Keynote: Software Reliability in Theory and Practice

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Quantitative measurement of software reliability remains an elusive goal. Simultaneously, there is an ever increasing critical dependency on software-based systems in the human infrastructure. There is a great deal of research in addition to well-intentioned methods and practices focused on improving the reliability of software-based systems. To date, most of which still only yields qualitative measurements except in very simple cases, e.g. a very few hundred lines of code. Probabilistic methods, such as reliability growth models, do offer a statistical inference for applications amenable to the methods. This talk will explore the meaning of software reliability in the context of safety, security, control, and quality attributes from an ultra-high assurance systems perspective, e.g. nuclear weapons. A systems level perspective will be taken related to the sources of defects (failure potential), including the “cross product” of software and hardware failure state spaces. The authors view of opportunities to improve the reliability of software-based will be presented.