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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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Rachid Benmoussa · Roland De Guio ·
Sébastien Dubois · Sebastian Koziółek (Eds.)

New Opportunities for Innovation Breakthroughs for Developing Countries and Emerging Economies

19th International TRIZ Future Conference, TFC 2019
Marrakesh, Morocco, October 9–11, 2019
Proceedings

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Preface

The high performance and innovation requirements resulting from the emerging countries striving to modernize the industrial and services sector, give rise to a deep impact on research and development activities being implemented. These requirements push companies to adopt customized tools to be attentive to market demand and to optimally mobilize limited material, technical, and human resources. It also requires reviewing the scientific methods solving invention problems as well as the innovation management procedures used by companies and organizations as part of their research and development process.

TRIZ is a theory of inventive problem solving that can indeed support companies to improve their research and development process. TRIZ was developed by Genrich Altshuller as a problem-solving, analysis, and forecasting theory derived from the study of patterns of invention in the patent literature. TRIZ was developed to assist engineers in systematically solving product design problems and develop next-generation technologies and products with less risk. Altshuller stated that TRIZ can be used to minimize energy requirements as well as complexity of engineering products. TRIZ is an organized theory for problem solving which can be applied to different areas.

ETRIA (European TRIZ Association) has been working for two decades towards the advancement of TRIZ and its impregnation in academic, scientific, educational, and industrial circles. Each year, ETRIA organizes, through one of its members, an annual conference in a different city and country – TRIZ Future Conference (TFC). TFC aims globally to promote TRIZ knowledge, tools, and methods worldwide. It brings together industrials and academics to share experiences, achievements, and progress on the subject of how to use and develop TRIZ.

The 19th International TRIZ Future Conference (TFC 2019) took place at ENSA Marrakesh, Cadi Ayyad University, Morocco, during October 9–11, 2019, under the theme ‘New opportunities for innovation breakthroughs for developing countries and emerging economies.’ The TFC conference series encourages research and feedback that deals with TRIZ theory and its applications in all areas. It also encourages professionals who are unfamiliar with TRIZ to submit their experiences with research development as well as the difficulties and obstacles they face with regards to innovation. TFC 2019 placed special emphasis on TRIZ integration into recent research topics that present new opportunities for innovation breakthroughs for developing countries and emerging economies, such as but not limited to:

- Industrial R&D processes and innovation best practices
- Knowledge based engineering and computer-aided invention with TRIZ
- Creativity in Science, Entrepreneurship, Industry, and Education
- Opportunities and challenges of digitalization for innovation progress
- Integration of TRIZ Methodology into Innovation Design Process

This book constitutes the proceedings of TFC 2019. It contains 41 papers divided into 7 themes. The first theme is dedicated to the ‘Improvement of TRIZ theory, methods, and tools,’ and includes seven articles proposing enhancements to TRIZ dealing with complexity, effectiveness, ideation, ontology, and patent integration. The second theme includes five papers dedicated to contributions that link TRIZ to other Innovation and R&D approaches such as frugal innovation, CK theory, FAST method, Lean, additive manufacturing, etc. A third theme is dedicated to TRIZ applications in technical design, an area addressed by authors within the nine papers. These first three themes confornt the origin of TRIZ which was initially developed to address technical issues. The following theme leads us towards TRIZ applications in Eco Design, which addresses green issues and is becoming more effective. Therefore, this year’s fourth theme includes eight papers and was the second most addressed area. Let us continue with the fifth theme. It is dedicated to associations between TRIZ and software engineering. This theme is composed of four papers that attempt to link TRIZ and the IA through Machine Learning or to use software techniques to help with problem solving in different areas. The sixth theme brings together five papers and addresses TRIZ applications in specific disciplinary fields such as healthcare, marketing, and farming. Finally, a seventh theme leads us to a series of three papers that address TRIZ in teaching, specifically through experimental studies with students.

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