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System Analysis in Risk Assessment

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System analysis stands in the center of most risk analysis. Deconstructing the system, one breaks it down into classes of scenarios that can allow an analyst to better understand how something can fail. The two biggest classes are dependencies on external factors and human error. Dr. Elisabeth Paté-Cornell, department chair of Management Science and Engineering at Stanford University, explains that you look at these types of scenarios because there are not enough reliable statistics.



Transcript

So how do we do it? By decomposing the system. That's really the ideal, that's systems analysis and try to the classes of failure and scenarios. We are not getting into exquisite details in all the scenarios of how things can fail otherwise we'd cover the walls. So classes of scenarios and get our arms around that. We include a lot of things that are tricky, dependencies that are very important, when failures are dependent in a system. And for one reason, for example, external events, earthquakes. An earthquake will shake this whole building, so all different components in the building might fail for the same reason. And the earthquake or these external events introduce a common cause of failure. We also include human errors and believe it or not, people make the same mistakes for the same reasons in many different areas. And what is most interesting to look at is what kind of information do they have, what kind of incentives do you give them, how do you reward them, and what kind of resource constraints do you put on them? To come back to the story of the offshore platform, there was old incentive at that time in England to push production and to somehow let's say, perhaps at the expense of safety, and you don't stop the system to fix it.

And that was part of the problem. OK, so we tried to look at the way people cut corners, because when you ask people to meet very stringent constraints, they will try to satisfy you. And sometimes, they do things that you will not like. OK, so do we it that way generally because we don't have enough statistics at the nuclear level? See, when we started constructing civilian nuclear power plants in this country, we had some experience with nuclear reactors. When I say 'we,' I was not there. But there was some experience with nuclear reactors in the Navy. But there was never enough experience with nuclear power plants at large and that's where these methods came from in part. Now, the fact is that the systems evolved. So the statistics that you may have, that you may have accumulated in 15 years may or may not be the information that you need. Think of financial crisis.

That was exactly the problem. New situations have emerged, and you find yourself with a conjunction of events that you have never seen before and that's what some people call 'the perfect storms.'