

# Lecture Notes in Networks and Systems

Volume 36

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# Reliability and Statistics in Transportation and Communication

Selected Papers from the 17th International  
Conference on Reliability and Statistics  
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RelStat'17, 18–21 October, 2017, Riga, Latvia

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# Preface

In this volume of “Lecture Notes in Networks and Systems,” we are pleased to present the proceedings of the *17th International Multidisciplinary Conference on Reliability and Statistics in Transportation and Communication (RelStat-2017)*, which took place in Riga in Latvia from October 18 to October 21, 2017. This event belongs to a conference series started in 2001 and organized annually by the Transport and Telecommunication Institute (TTI) in Riga, Latvia. The mission of RelStat is to promote a more comprehensive approach supporting new ideas, theories, technologies, systems, tools, applications, as well as work in progress and activities on all theoretical and practical issues arising in transport, information, and communication technologies. Results of previous editions Relstat were published by the “Procedia Engineering” by Elsevier (Relstat 2016) and by the Transport and Telecommunication Institute (TTI) Publishing House (Relstat 2001–2015) in the journal “Transport and Telecommunication” (ISSN 1407-6160).

Design, implementation, operation, and maintenance of contemporary complex systems have brought many new challenges to “classic” reliability theory. We define complex systems as integrated unities of assets: technical, information, organization, economical, software, and human (users, administrators, and management) ones. Their complexity comes not only from their technical and organizational internal structure, which is built upon diverse hardware and software resources, but also from the complexity of information processes (data processing, monitoring, management, etc.) that must be executed in their specific environment. During the operations of such wide-ranging (and often also geographically distributed) systems, their resources are dynamically allocated to ongoing tasks, and the rhythm of system events (incoming and/or ongoing tasks, decisions of a management subsystem, system faults, defensive system reactions and adaptations, etc.) may be considered as deterministic and/or probabilistic stream of events. Security and confidentiality issues enforced by social context of information

processing introduce further complications into the modeling and evaluation methods based on statistical and mathematical approach. Diversity of the processes being realized, their concurrency, and their reliance on in-system intelligence often make construction of strict mathematical models impossible and lead to application of intelligent and soft computing methods.

A system approach to the evaluation of the efficiency of complex systems at all phases of their life cycle is the contemporary answer to new challenges in the use of such systems. The dependability approach in theory and engineering of complex systems (not only computer systems and networks) is based on a multi-disciplinary approach to system theory, technology, and maintenance of the systems working in real, very often unfriendly, environment. Usability and dependability concentrate on efficient realization of tasks, services, and jobs by a system considered as a unity of all technical, information, and human assets, in contrast to “classical” reliability, which is more restrained to analysis of technical resources. This difference has caused a natural evolution in the topical range of subsequent RelStat conferences, with an increased focus on dependability approaches over the classical reliability approach. Efficiency of different modes of transport; transport for smart city; reliability, safety, and risk management for transport applications; statistics, modeling, and multi-criteria decision making in transportation and logistics; smart solutions, telematics, intelligent transport systems, innovative economics, and education and training in engineering are the main topics of RelStat.

This year the RelStat conference was supported by the HORIZON2020 funded project ALLIANCE (Enhancing Excellence and Innovation Capacity in Sustainable Transport Interchanges) and led by the TTI, in collaboration with University of Thessaly (Greece) and the Fraunhofer Institute for Factory Operation and Automation (Germany). The special session entitled “Sustainable Transport Interchanges” was organized to allow collaborative research teams from Latvia, Greece, and Germany to present and discuss their findings in the areas of governance and policy development, smart solutions, and decision making.

The Program Committee of the 17th International RelStat Conference, the organizers, and the editors of these proceedings would like to acknowledge the participation of all reviewers who helped to refine contents of this volume and evaluated conference submissions. Our thanks go to all members of Program Committee:

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Thanking all the authors who have chosen RelStat as the publication platform for their research, we would like to express our hope that their papers will help in further developments in design and analysis of complex systems, offering a valuable and timely resource for scientists, researchers, practitioners, and students who work in these areas.

Igor Kabashkin  
Irina Yatskiv (Jackiva)  
Olegas Prentkovskis



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