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Understanding and modeling the inter-play between Sustainability, Resilience, and Robustness in networks

Dimitri Papadimitriou [1]

Alcatel-Lucent - Bell Labs,
Antwerp, Belgium

Heiko Niedermayer [2]

Technische UniversitätMünchen(TUM),
Munich, Germany

Bart Lannoo [3]

iMinds - Ghent University,
Ghent, Belgium

Jacek Rak [4]

Gdansk University of Technology,
Faculty of Electronics, Telecommunications, and Informatics
G. Narutowicza 11/12,
PL-80-233 Gdansk, Poland

Abstract

The second edition of the International Workshop on Understanding and modeling the Inter-play between Sustainability, Resilience, and Robustness in Networks

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(USRR) was held on Nov.19, 2014 in Barcelona, Spain in cooperation with the 6^{th} International Workshop on Reliable Networks Design and Modeling (RNDM 2014). In this paper, we detail the scope and objective(s) of this multi-disciplinary workshop as well as introduce the peer reviewed research papers presented during this event.

Keywords: Sustainability, Resilience, Robustness, Uncertainty, Communication Networks

1 Scope

With the increasing level of uncertainty resulting from unpredictable disturbance/perturbations, unexpected changes/variations, (un)voluntary disruptions, malfunctions, and changes in usage patterns due to socio-economic or technological evolution, current network design but also their verification and validation methods are confronted to the fundamental challenge of meeting inter-dependent properties involving resilience, robustness and sustainability. Capturing the inter-play between sustainability, resilience, and robustness, requires in turn to reconsider the classical engineering-centric definition of these properties and their role. The interplay between resilience and robustness is representative of the challenge: a resilient system is one that can withstand a number of sub-system(s) and component(s) faults and failures while continuing to provide and maintain an acceptable level of performance. Resilience may indeed be defined as system's ability to either absorb, tolerate or adapt to change(s), error(s) and perturbation(s) without losing one's peculiar traits or expected behavior(s) by considering that systems exist close to a stable steady-state. From this perspective, resilience can be seen as both the ability of a system to return to the steady state and the characteristic of being able to adapt, absorb or tolerate change(s), perturbation(s) or error(s) without losing functionality and expected behavior.

On the other hand, robustness can be defined as the ability to resist to change(s) and perturbations(s) without adapting the initial stable configuration of the system. It would be thus tempting to move from a system designed for robustness to one that supports resilience. However, robust decision methods to (satisficing and/or an optimization) problems still provide solutions that

[1] Email: dimitri.papadimitriou@alcatel-lucent.com
[2] Email: niedermayer@net.in.tum.de
[3] Email: bart.lannoo@intec.ugent.be
[4] Email: jrak@pg.gda.pl