BREAKTHROUGH THINKING WITH TRIZ FOR BUSINESS AND MANAGEMENT: AN OVERVIEW

Valeri Souchkov

ICG Training & Consulting
www.xtriz.com

BREAKTHROUGH THINKING WITH TRIZ FOR BUSINESS AND MANAGEMENT: AN OVERVIEW

Valeri Souchkov
ICG Training & Consulting
www.xtriz.com
2007. Updated edition: 2017

In conflict rooted,
With inventive principles
A problem solved!

Russell Sutcliffe, xTRIZ Practitioner, London, UK

INTRODUCTION

Technology innovation has always been among the most crucial factors driving the progress of human civilization. Today it also becomes clear that business innovation is not less important to successfully compete and becomes the necessity. Modern business environment is extremely dynamic and fast, information technology and global networking eliminate borders, which used to keep businesses in their comfort zones, the market continuously demands better services, competition even between small companies moves to a global scale. At the same time there is no solid and proven method that would help with business innovation. In search for a solution, more and more business people turn their attention to TRIZ.

TRIZ is a term which is used for the Theory of Solving Inventive Problems[1]. TRIZ was originated in the middle of the 20th century in the former Soviet Union to develop a method which would support a process of generating inventive ideas and breakthrough solutions in a systematic way. Although relatively little known outside ex-USSR before the end of last century, today TRIZ is going global: more and more companies and organizations worldwide start recognizing TRIZ as the best practice of innovation. Among which are General Electric, Procter & Gamble, Intel, Samsung.

While TRIZ nowadays is known and used in technology and engineering, applications of TRIZ in business and management areas have been practically unknown. This should not be surprising: TRIZ was created by engineers for engineers. The vast majority of TRIZ professionals work in the areas of technology rather then business due to historic reasons. In addition, many TRIZ experts working in the technology areas are vaguely familiar with specifics of business environments, therefore direct applications of "technological" TRIZ have

[1] TRIZ is a Russian acronym written in Latin characters. In Russian it stands for "Teoria Resheniya Izobretatelskikh Zadatch"

not been always successful. A separate version TRIZ for Business and Management was needed.

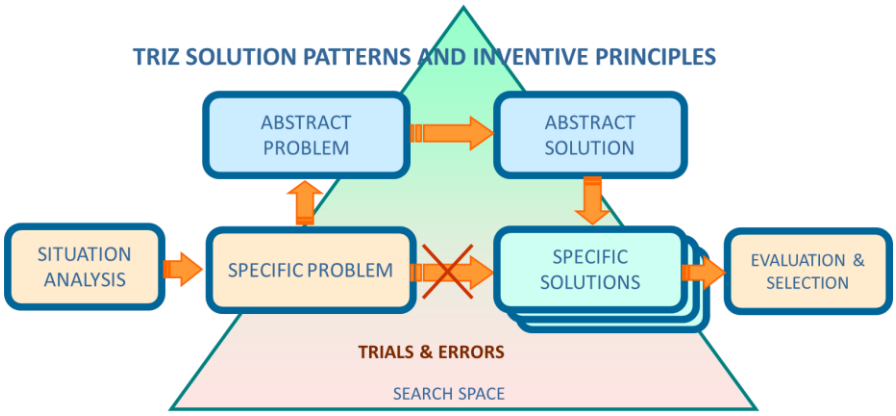
Relatively recently, within last 10-15 years, several TRIZ developers started to expand application of TRIZ to business and management areas [3,10,13,14]. The results appeared to be rather encouraging: a number of seemingly unsolvable business and management problems were solved quite effectively and efficiently. Such situation triggered further development of TRIZ for Business and Management, which has been actively evolving during recent years. A major step in further promotion of "business TRIZ" was made by Darrell Mann's book "Hands-On Systematic Innovation for Business and Management" [7].

This paper proposes a brief overview of essential parts of TRIZ for Business and Management which are already successfully used to generate new business ideas and solutions, and is intended for readers familiar with TRIZ as well as for those who never heard about TRIZ.

WHAT IS TRIZ?

TRIZ was developed as a theory and a set of applied tools to support solving so-called "non-ordinary" problems in technology and engineering: problems which can not be solved with known formal methods, for example, mathematical optimization or configuration change. Such problems require new, out of the box solutions unknown before. Usually we refer to such solutions as "innovative" or "inventive" while calling the problems innovative (or inventive) as well.

To develop TRIZ, Russian inventor Genrich Altshuller (founder of TRIZ) and his associates studied a vast massive of technological solutions, patents, inventions, and extracted a number of common solution patterns which existed among them [1,2]. Another important achievement of TRIZ studies was discovering mechanisms which help to transform an ill-defined initial problem situation to a solution by solving an inventive problem at abstract level thus drastically reducing solution search space by directly navigating to the area of most relevant solutions. Such approach helps to re-use previous experience available as a collection of high-order solution patterns and reduces time and efforts needed to solve an innovative problem.



