MADE WITH TRIZ

Executive Overview

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In 2004, Samsung Electronics officially stated that since 2001, the use of TRIZ provided the company with total economic benefits of Euro 1.5 billion. The most successful commercial product ever of Proctor & Gamble, *Crest™ Whitestrips™* was developed with TRIZ. Thanks to TRIZ, Boeing Corporation designed a better refueling tanker on the basis of 767 aircraft than similar aircraft of a competitor, and it helped the company to win a contract totaling more than Euro 1 billion. Intel Corp. recently named TRIZ as an "*Intel's innovation platform of the 21st century*". Relatively little known in the past outside of the former Soviet Union, today TRIZ is becoming a key element for supporting invention and innovation since it helps organizations and individuals with turning innovation to scientifically-based, structured, and predictable process. In short, TRIZ enables to create new value on demand.

TRIZ (which is a Russian abbreviation for the "*Theory of Solving Inventive Problems*") was originated in 1946 by Russian engineer and patent examiner Genrich Altshuller. He wanted to understand how inventors came up with creative solutions. To reach his goal, he studied more than 400.000 patents intentionally drawn from different areas of technology. Such massive studies helped Altshuller to understand the nature of creative process behind solving inventive problems and to identify a relatively small number of patterns and principles which comply with the majority of inventions. Later, a growing number of researchers joined Altshuller with further studies. In total, more than 1.5 million patents and technological solutions were studied to understand the origins and principles of invention and create modern TRIZ.

One of the first TRIZ discoveries was that technology, like any other type of human activity, does not evolve randomly. Each product in every area of technology follows a certain sequence of "inventive transformations" to meet ever evolving market demands and requirements. Long-term studies of technology evolution revealed common patterns and trends, according to which seemingly different systems evolve. Studies of these trends and patterns form a large part of TRIZ which is known as a Theory of Technology Evolution.

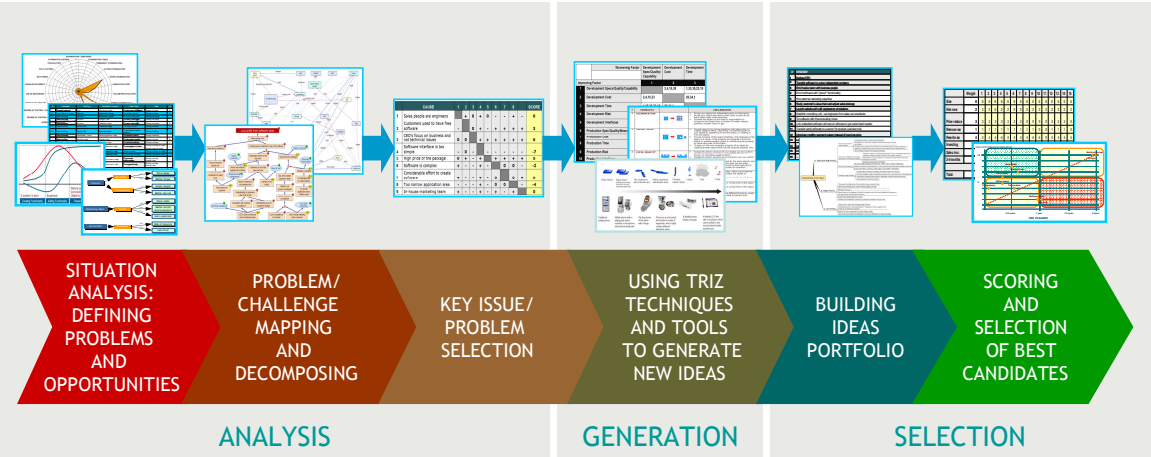
Technologies and products can be improved either incrementally or, when incremental improvements do not help any more, a radical improvement takes place. We usually call such radical

improvements “inventions”, which represent new non-obvious solutions unknown before. By Altshuller, an invention results from resolving a contradiction, which arises when some existing product or system is not capable any longer of satisfying new or growing demands of the market, and simple improvements of product features by known methods do not help. For instance, to increase speed of the car, its engine should be made more powerful. But this will result in the growth of fuel consumption.

By TRIZ, to obtain the best solutions such contradictions must be eliminated without compromising. With a new solution, we should be able to achieve the desired effect in full, without diminishing other advantages of a product or a technology, and without causing negative side effects. For instance, coffee in a cup gets cold over time due to the contact with a much colder air. An obvious solution would be to cover a cup with a lid. But did we solve a contradiction? Not completely, because to drink coffee we will have to remove the lid first, and this increases our discomfort. Therefore we have a contradiction between the desired temperature of coffee and the degree of our comfort. According to TRIZ, the best solution will keep coffee hot without introducing any discomfort during drinking. In addition, this best solution should be “ideal”: it should eliminate contradiction without introducing new negative effects and, what is very important, without increasing costs. A good example of resolving this contradiction is cappuccino: a milk foam layer insulates coffee from air without introducing obstacles for drinking and without. But what about those who prefer other types of coffee? This contradiction is still to be solved. With TRIZ, contradictions are solved at the abstract level by following certain innovative principles rather than by numerous trials and errors which do not guarantee successful results. This knowledge-based approach drastically reduces amount of time needed to find a specific solution.

