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*IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.*

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

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Luis M. Camarinha-Matos ·  
Ricardo Almeida · José Oliveira (Eds.)

# Technological Innovation for Industry and Service Systems

10th IFIP WG 5.5/SOCOLNET  
Advanced Doctoral Conference on Computing,  
Electrical and Industrial Systems, DoCEIS 2019  
Costa de Caparica, Portugal, May 8–10, 2019  
Proceedings

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# Preface

This proceedings volume, which collects selected results produced in engineering doctoral programs, focuses on research and development in the field of technological innovation for industry and service systems. The industry and service sectors are undergoing profound transformation towards digitalization and integration of new levels of “smartness.” The idea of a fourth industrial revolution, represented by terms such as “industry 4.0,” “smart manufacturing,” and “economy 4.0” are an expression of such transformation. This movement is characterized by an increasing digitalization and interconnection of systems, products, value chains, and business models. The interconnection between the physical and the cyber worlds – cyber-physical systems and Internet of Things – and the integration of the so-called exponential technologies, are central features of this innovation trend.

The DoCEIS series of advanced Doctoral Conferences on Computing, Electrical and Industrial Systems aims at providing a venue for sharing and discussing ideas and results from doctoral research in these inter-related areas of engineering, while promoting a strong multidisciplinary dialog. Furthermore, the conference aims at creating collaborative opportunities for young researchers while also collecting valuable feedback from colleagues in a welcoming environment. As such, participants were challenged to look beyond their specific research question and relate their work to the selected theme of the conference, namely, to identify in which ways their research topics can benefit from or contribute to industry and service systems. Current trends in strategic research programs are confirming the fundamental role of multidisciplinary and interdisciplinary approaches in innovation. More and more funding agencies are including this element as a key requirement in their calls for proposals. In this context, the challenge proposed by DoCEIS is a contribution to the process of acquiring such skills, which are mandatory in the profession of a PhD.

The tenth edition of DoCEIS, which was sponsored by SOCOLNET, IFIP, and IEEE IES, attracted a good number of paper submissions from a large number of PhD students and their supervisors from 14 countries. This book comprises the works selected by the international Program Committee for inclusion in the main program and covers a wide spectrum of application domains. As such, research results and ongoing work are presented, illustrated, and discussed in areas such as:

- Collaborative systems
- Collaboration and resilient systems
- Decision and optimization systems
- Assistive systems
- Smart environments
- Smart manufacturing
- Water monitoring systems
- Communication systems
- Energy systems

We hope this collection of papers will provide readers with an inspiring set of promising ideas and new challenges, presented in a multidisciplinary context, and that by their diversity these results can trigger and motivate richer research and development directions.

We would like to thank all the authors for their contributions. We also appreciate the efforts and dedication of the DoCEIS international Program Committee members, who both helped with the selection of articles and contributed with valuable comments to improve the quality of the papers.

March 2019

Luis M. Camarinha-Matos  
Ricardo Almeida  
José Oliveira

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