Technology forecasting for strategic decision making - An Introduction
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Why do we need technology forecasts?
Why is it difficult to forecast?

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Prof. Dmitry Kucharavy: Why is it difficult to forecast? If it is so on-demand, why it is not practiced so widely? Why it is really difficult to predict the distant future and to have a bold idea about the distant future? There are several reasons, I am not going to put you into all the network of the reasons because this is an introductory course, I would like to show you kind of tip of the iceberg.

That really helps us to understand how big size can be evolved, why is it difficult to forecast? In fact, the question is when we are forecasting, the question is how to get knowledge about technological future? The question is how to learn about something that still did not happen. And this is not the same how to learn about something that we have experienced.

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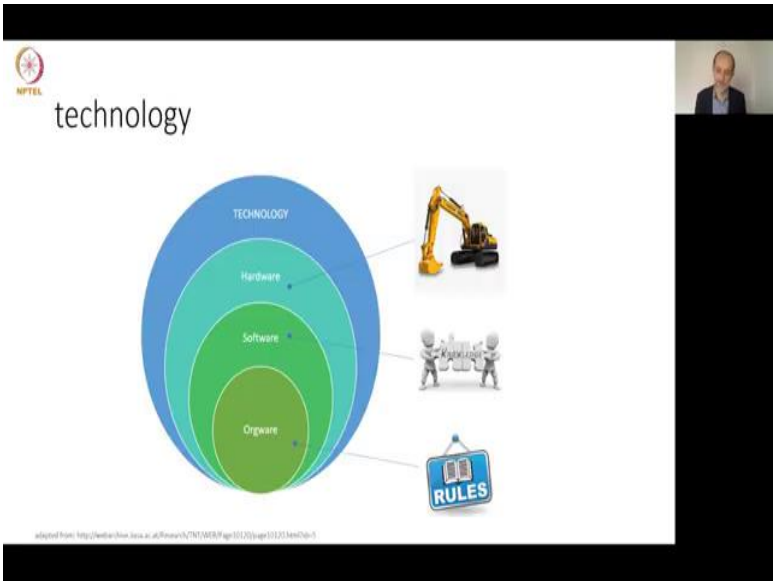

First difficulty is that technology is not only hardware, it is not only machines, that we have to predict. The technology is always a synergy of hardware, we need a software, in other words, knowledge of how to build this hardware and how to use it and how to recycle it. And it is also including a very essential part I can say this, this is a core part, this is an Orgware, this is the regulations in infrastructure. How we are going to use this hardware? This is a one difficulty, we have to be multi-dimensional, we have to be not only knowledgeable about the machine by itself, but the evolution of three of them.

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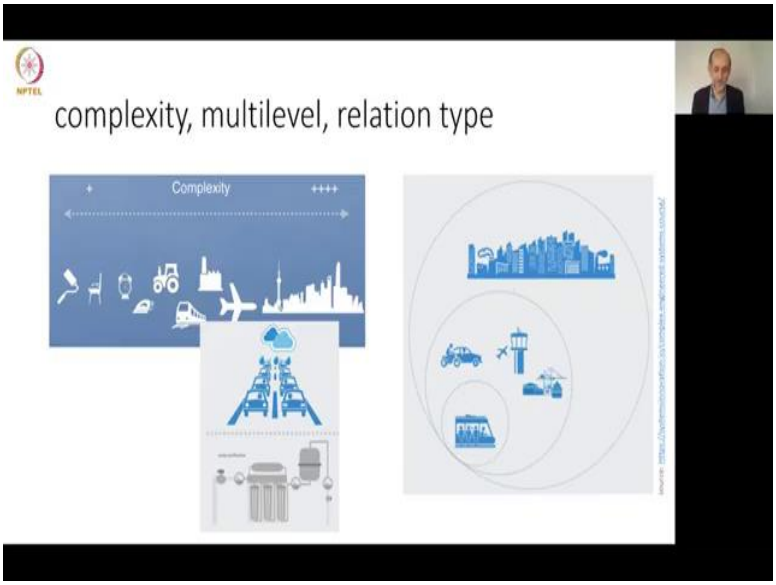

Another reason that our technologies they have different complexity, we have a relatively simple technology like a chair, like a clock, and we have a complex technology like a city, modern city with a lot of interaction. Our technologies are always multi-level technology; the one technology is a part of another one. For instance, the railroad, this is a part of technology of transportation, when Transportation Technology is a part of urban technology and inter-city technology.

