

## Preface

It is our pleasure to present you the proceedings of the Workshops co-located with ICTERI 2019, the fifteenth edition of the International Conference on Information and Communication Technologies in Education, Research, and Industrial Applications, held in Kherson (Ukraine) on June 12-15, 2019. This year's edition focused on research advances, information systems technologies and applications, business/academic applications of Information and Communication Technologies. Emphasis was also placed on the role of ICT in Education. These aspects of ICT research, development, technology transfer, and use in real world cases remain vibrant for both the academic and industrial communities. Overall, ICTERI 2019, including the Workshops, was focused on the four thematic tracks reflecting these research fields: (I) Advances in ICT Research; (II) Information Systems: Technology and Applications; (III) ICT in Education; and (IV) ICT Cooperation in Academia and Industry.

This volume is structured in five parts, each presenting the contributions to a particular workshop:

Part I: 4<sup>th</sup> International Workshop on Professional Retraining and Life-Long Learning, using ICT: Person-oriented Approach (3L-Person 2019). This workshop was organized by Hennadiy Kravtsov, Svitlana Lytvynova, and Mariya Shyshkina and dedicated to the 20<sup>th</sup> anniversary of the Institute of Information Technologies and Learning Tools of the NAES of Ukraine. The workshop discussed novel research issues and uses of information technology for life-long learning.

Part II: 7<sup>th</sup> International Workshop on on Computer Simulation in Education: A Workshop in Memory of Professor Illia O. Teplytsky (CoSinE 2019). This workshop was organized by Arnold Kiv, Serhiy Semerikov, Vladimir Soloviev, and Andrii Striuk. It addressed real-world applications of computer simulation in education.

Part III: 7<sup>th</sup> International Workshop on Information Technologies in Economic Research (ITER 2019). This workshop was organized by Vitaliy Kobets, Tetiana Paientko, and Alessio Maria Braccini. It focused on research advances, business/academic applications of information and communication technologies related to solving practical economic problems and also pushing forward economic research.

Part IV: 3<sup>d</sup> International Workshop on Rigorous Methods in Software Engineering (RMSE 2019). This workshop was organized by Artur Kornilowicz, Mykola Nikitchenko, Vladimir Peschanenko, and Grygoriy Zholtkevych. It dealt with the aspects of the use of rigorous methods and techniques, which are used in different fields

of software engineering: specification, verification and optimization of software; software analysis, testing, and re-engineering.

Part V: 5<sup>th</sup> International Workshop on Theory of Reliability and Markov Modelling for Information Technologies (TheRMIT 2018). This workshop was organized by Vyacheslav Kharchenko, Elena Zaitseva, De-Jiu Chen, and Bogdan Volochiy. It addressed modern information technologies, systems, and IT-infrastructures as objects of reliability (dependability, safety, security and resilience) regulation, modelling, assessment and assurance. The workshop focused on the mathematical models, application of software tools for IT reliability analysis and assessment, decision support and decision making in the context of the development of dependable, safe, secure and resilient IT-based systems.

Overall, ICTERI 2019 workshops attracted 218 paper submissions. Out of these submissions, the organizers have accepted 82 high quality and most interesting papers. So, the average acceptance rate was of 38 percent.

This volume would not appear without the support of many people. First of all, we would like to thank all the authors who submitted papers to the workshops of ICTERI 2019 and thus demonstrated their interest in the research problems within their scope. We are very grateful to the members of the Program Committees for providing timely and thorough reviews and, also, for being cooperative in doing additional review work. We would like to thank the local organizers of the conference whose devotion and efficiency made the constellation of ICTERI 2019 workshops a very interesting and effective scientific forum.

June, 2019

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