

29th IEEE International Symposium on Software Reliability Engineering (ISSRE 2018)
 Memphis, TN, October 15-18, 2018

Tutorial Proposal

Title: Past, Present and Future of Software Reliability Assurance

Duration: Half Day

Speakers: Rashid Mijumbi, Kazu Okumoto, Abhaya Asthana, Jacques Meekel

Abstract: The communications industry is evolving towards a convergence of ICT and Telecommunications in which most communications software will run on generic servers the cloud. This trend is making it a requirement for software vendors to ensure continuous product integration and delivery. In order to guarantee the required levels of software reliability within such agile processes, software reliability growth modelling (SRGM) tools must also evolve. Specifically, the very short development cycles in DevOps projects make traditional exponential or s-shaped curve models inefficient in accurately predicting defects, and call for a revolution in software quality assurance.

Objective: In this tutorial we will argue for a need for software reliability growth modelling to evolve from traditional exponential or s-shaped data fitting to ‘curve shifting’. Towards this end, we will begin by discussing the past of SRGM – a past dominated by complex curve fitting only achieved by statistics experts. We will then introduce recent trends (the present) in SRGM where the entire process of data collection, pre-processing, curve fitting and visualization is automated to create SRGM-as-a-service without the need for specialized experts. Finally, we will introduce the future of SRGM in which curve fitting can be augmented by curve shifting during the early stages of software development so as to enhance the accuracy. Moreover, throughout the tutorial, we will use specific use cases from a real DevOps project so as to motivate the need for evolution. Participants will also benefit from a live demo as well as hands-on experience with a recently developed and deployed cloud-based, automated SRGM tool which embodies all features of the discussion.

Outline

Item	Duration
PART I [Theoretic]	(2.5 hours)
A. Background [Curve Fitting]	
a. Practical software reliability modeling – Overview	30 minutes
b. State-of-the-art in SRGM	30 minutes
B. Enhanced SRGM [Curve Shifting]	
a. Early defect prediction model (eDPM)	30 minutes
b. Case studies	20 minutes
c. DevOps CI/CD application	20 minutes
D. Project management vs. Quality management	20 minutes
PART II [Practical]	(1.0 hour)
A. Demonstration of a Cloud-based, automated SRGM + eDPM	30 minutes
C. Hands-on	30 minutes

Target Audience and Takeaways: Practitioners, researchers and students who are interested in applying software reliability prediction to real projects. The main pre-requisite of this tutorial will be a good understanding of basic software development processes as well as basic knowledge of (the need for) software reliability. Therefore, it will be appropriate for the general ISSRE 2018 attendees. Practitioners will be able to understand a software reliability prediction procedure that can be used for making a decision on whether the software product is ready for delivery, and if not, the necessary amount of testing that is needed to achieve the required software quality. Researchers and/or students will be able to understand industry needs to advance future research areas in software reliability and availability.

Track Record:

Rashid Mijumbi received a PhD in telecommunications engineering from the Universitat Politecnica de Catalunya (UPC), Barcelona, Spain. He was a Post-Doctoral Researcher with the UPC and with the Telecommunications Software and Systems Group, Waterford, Ireland, where he participated in several Spanish national, European, and Irish National Research Projects. He is currently a Software Systems Reliability Engineer with Bell Labs CTO, Nokia, Dublin, Ireland.

Kazu Okumoto started SW reliability research for his Ph.D. program at Syracuse University 40 years ago, sponsored in part by U.S. Air Force, where he developed a NHPP exponential model and co-authored a technical paper which is the most referenced paper in this field. Since he joined Bell Labs, Kazu worked with John Musa and co-authored a book on software reliability. Over the last 15 years he has focused on practical aspects of software quality and reliability using his management experience in customer technical support and software development. Kazu has successfully implemented a software reliability program for various wireless products in Lucent, Alcatel-Lucent, and Nokia.

Abhaya Asthana received his Bachelor's degree in electrical engineering from the Indian Institute of Technology (IIT), Kanpur in 1970, and his doctorate degree from Tulane University in 1974. He led the design of VLSI systems at INTEL from 1982-1985 and was on the faculty of IIT Kanpur in 1984. He previously directed R&D in the areas of computer and communications systems and solutions, multimedia, wireless systems, converged network systems, computer architecture, operating systems, optical networks and VLSI design. He is currently a Bell Labs Fellow. He currently directs R&D within the Software and Systems Reliability Group at Bell Labs with main focus areas on the reliability of software systems with the target of achieving autonomy using techniques from analytics, modeling and machine learning.

Jacques Meekel obtained an M.S in Electronics Engineering from Ecole Supérieure d'Electronique de l'Ouest-ESEO ANGERS and a Ph.D. in Computer Science (Software Engineering) from Université Paul Sabatier Toulouse III. He has close to 40 years' experience in mobile/embedded software development, software operations management, network analytics and optimization, systems engineering & architecture. He is currently the Head of Innovation Quality at Nokia. His current focus is on driving quality innovation and digitalization roadmap for the Cloud era and Continuous Delivery/ DevOps mode of operation - machine learning based predictive analytics & optimization, continuous real time & optimization, Continuous Quality Delivery.