And they have a very different relationship all those technologies among them, what is since optimal for one point of view, for instance, in order to go from point A to point B we built the railroad and the highways, the highway is very good for cars, but not so good for water cleaning because we have a heavy problem about water evaporation from the concrete surface. So, all those interactions between different technologies make it not so easy to predict, how the future long-distance particularly long distant future of technologies will look like?

It is possible, but it is not as simple as it looks like from the beginning. When you make just projection with extrapolation curves, and you can build. Yeah, we can see how it looks like in the future. But what it will be? This is still the question to explore. That is why it is not so easy to answer for the distant future. This is why the people or a lot of people, they do not believe it is really possible.

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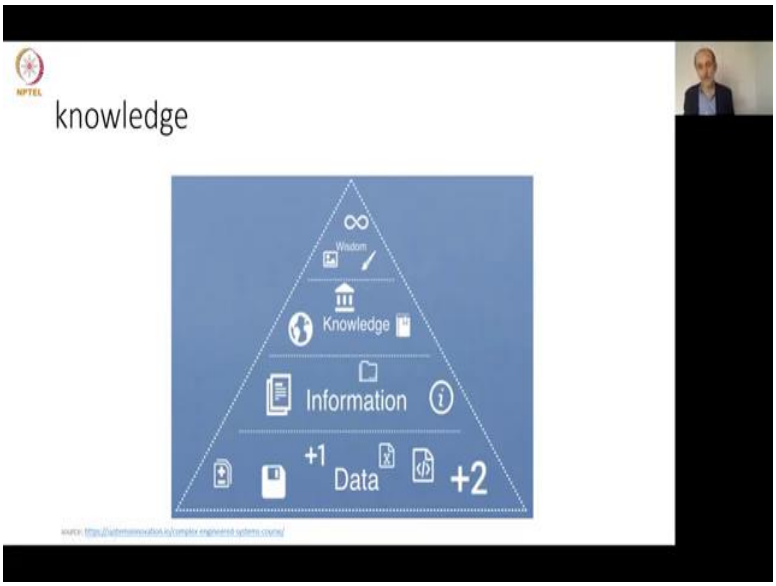

Another problem is, we are talking about knowledge. Do you remember the forecast, the forecast, this is about technology, but it is knowledge about future of technology? When by itself the knowledge, they are based on data information, our capacity to digest information,

our capacity to collect data, and our knowledge are also depending on about our strong wisdom and strong beliefs.

So, this way in order to get this knowledge about future technologies, which are entirely by themselves are very interlinked with other domains of our activities. We have to have a good idea of how to manage the knowledge and how to manage all the processes of learning. We shall we are learning about future. We are not learning about past or about past, it is relatively easy, we can always confirm what we learn by past experience about the future, it is a bit different.

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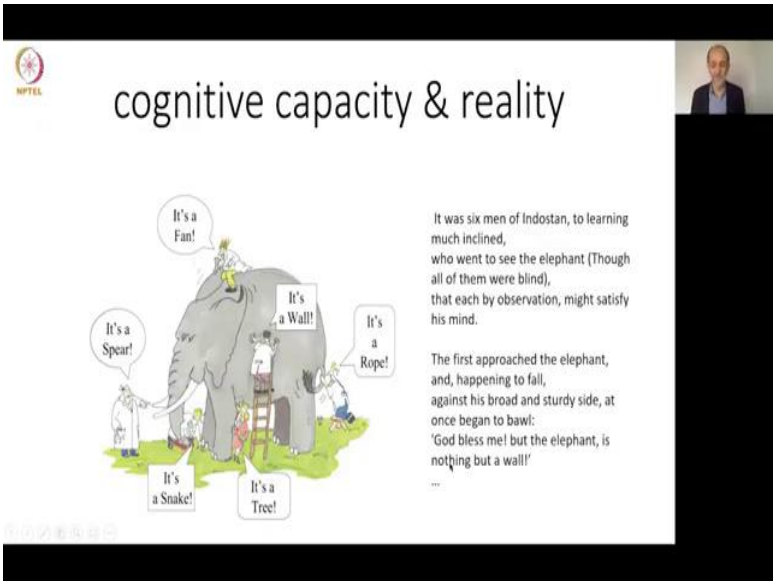

