Complex System Construct Considerations for Resilience of Civil Infrastructure Systems to Natural Hazards

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In a community, technical systems act together interdependently with socio-economic systems making the overall community system a complex system. Interdependence even among various technical system components is not well understood. Although interdependence among technical systems can be quantified to some degree, it is not possible to capture it in totality as actions by various actors are involved in operating these systems thus changing the behavior of the system based on the feedback as a result of these actions. Developing resilience in technical system, economic system, and societal system is critical to minimize the impact of natural hazards. However, developing resilience in technical system is entirely different than developing resilience in economic or societal system. By the very definition community resiliency is multi-disciplinary, multi-stakeholder dependent, thus making it a challenging concept. Although it is possible to quantify resiliency of technical systems, quantifying overall Community Resiliency is difficult. To minimize the impact of a damaging natural hazard on a community, actions by several levels of decision-makers are necessary. On a long term basis, a community is interested in minimizing the loss of daily functionality due a damaging natural hazard thus an integrated approach by all stakeholders is important. This talk provides some details on this framework and poses some basic issues to be addressed.

Dr. Vilas Mujumdar, D.P.A., P.E., S.E., Dist.M.ASCE, FACI, FPCI,F.I Struct. E. (U.K), is a consulting engineer based in metro Washington area. For thirty five years, he was engaged in executive management in the private industry and high-level administration in the public sector. In the private sector, he worked as Chief Executive Officer, President, & Partner in many engineering organizations. In the public sector, he served as Chief of Operations for the Division of the State Architect, State of California, as the Program Director for Engineering Research Centers, and for the Network for Earthquake Engineering Simulation (NEES) Programs at the National Science Foundation (NSF). His range of experience includes consulting engineering, project management, teaching, research, and research management. His focus is to integrate engineering and social science to reduce natural hazard risk to society. Mujumdar has a doctorate in Public Administration/Policy (Seismic Risk), a Bachelor’s degree in Civil Engineering, a Master’s degree in Civil Engineering, and a Master’s degree in Business Administration.