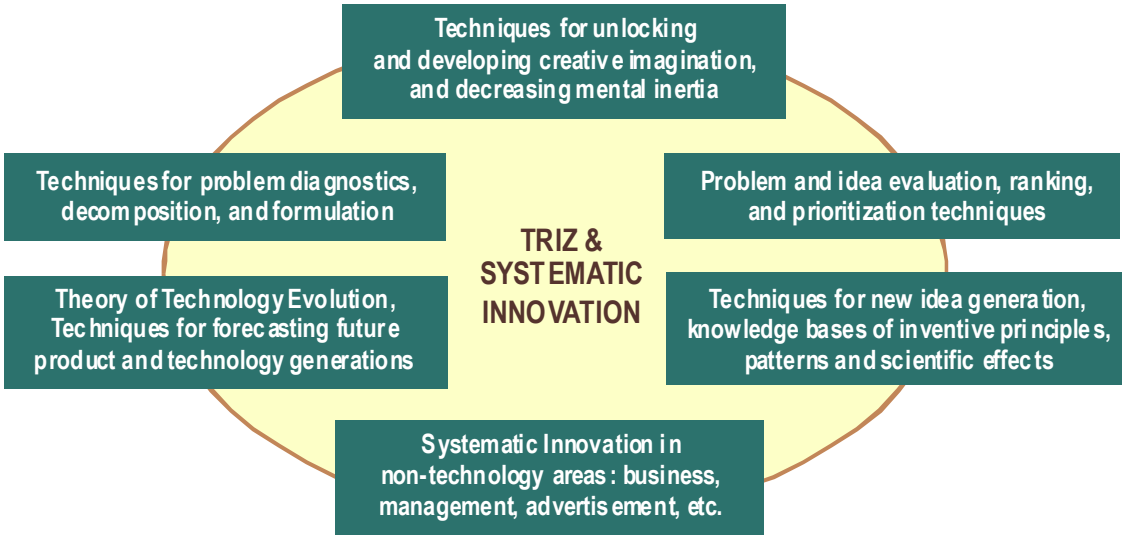
Another large part of TRIZ focuses on forecasting what will happen next with a selected product or technology. TRIZ includes a collection of system evolution trends, which indicate how different systems evolve over the time. Knowledge of these trends is of immense help to create new generations of products and technologies.

Modern TRIZ is a result of research efforts of more than 50 years in Soviet Union, and lately in Europe and Unites States. It offers a number of practical techniques, which help to perform the complete “idea cycle” – from analysis of a given situation and competitive intelligence to generation and evaluation of new ideas according to their feasibility, value, and degree of ideality.



The use of the TRIZ is organized within Systematic Innovation Process, which structures the use of the techniques and tools according to the desired outcome. Modern Systematic Innovation includes:

- **Analytical techniques**: A number of techniques that help to manage complexity of problem situations, look at problems at different angles, understand real problem causes and formulate right problems, extract and predict future problems.
- **Knowledge bases**: Generic guidelines of solution strategies and patterns of "strong" solutions, which can be applied to virtually any new problem to quickly come up with new solution ideas. TRIZ also includes a unique database of scientific effects structured according technological functions. Currently, the database of "Goldfire Innovator"™, a leading software which also supports TRIZ, contains over 8000 physical, chemical and geometrical effects.
- **Theory of Technology Evolution**: models of evolution of technical systems and techniques for forecasting future product/technology evolution; tools to explore innovative potential of systems and generate new ideas on the basis of system evolution trends, technology intelligence, and market research.
- **Psychological techniques to enhance creativity**: a group of techniques to overcome mental inertia and further develop creative imagination.
- **Evaluation and ranking techniques**: A number of techniques which help to rank and select problems and generated ideas.
- **Extensions to non-technological areas**: adapted versions of TRIZ to support innovative thinking and new ideas generation in such areas as business, management, service industry, marketing, advertisement, and others.



For a long time, TRIZ has been relatively unknown outside the former Soviet Union. Emergence of TRIZ companies in Europe, USA, Korea during last decade helped further promotion of TRIZ worldwide. In parallel with technology, TRIZ principles and tools have been developed in applied lately in other areas, such as business, management, marketing, and so forth.

TRIZ is not a magic wand which solves problems all by itself. Creative solutions are always found by people. But thanks to TRIZ, there is no need any more to go through the painful process of generating hundreds and thousands trials and errors and wait many years for the next insight. The use of TRIZ-based Systematic Innovation provides the following benefits:

- Structuring and organizing creative phases of the innovation process in a systematic way.
- Quick access to the previous experience of inventors as well as specially organized databases of scientific and technological knowledge.
- Considerable acceleration of new idea generation.
- Ability to forecast and roadmap future generations and products and services.
- Fast solving of problems related to product development, improvement, and manufacturing which demand innovative solutions.
- Considerably raising the degree of innovative productivity of organizations and individuals.

However, modern TRIZ is a complex discipline, therefore to learn and master skills with it demands time and effort. But thanks to recent advancements in TRIZ education and developing new tools of Systematic Innovation this process is not that difficult as it was 10 years ago. Today, TRIZ and Systematic Innovation are used at many organizations across the globe. Recently, TRIZ was included as a supporting tool for Six Sigma to solve those problems that can not be solved with traditional methods. TRIZ conferences and congresses are conducted annually in many countries. A good entry source to TRIZ is a free online TRIZ Journal: *www.triz-journal.com*

About the author: Valeri Souchkov, TRIZ and Systematic Innovation expert certified by the founder of TRIZ G. Altshuller. He has been TRIZ consultant and trainer since 1988. He was among the first who pioneered promotion of TRIZ outside the former Soviet Union, and initiated and co-founded the European TRIZ Association (*www.etria.net*). Currently he heads ICG Training & Consulting in Enschede, The Netherlands. Among his customers are Fortune 500 organizations worldwide.

More information can be requested from ICG Training & Consulting: *info@xtriz.com* or found at *www.xtriz.com*