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SPEAKER TITLES/ABSTRACT

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"Resilience: State of Science and State of Applications "

This presentation will review the history of risk assessment and management in the USA, discuss the emergence of resilience management, and the role of both constructs in addressing emerging risks. At the policy level, Resilience was a priority for Obama administration, especially in the context of climate change. Trump's administration is shifting the focus from climate change towards cyber and supply chain resilience, as it is reflected in recent Executive Orders. A major resilience impediment includes the lack of science of resilience, especially as it relates to assessing risks. Risk and Resilience are often used as synonymous even though they have a very different meaning, Risk-based approaches have been used to assess threats and mitigate consequences associated with their impact. Risk assessment requires quantifying the risk of failure for each component of a system and associated uncertainties, with the goal of identifying each component's contribution to the overall risk and ascertaining if one component poses substantially more risk than the others. These components become the basis of quantitative benchmarks for the system, and becomes the de facto standard for system improvements designed to buy down risk. In contrast to the definition of risk, resilience is focused on the ability to prepare and recover quickly from threats which may be known or unknown. Resilience is a property of the system itself and can be measured without identification and assessment of threats which act on or within a system. Managing for resilience requires ensuring a system's ability to plan and prepare for a threat, and then absorb, recover, and adapt. Coupled with a systems view that decomposes components across physical, information, cognitive, and social environments in which the system exists, is the basis of an approach to quantifying resilience with decision analytical tools and network science approaches.

I will present case studies of resilience assessment in the areas of infrastructure, transportation, cybersecurity, and organizational behavior using tools of decision analysis and network science. In all the cases, rapid technological evolution, combined with the unprecedented nature and extent of emerging threats defy us to enumerate all potential hazards, much less estimate reliable probabilities of occurrence and the magnitude of consequences. A comprehensive approach to protecting the nation's critical infrastructure, economy, and well-being must be risk based—not risk exclusive—and must provide a way for decision makers to make their organizational systems resilient to a range of threats within specific cost and time restraints.