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This volume represents the proceedings of the Workshops co-located with the 16th International Conference on ICT in Education, Research, and Industrial Applications, held in Kharkiv, Ukraine, in October 2020. It comprises 101 contributed papers that were carefully peer-reviewed and selected from 233 submissions for the five workshops: RMSEBT, TheRMIT, ITER, 3L-Person, CoSinE, MROL. The volume is structured in six parts, each presenting the contributions for a particular workshop. The topical scope of the volume is aligned with the thematic tracks of ICTERI 2020: (I) Advances in ICT Research; (II) Information Systems: Technology and Applications; (III) Academia/Industry ICT Cooperation; and (IV) ICT in Education.

Preface

In these extraordinary and challenging times, it is our great pleasure to present you the proceedings of the Workshops co-located with ICTERI 2020, the sixteenth edition of the International Conference on Information and Communication Technologies in Education, Research, and Industrial Applications, held in Kharkiv (Ukraine) on October 5-10, 2020. 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 2020, including the Workshops, was focused on the four thematic tracks reflecting these research fields: (i) ICT research advances, (ii) information systems technologies and applications, (iii) academic and industry cooperation in respect to Information and Communication Technologies, and, more relevant than ever, (iv) the role of ICT in Education.

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

Part I: RMSEBT Workshop is the fourth workshop Rigorous Methods in Software Engineering and Blockchain Technologies. The workshop was organized by Vladimir Peschanenko, Mykola Nikitchenko, and Yulia Tarasich. The workshop dedicated to rigorous methods which are used in different fields of software engineering: rigorous methods for specification, verification and optimization of software, rigorous methods for different kinds of software analysis (modeling, business rule extraction etc), software testing which based on rigorous methods (model based testing, white box testing and so on), re-engineering problems (model extraction from source code, language migration etc), DLT architecture development, modeling and verification of token economies, detected of smart contracts vulnerability.

Part II: TheRMIT Workshop is the sixth workshop on Theory of Reliability and Markov Modelling for Information Technologies. The workshop was organized by Vyacheslav Kharchenko. The workshop dedicated to overcoming a gap between researchers of mathematical methods for reliability, safety, security and dependability as a whole, on the one side, and engineers who develop critical systems, auditors who assess and assure dependability during life cycle stages, on the other side.

Part III: ITER Workshop is the eighth workshop on Information Technologies in Economic Research. The workshop was organized by Vitaliy Kobets, Tetiana Paientko, and Alessio Maria Braccini. The workshop intended for providing a meeting point for intensive scientific exchange among researchers and experts from computer science, business computing and information system areas in emerging technologies interested in a focused look into IT in economic research related to the design, development, implementation, use and management of emerging technologies, real-world business applications and the move to a digital economy.

Part IV: 3L-Person Workshop is the fifth workshop on Professional Retraining and Life-Long Learning using ICT. The workshop was organized by Oleksandr Burov and Svitlana Lytvynova. 3L-Person Workshop intended for providing for evaluating new and emerging technologies in education, learning environments and methods that have

to satisfy life-long learning of a person (from school age to retirement), professional training and retraining in view of the person-oriented approach. It covers such topics as an adaptive learning strategy and design, day-to-day support for individual's learning, life-long learning of individuals, learning at the workplace, learning with emerging ICT that provide remote collaboration, learning/training process of individuals with special needs, ICT in education safety and security, recommendation regards vocational retraining and/or further carrier etc.

Part V: CoSinE Workshop is the eighth workshop in memory of Illia O. Teplytskyi on Computer Simulation in Education. The workshop was organized by Arnold Kiv, Serhiy Semerikov, Vladimir Soloviev, and Andrii Striuk. CoSinE Workshop is a regular peer-reviewed workshop co-located with ICTERI focusing on theory and practice of computer simulation in education. CoSinE puts special emphasis on real-world applications of computer simulation in education. Therefore, all contributors are strongly encouraged to demonstrate how and for what purpose the proposed solutions are to be used. Examples could be taken from case studies involving new tools and/or methodological approaches in education, experimental studies with usable learning applications, or surveys revealing new modelling tools in educational research and practice.

Part VI: MROL Worksop is the fourth workshop on Methods, Resources and Technologies for Open Learning and Research. The workshop is organized by Hennadiy Kravtsov and Mariya Shyshkina. MROL Workshop intended for benchmarking the state of the art and defining the future prospects of the open systems of higher education design and development, with the focus on the most valuable trends, methods, tools and technologies driving the innovative development of educational environment. It focuses also on the learner' competencies needed for the open educational and research systems development including higher responsibility, collaborative skills, leadership, creative thinking, taking the problem in general and others are to be considered and explored.

Overall, ICTERI 2020 workshops attracted 223 paper submissions. Out of these submissions, the organizers have accepted 101 high quality and most interesting papers. So, the average acceptance rate was of 43,3 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 2020 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 2020 workshops a very interesting and effective scientific forum.

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