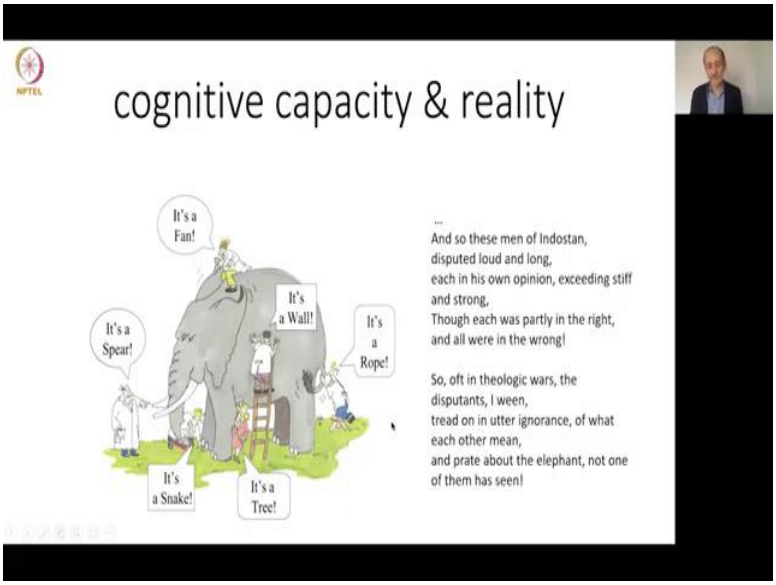

One more problem to get this knowledge is how do we operate, and how do we work together in teams? The famous story about 6 scientists who came to explore the elephant, and they touched different parts, and they were not agree who is experiencing what, and they try to convince each other that one is right, and the second one is wrong, make it also different. The question is not to make clear who is right and who is wrong, but to find a way how to join all those experiences together, how to integrate it, in order to discover this elephant, this future technology. So, we need to enhance our cognitive capacity. And we need to enhance our capacity to work together in a team.

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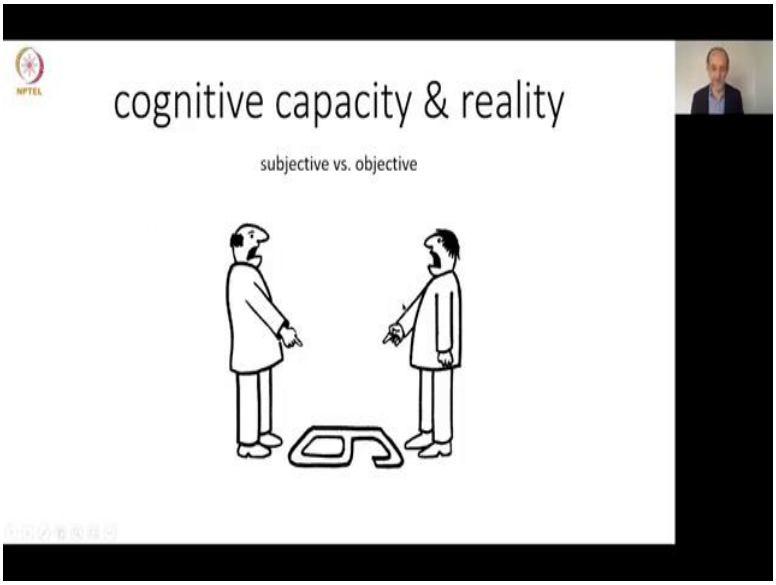

