Cooperative Poultry Farm an example of a rural enterprise turning even more profitable as a cooperative venture, the Warana bazar chain with branches. And all the villages of the cooperative vegas, the waste from the sugar factory was used as raw material to manufacture paper, Warana distillery which uses molasses, a by-product of sugar to manufacture industrial alcohol, Warngau Agricultural Research Center devising environmentally friendly techniques for better farming, Mahatma Gandhi hospital enabling the villagers to easily access the best in health care.

The picture Warana valley the Tatyasaheb Kore's had envisioned was a reality for all to see and be inspired by the vision of Tatyasaheb was inherited by his sons. Shree Vilasdada Kore who envisioned the advent of Agro acknowledges is something equally dynamic. Vinay kore sow in Warana valley is carrying forward this vision. A mission is to enable every man in Warana valley to take control of his destiny; the need of the hour is to amalgamate the goodness and strength of our traditional Indian values and technological achievements of the 21st century.

We are determined for the upliftment of every individual through the Warana cooperative movement. Today in Warana valley a revolutionary concept is shaping up. The Warana wired village project where all the 80 villagers will be connected by their own net abandoned project of the government being implemented here in Warana nagar

WAGPCOS State of the Art Food Processing Factory was set up with the American voice and technology. Clearly the Warana farmers were put enough mortgage for International funds to in Warana nagar. Every process is integrated, interconnected, interdependent and completely independent of outside assistance.

The new generations in Warana nagar do not toil without rewards, every farmer and these 80 villagers is a shareholder in the hugely successful cooperative story. There is true freedom here freedom from poverty, from inliteracy. The renaissance has happened, the vision, the sense what the value of hunger and depravity. Warana nagar is now a paradise, a role model of cooperative success for all to see and be inspired by.

So, in this example you can see that by providing infrastructure, strategically providing infrastructure, physical electronic knowledge and economic connectivity by connecting infrastructure such as roads, railways, education, medical institutions, communication networks, such as wireless networks and broadband connectivity to the village areas, it improved access technical knowledge for improving productivity of village farms and non-farm activities and creating opportunities for economic growth and development through setup of related factories industries and other institutions.

So, we went through four different types of design for sustainability intervention. In the last intervention which I was speaking about the situation is something like a socio-economic context. It is a situation which was a developing situation or an underdeveloped situation in which I tried to develop an entire societies economic activities, convert it into a socially economically and environmentally sustainable region to over 8 to 9 decades of hard work and it needs continuous development. This is a kind of design intervention scenario in a underdeveloped, but developing situation with societal dynamics.

The first example that I was talking about the Levis jeans, that is kind of an example wherein we do certain design for sustainability activities wherein we know that there is an existing waste stream, there is not much we can do. Certain things to avoid, to reduce the waste stream, but at this moment there is not much waste is being done to in reduce the waste stream. So, let us do a re-use of the waste stream and come up with some design solutions in an industrial context.

The second kind of examples, the blue economy based example, they are trying to talk about a context in which I am trying to create altogether new ventures. These ventures will be most likely small ventures, not very big ventures, not like multinational companies. Maybe we do not know it might happen eventually, but small enterprises more localized enterprises using processes inspired from the nature which are physical processes and putting it into a successful business module.

The third example that we spoke about Cradle to Cradle; it again comes from industrial context wherein we take up a particular product stripped down into components and see how each and every component can either be taken into a biological cycle or a technical cycle. And then, introduce this redesigned product into the market along with an infrastructure which can enable the collection of the products back, so that it can be put into the biological or technical cycle by the company itself or put an infrastructure in place which enables the users to do the same.

So, in this particular week we studied about what is unsustainability, what do we, how do we move towards sustainability, the definition of sustainability, definition of sustainable development and some design approaches on how to achieve it.

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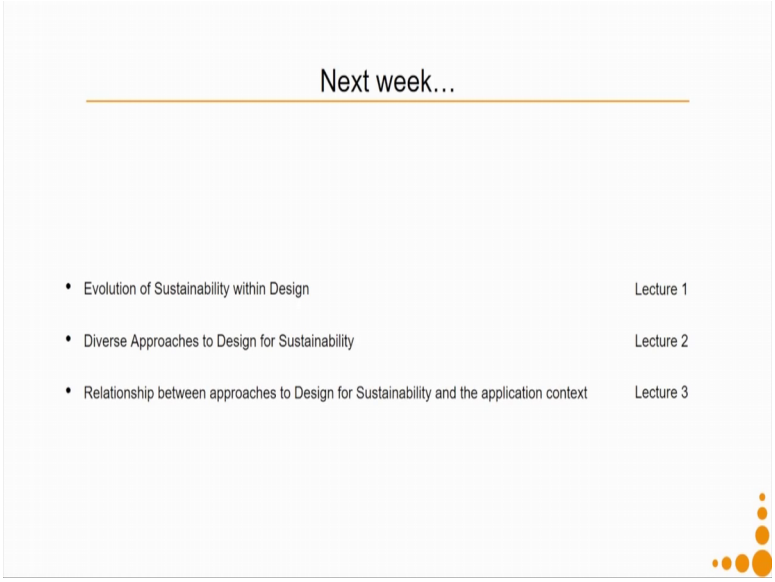


What we will do in next week taking this today's lecture forward, we will try to see that how these different techniques have evolved through the design history. How these different techniques are applicable in different contexts, industrialized context,

developing context, developed context, the kind of impact that we want and try to compare them. No one technique is better than the other. In terms of absolute ways, there are certain contexts in which we can apply one technique more easily than the other; Hoping to see you back again next week.

Thanks.