Technology forecasting for strategic decision making - An Introduction
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Lecture 30
System function - What's the function 2 Mosquito repellent

Hello and welcome back to the technology forecasting for strategic decision making. This is an exciting module for me. We are looking at functions of a particular system itself. So, I have two example cases that we have been looking at and at the end of it I will also be giving what function this is. I would like to examine the history of products and so does Professor Dmitry Kucharavy who also loves to track history of inventions and over time.

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So, we will take two systems, one of them is in the frame of the picture that you see of the video that you will see and we are going to talk about that. You will guess which one I am talking about. There are a few objects in the frame, but one of them is what I am talking about.

Now, in the good old days 2000 years at least ago, even older than that, maybe even 3000-4000 years ago, people had a certain habit and that habit was that, in my part of the world which is in India, southern part of India, particularly I am sure this is the same case throughout India and several parts of the world as well, I am sure but the way a place where you grew up at 6 pm sharp, at 6 pm sharp, we had to light incense sticks.

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Now, incense sticks are for those of you do not know are sticks with stuff plastered on top of it, then you set fire to the top and it keeps smoking throughout for a long time. It takes about I think an hour, maybe 2 hours depends on the length of the stick itself, incense stick. It is used in lots of places, in places of worship I have seen it, I have also done it at home, but at 6 pm sharp, where I was asked to do that when I, when we were kids, we were asked to do that. And I said wow this is a interesting practice.

So, for me 6 pm got associated with that smell, with that practice and all that. So, for a long time I took it for granted and I never really questioned why it was. Till not too long ago and I read up about the history of incense sticks. So, this agarbatti is they called it in India. So, the, I was wondering about what is this all about, why do we do that? Turns out there is a good functional reason for that as well.

So, the reason was and now here again you can see the clue in my the frame is to sort of drive away the mosquitoes as well. Of course, it gives a great fragrance, it gives a certain mood, etcetera, etcetera, I could talk about that. But one of the primary functions that this is performing was to sort of drive away the mosquitoes.

So, apparently the smoke did not agree with the mosquitoes, so it worked and people used to use fire and smoke for a really long time. I believe from what I read on the internet that when Romans all across the globe also used to use such practices to drive away mosquitoes wherever it was a bit warm and mosquitoes were a problem, people used to use such techniques.

So, that was eons ago and it is still a practice even today we do practice it, lots of people practice it. Now, I was looking at the history of this whole idea, because mosquitoes can cause so much harm to human beings, what have we done or what has evolved in this particular technology. So, again from my childhood memory I remember that we used to have these coils, incense sticks which are long suddenly became coil. So, there is a holder, I do not know how many of you know of this or seen this mosquito coil as they call it.

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On a metallic clamp and on top of that you place this particular coil and you set fire to this. So, it took a really long time. So, just not that couple of hours that the incense sticks used to have, but this could go on for a really long time. I do not know how many hour, I do not remember how long, but I am sure it is in the order of hours as well and it is much longer than an incense stick, and much compact, it is thicker, it is much more and it also came with a lot of fragrance and I always associated that with the fact that I do not want mosquitoes in my house. So, that was the next sort of step that we took in driving away these mosquitoes.

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Then, I remember that one of them was this idea of using a mat but now with wall sockets which is what I was referring to, you can see right about there. That is a wall sockets and prior to this technology we had a mat, a mat came as a refill for wall socket like that and we place it slide it in there, switch it ON there is a heater plate, heater plate would heat up the mat which had some sort of chemical I guess and that would sort of help us drive away the mosquitoes. So, that was the next level of evolution in that. So, mosquitoes are driven away by these mats.

Then came this one that you see in my household which is a liquid instead of a mat which is a solid, now we used a liquid. So, the liquid when you switch it ON, it vaporize it because of capillary effect the liquid comes up to the heating surface and heats up and lets out these fumes, invisible fumes of course, and you could smell it and you know it is at work and it would help us deal with the mosquito problem.

So, this was what the evolution was right now this is what we use, but I remember buying one of these little gadgets which promised to let out ultrasonic waves when switched on and that would apparently get rid of or help in the mosquito problems as well. But let us keep that aside and let us look at the incense stick to the coil, mosquito coil to the mat to now this one that you see behind me, the liquid refill.

So, what evolution has gone into this one, into this? So, what is the function? I am not - the evolution I told you and what is the function that we are trying to deliver. So, when I started out I thought the function of this particular system is to drive away mosquitoes. So, when mosquitoes came in, switch on and it sort of drive away. Actually, it is mistaken because if you look at the definition of a function, the function of this system eventually yes, it is to deal with

the mosquitoes, but that is the secondary indirect effect, indirect function and not the direct function.