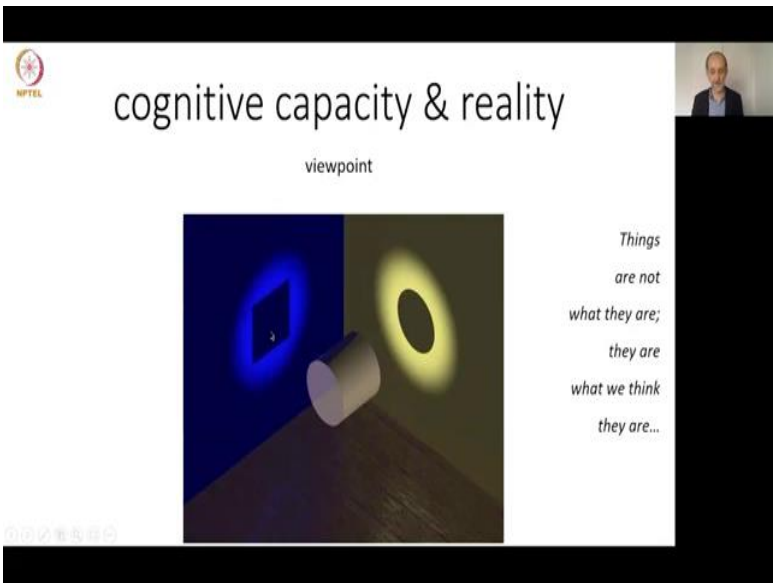

Another cognitive barrier for the forecasting, this is so-called subjective versus objective. For instance, if you look at this picture, I have a question who is right on this picture, the man on

the right or the man on the left? Because the man on the left, he says that this number is 6, when for the men on the right, it is absolutely evident that the number is 9.

And this is where it often happens, when people are discussing what will be the future, because they observe situation just from different point of view, and different point of view, to be capable to see situation from different point of view can be illustrated. For instance, in this picture, if you look to the cylinder from this side, you can see just the circle, if you just change your viewpoint from this side, you will see a rectangle.

And it depends on our capacity to integrate these 2 viewpoints in order to discover. No, it is not rectangular, it is not a circle, this is a cylinder. And this is exactly one of the reasons why it is entirely difficult to learn about the future. Because we have to learn about future from different point of view, not only from technological, from economic, social, environmental, and we need to be capable to integrate it in order to see this cylinder not to convince each other that this is a circle or this is rectangular.

In fact, the things that we try to predict, they are not, what they are in our descriptions, but they are what we think they are and how to merge this limited cognitive capacity of a human being with reality, this is a problem. This is a problem that has to be solved on the way to provide reliable forecasts and this is much more difficult to collect, if I compare with the collection of the data, or buildings or run in some models, even very sophisticated models, this is the main barrier, the cognitive capacity, the biases.

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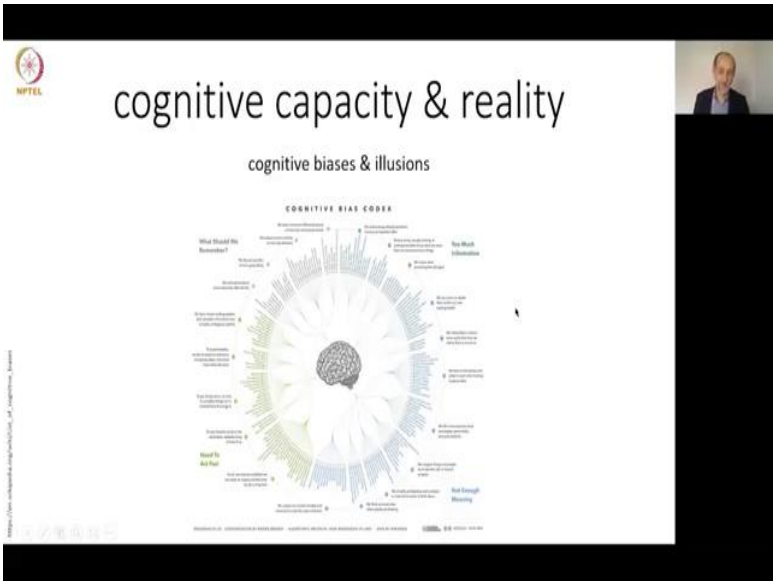

And if you look to the history of research about cognitive biases and our illusion, there is a map like that. Just give you the very generic picture of this just illustrate how this topic is explored already from one point of view, but from another point of view, how it is not easy to answer the cognitive biases. This is something that prevents us from learning, that prevent us to see something that we do not believe in existence, and so on and so that.

So, in order to be a reliable wish for caution, we have to have a bold idea. Bold idea means practical idea, which works how to deal with all these limitations that I tried to share with you and this is as I said at the beginning, this is just tip of the iceberg, which we need to be reliable with answering this question with our methodology. In one of our courses, we introduce you some methodologies that help and that helps to deal with, and in our advanced course, we can suggest for your attention to practice. How to do this in practice?