

Recent Advances in the Dependability Assessment of Complex systems (RADIANCE)

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I. MOTIVATION AND GOALS

Critical systems are becoming *more and more complex and heterogeneous*, integrating previously separated systems and including design solutions ranging from the introduction of software Off-The-Shelf (OTS) to the adoption of loosely-integrated and composable services. Innovative dependability assessment solutions and certification processes are thus needed to deal with such complexity, calling for new solutions for the efficient, automated, and possibly continuous assessment and certification.

The workshop on **Recent Advances in the Dependability Assessment of Complex systems (RADIANCE)**, in its first edition, aims to *discuss novel dependability assessment approaches for complex systems* and to promote their adoption in real-world settings through industrial and academic research. The main objective is to promote and foster discussion on novel ideas, constituting a forum where researchers can share both real problems and innovative solutions for the assessment of complex systems.

The workshop focuses on assessing complex evolving systems, where increasing complexity and changes are due to the introduction of new components and sensors, and to the extensive usage of *software OTS* components or black box components in general. In this macro area, the workshop welcomed a broad list of applications ranging from agile development in critical systems to model-driven assessment approaches as well as new needs for verification, validation and certification of dynamic and evolving systems, which also includes solutions for automating the verification and validation processes. Finally, the workshop was interested in experimental assessment of dependability and security at large.

We believe that the RADIANCE goals are **aligned with the main trends in the evolution of critical systems**, which showed the progressive shift from small systems in close networks towards broad, open, potentially loosely-integrated System of Systems. They are also aligned with recent research trends in the community of dependable and secure systems, therefore with the main topics of the *DSN*.

II. CONTRIBUTIONS

The **Program Committee (PC)** selected consists of an *eclectic group of 23 researchers* from around the globe, including a minority of experienced representatives of the partners of the sponsoring projects. The final list includes a mixture of researchers from the academia and industry which provided enough diversity to assess the quality of the different submissions received.

RADIANCE was able to attract submissions from both **industry and academia** and also from all corners of the world. The final number of **submissions received was 14**, a number that met our expectations for the *first edition* of the workshop. By these submissions, it is possible to see the strong contribution from the supporting projects. However, the workshop also received 6 submissions from outside these projects.

Thanks to the PC members and also to **5 external reviewers** it was possible to perform *at least 3 reviews in each paper*, helping to guarantee the high quality of the selection process. The papers were evaluated based on their scientific impact or industrial applicability, taking into account not only their novelty but also their capacity to promote interesting discussion in the challenges addressed by the workshop.

From the submissions received, **10 papers were accepted** to be presented in the workshop. We are confident that the final list of accepted papers has the ingredients to *foster the discussion* on novel ideas and the transfer of knowledge among the participants.

III. PROGRAM

A. Keynote presentation

The workshop will start with an invited keynote by **Bradley Schmerl**, a *Senior Systems Scientist* at the *Institute for Software Research* of the *School of Computer Science* of the **Carnegie Mellon University**.

The title of the presentation is “*Challenges in Engineering Dependable Self-Adaptive System*” and it will cover relevant work that his research group has been doing to make self-adaptive systems more dependable. This includes probabilistic

model checking and stochastic games to provide assurances for adaptation especially in the presence of uncertainty, models to specify context and impact of adaptation, and ultimately prediction and involvement of human operators in the process of adaptation.

Self-Adaptive systems are *very complex* by their nature as dynamic and evolving systems. Thus, the **assessment of their dependability** raises particular challenges, which must be met with novel techniques. We believe that this presentation can set the tone for interesting discussions for the whole duration of the workshop.

B. Paper discussion sessions

The workshop will also feature the *presentation and the discussion of the accepted papers*. Given the interest of the workshop in novel techniques (even if preliminary) much emphasis will be put on the discussion phase.

The accepted papers span on four macro areas: 1) *Security and Dependability analysis*, with papers which use analysis techniques to quantify the impact of security attacks and dependability problems; 2) *Agile Development and Natural Language Requirements*, featuring papers that automatize and improve development processes that are dependent on natural language documentation; 3) *Safety assessment in industrial systems*, presenting papers which discuss safety assessment challenges faced by the industry such as cost estimation and processes improvement; 4) *Fault Injection for Complex Systems*, including papers that apply fault injection techniques, a premier technique for dependability assessment, to complex systems such as SOAs, OTS and for novel purposes such as failure prediction.

Presenting this groups together in the same session allows a more focused discussion of the topics. To foster and cement the discussion, we also plan to have **wrap-up discussions in the end of every session**, where the common points of the presented papers will be recapitulated, challenges will be raised and there will be more room to discuss the main points presented.

C. Complete list of accepted papers

The list of papers to be presented during the sessions is the following:

Security and Dependability analysis

- “*Service Deterioration Analysis (SDA): An Early Development Phase Dependability Analysis Method*” by Georg Macher, Andrea Höller, Harald Sporer, Eric Armengaud and Christian Kreiner
- “*Quantifying the Impact of External Attacks on a Distributed Automatic Track Warning System*” by Leonardo Montecchi, Paolo Lollini and Andrea Bondavalli

Agile Development and Natural Language Requirements

- “*An Approach to Clustering and Sequencing Textual Requirements*” by Ricardo Barbosa, Daniele Januario, Ana E. A. Silva, Paulo S. Martins and Regina Moraes
- “*Semi-Automatic Generation of Extended Finite State Machines from Natural Language Standard Documents*” by Juliana Galvani Greggi, Eliane Martins and Ariadne M. B. R. Carvalho

Safety assessment in industrial systems

- “*An asset-based development approach for availability and safety analysis on a flood alert system*” by Fumio Machida, Jianwen Xiang, Shigeru Hosono and Kumiko Tadano
- “*Cost Prediction for V&V and Certification Processes*” by Francesco Brancati, András Pataricza, Nuno Silva, Ábel Hegedüs, Laszlo Gonczy, Andrea Bondavalli and Rosaria Esposito
- “*Assessment of Defect Type influence in Complex and Integrated Space Systems*” by Nuno Silva, Marco Vieira, Dario Ricci and Domenico Cotroneo

Fault Injection for Complex Systems

- “*A Virtual Fault Injection Framework for Reliability-Aware Software Development*” by Andrea Höller, Georg Macher, Tobias Rauter, Johannes Iber and Christian Kreiner
- “*Towards assessing representativeness of fault injection-generated Failure Data for Online Failure Prediction*” by Ivano Irrera and Marco Vieira
- “*Studying the Propagation of Failures in SOAs*” by Cristiana Areias, Joao Carlos Cunha and Marco Vieira

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