

Special Issue Editor's Message

In October 2014, the Technical Committee on Systems of Systems issued a white paper to characterize that notion and to emphasize the challenge it represents for Reliability Engineering.

While no standardized definition of a System of Systems exists as yet, typical characteristics of Systems of Systems include:

- Operational and managerial independence
- Geographical distribution
- Emergent behavior
- Evolutionary development
- Heterogeneity of constituent systems

A key aspect of systems of systems is interconnection between otherwise independent systems.

Those characteristics imply challenges for reliability and dependability engineering, as the methods and tools which have been developed since the beginnings of that discipline typically assume independence between subsystems and rely on a 'divide and conquer' reductionist strategy: randomness confined to component failures and deterministic interrelationships between different components.

In this issue, Professor Enrico Zio, in his article Reliability Analysis of Systems of Systems, explores those challenges and advocates viewing the systems of systems from new perspectives: structural, dynamic, control-based and logic-based. He illustrates his views with the example of the large-scale interconnected electric power grid.

Then, in 'Strategic asset management: a system driven approach on electrical transmission systems', Thomas Lacroix and Pierre Stévenin describe a method and a tool which they have applied for optimizing maintenance and investment strategies in electric transmission networks.

They claim it provides a more systemic and accurate view of the impact of different scenarios on operating and capital expenditures and also on Risk and Reliability.

Finally, Dr. Vitali Volovoi, in a provocative essay entitled «Big Data for Reliability: threat and opportunity», considers the impact that Big Data and the Internet of Things clearly will have on the Reliability Engineer: if he is not to be «driven into obsolescence», he must resolutely embrace the opportunities offered by the Big Data revolution: addressing the complexity of the new engineering systems, which are increasingly akin to natural systems.

He argues that «big picture thinking», at the core of the systems-of-systems concept, will help him do so, and is key for the future of Reliability Engineering.



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