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Denis Cavallucci · Roland De Guio  
Sebastian Koziółek (Eds.)

# Automated Invention for Smart Industries

18th International TRIZ Future Conference, TFC 2018  
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Proceedings

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# Preface

Industry is constantly changing. But the recent changes it has to face are of a completely different magnitude compared with previous ones. If improving quality, avoiding unnecessary expense, producing in time and as ecologically as possible have been the main difficulties that industry has had to face in the past 60 years, the challenge it faces today is different.

The notion that an inventor (or a brainstorming group) in a company is enough to constantly feed it with new ideas is a model that has lived. The abundance of knowledge freely available to consumers and inventors forces companies to design differently, especially when searching for innovation. We must now deal with the digital availability of knowledge, its versatility, and the fact that it is available in abundance for a world where intelligence is linearized and where competition to be the first with the best possible ideas is both more complex and more ephemeral.

Artificial intelligence (AI) could not dream of better conditions to get back in the spotlight. The first experiences in the 1970s were encouraging but of little value. Today AI benefits from the appetite of companies to process the abundance of data, boosted by the fact that computing power has increased tenfold in the past ten years. In addition, the industrial giants of the Web have for the most part freely offered their algorithms for computer researchers to make use of. We are facing a new era: the era of digital intelligence driven by AI advances and the impact they will have on the world.

Our association, ETRIA (European TRIZ Association) has been working for two decades for the advancement of TRIZ and its penetration in academic, scientific, educational, and industrial circles. ETRIA organizes, through one of its members, its annual congress in a different city and country every year. This 18th edition took place at INSA in Strasbourg and was organized by the CSIP team of the I-Cube Laboratory (UMR CNRS 7357) and sponsored scientifically by IFIP. More particularly within IFIP, its TC5 is composed of working groups and one of them, working group 5.4, is entirely dedicated to computer-aided innovation. This edition of the TRIZ Future Conference (TFC 2018) was once again an opportunity to take stock of the main advances made by major contributors to the progress of this theory.

In view of the facts described above and the theme of ETRIA, which is associated with the progress of TRIZ in the world, this edition raised the question of invention and its digitization. In a digital world where industry increasingly aspires to automate its global operation and the way in which it responds with agility to the versatility of customer requirements, how are the recent developments of TRIZ contributing to this?

This book contains 27 articles divided into seven themes. The first theme is dedicated to the teaching of TRIZ. It includes two articles dealing with gamification, continuing education, or the development of education systems. The second theme includes three articles. It is dedicated to contributions that link TRIZ to knowledge representations. A third theme is dedicated to biomimicry, either in software or methodological terms. Here again three articles comprise this theme. The following

theme leads us toward the strategic management of the company. The implications of the use of TRIZ are discussed, and this year this theme includes five articles. The fifth is dedicated to associations between TRIZ and other methods. Whether it is a question of experimental design, design thinking, or even of new approaches such as the FORMAT method, this theme is covered in six articles and constitutes the most extensive part. Perhaps we can see this as a way to extend TRIZ beyond its intrinsic capabilities. A little as if the association with other approaches constituted an undeniable way of evolution toward ever more potentialities. The sixth theme is presented in a series of four articles that address the sometimes close, sometimes contradictory links between the TRIZ and the functional approach. Finally, the seventh theme brings together four articles and addresses the use of patent or text populations as a data source to feed projects, whether upstream to capture knowledge or further downstream for a strategic purpose. In this section we find the most obvious link between TRIZ and IA through machine learning.

As we see year after year, TRIZ continues to initiate new thematic orientations while reinforcing older ones. This shift the world is making toward digitization is a tremendous opportunity for TRIZ. By extending beyond its usual scope to other approaches, by offering its ontology as a potential database architecture, TRIZ has been able in recent years to continue its evolution to stay tuned with the requirements of our world.

What challenges are then still facing us? To convince, through excellence, again and again. By observing what characterizes the longevity of TRIZ we notice that its two fundamentals (the notion of contradiction and the notion of laws of evolution of technical systems) continue to question other fields. Whether it is a question of observing biomimicry in the light of contradiction or making use of machine learning as a way of extracting information likely to give rise to contradictions, we always find in current research the two fundamentals of TRIZ. Its future will thus lie in the resolution of both extending toward novelty while preserving its fundamentals.

The leitmotiv this year was “Automated Invention for Smart Industries.” It prefigures a theme that is not new to the world of TRIZ. The oldest remember the catchy title “invention machine” and software that later became a company. But perhaps it was too early to make such a statement three decades ago. Today, the rise in the frontline of AI, the supercomputers, the considerable financial efforts of leading countries not to lose in advance the world battle of AI, allows us to envisage a completely different future for systematic invention than being once more forgotten.

For its part, ETRIA will have contributed to it once again this year by offering the TRIZ world the opportunity to meet and share our progress in all the subjects that make it up. To welcome newcomers, ensure that they are in contact with their older colleagues, learn about the latest developments of teams, and leave the edition more motivated than ever to continue this wonderful adventure called research. And there is nothing more beautiful than research that turns into something useful for society and more particularly for industry. ETRIA provides a forum for these two worlds (research and industry) to meet, discuss, understand, share, and produce new knowledge together.

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