The direct function is to take this stuff, the smoke, or the fume and spread it in a room. That is the function. The function is to move chemicals, chemical fumes, not even chemical; chemical fumes and spread it inside a room.

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So, we are looking at a very, very tight function and the fact that mosquitoes do not agree with the fumes helps us and gets driven away in the process. Maybe even deadly, I do not know, I have not researched it to what the chemical does, but I know that the function of the system really is to spread the fumes inside a room that is the function.

Now, if you were to zoom out and look at not at spreading fumes, so if you were to stick to this idea, this function of spreading fumes inside a room, you will get more in the evolution along this line, so how do we do that, liquid, solid to liquid, next will be gaseous. So, you have gas canisters which will go and you will get refills of that and then that spreads. So, that is the next logical evolution in this system.

But really what is our function? So, if you want to expand the horizon of the mosquito problem itself, expand our outlook on this particular problem, then we have to look at the eventual functionality that we want to deliver which is to separate out the human being from the mosquitoes. So, if you think about that as a problem, then you get solutions like mosquito nets, so that is another solution, mosquito nets that enclose say a bed, this is also an old-time solution.

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I remember from my childhood days also that we had beds which would actually keep you away from mosquitoes. Or nets on the windows like on my right there is a window and that if you have a net that would keep the mosquitoes away from the entire room itself.

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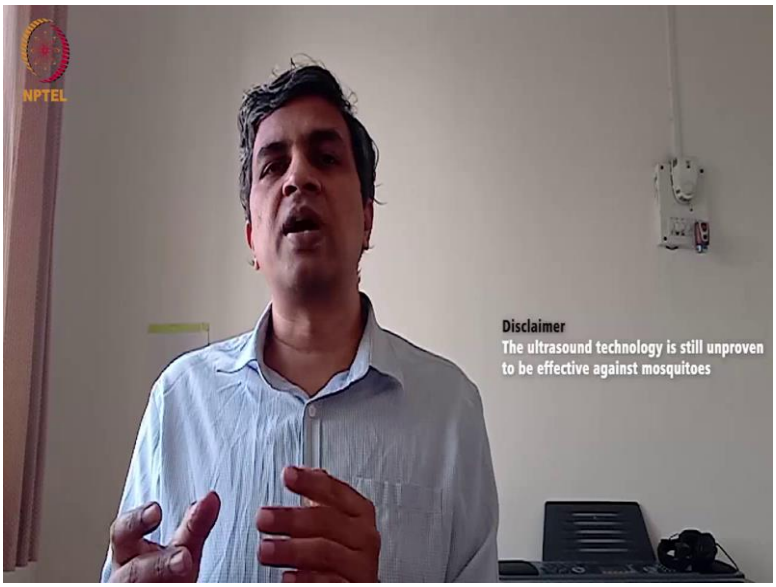

And at a personal level, I remember these creams that were available, I am sure it is even available as bugs sprays. So, that is an evolution. So, the first it started off probably as cream or even before that probably a solid which was which could be smeared on top of yourself and then it became a lotion or a cream which you can apply it on yourself and that separates the mosquito from the your skin because that is where the problem was that the mosquito wants inside would bite you. So, that was something that you need to keep that away, it should not bite you.

Now, the next evolution of that was that how can I separate this mosquito from me, from the person itself and now that is where the ultrasound really comes is in driving away the mosquitoes. So, keep away the mosquitoes from the human beings. So, now you are thinking

of ultrasound, so that is the field. So, we have move from solid, liquid and gas, then we are moving into field. So, this I am of course, quoting from TRIZ trend of evolution, one of them is called dynamization.

So, dynamization is the evolution in the geometry and the way it is delivered, the function is delivered, but you need to first step is to look at it as a function. What is the function, we are trying to deliver? A smaller function which is spreading of the fumes inside a room and the secondary, the larger function which is to keep the mosquitoes away from the human being.

So, to move mosquitoes away from the human being or in the cream case it is to keep the mosquito from biting the or even drive because they add a repellent also and you can move away or the sprays that you put on yourself. So, this is an example of if you get the function right, at what level are you operating at determines what kind of a solution that will be that you can obtain. The next part of this video I will talk about another system which is also equally exciting and something that I have loved to keep track of. We will talk about it in the next part of the same video.