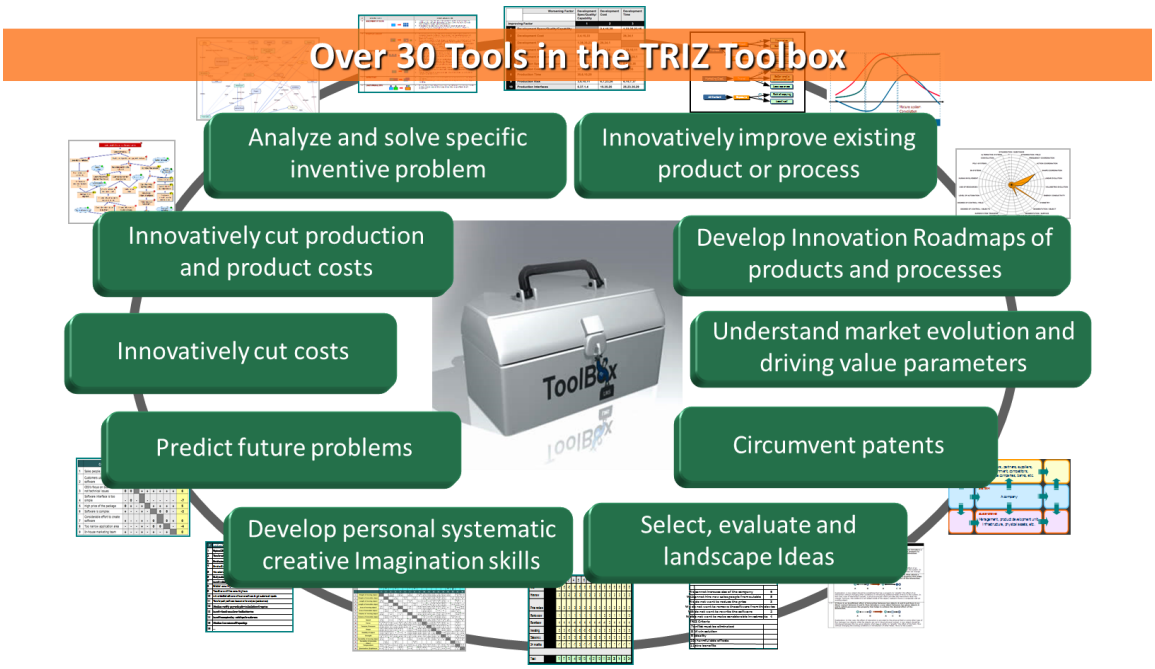
One of the fundamental principles of TRIZ: Instead of directly jumping to a solution, TRIZ offers to analyze a problem, build its model, and apply a relevant pattern of a solution from the TRIZ databases to identify possible solution directions.

During many years of evolution TRIZ developers introduced a number of different techniques and tools which support different phases of a process of solving innovative problems and innovation roadmapping. More information about classical "technological" TRIZ can be found in [8,15].

In general, regardless of an application area, today the TRIZ methods and techniques can be used in the following situations:

1. To solve a specific problem which is formulated as a negative or undesired effect (e.g. a product degrades too fast, an engine breaks, a project fails, a customer leaves, sales drop, and so forth) or as the lack of needed performance or control (e.g. speed is too low, insufficient sales, poor management of a supply chain).
2. To explore a system (business or technological), discover existing bottlenecks and barriers which can be removed by innovative solutions found with TRIZ tools and techniques.
3. To analyze evolutionary potential of technological or a business system and propose strategies for developing next generations of the system.
4. To predict potential failures in new products and processes and help with their prevention.

Modern TRIZ is a large body of knowledge [17], which is a combination of a theory of solving inventive problems and systems evolution, analytical tools and methods for problem solving and analysis, collections of patterns of solutions, databases of specific effects and technologies, and techniques for creative imagination development.



Areas of application, methods and techniques of modern TRIZ

WHY DOES TRIZ WORK FOR BUSINESS AND MANAGEMENT?

If a role of TRIZ has to be defined in a single sentence, TRIZ provides creative phases of innovation with knowledge-based systematic support. While most of the basic TRIZ principles were drawn from the studies of technological inventions, the ways we solve problems and generate ideas are rather similar in virtually every area. For instance, TRIZ postulates that one of the major driving forces of evolution of a certain technology is a stepwise resolution of contradictions emerging between the current technology capabilities and our growing demands. A concept of evolution through contradictions resolution was known in philosophy long before TRIZ, but the TRIZ researchers developed this concept further and made it applicable for supporting technological innovation. The same idea of evolution through contradictions resolution appears to be true for many other domains: social, political, business, economic. As an example, an old and seemingly solid business model will not survive when its business environment changes because the model starts facing contradictions; and in many cases the business model has to be radically improved since compromising and optimizing will only help to incrementally improve the model.

One of the most significant contributions of TRIZ was that it identified strategies and patterns for resolving contradictions: both very generic like resolving contradictions in time and space, and more specific, like "Consider doing the opposite action instead of an intended one". The high degree of abstraction makes major discoveries and principles of TRIZ domain-independent with respect to creative problem solving. Even the current system of generic principles and patterns of TRIZ can be applied to almost every man-made system created to add a certain value. Today TRIZ is used in business, software architectures, marketing and advertisement, pedagogy. In many schools of the former USSR kids learn to think with TRIZ – via games, puzzles, fairy tales. Although originally developed for engineering applications, today TRIZ gradually develops to a universal problem solving paradigm which is based on a heuristic approach to generate breakthrough ideas.

TRIZ DISCOVERIES:

- 99.7% of inventions use already known solution principle
- Less than 0.3% are really pioneering inventions
- A breakthrough solution is a result of overcoming a contradiction
- Inventors and strong thinkers use common patterns
- Creative problem solving patterns are universal across different areas
- Evolution of man-made systems is governed by certain regularities and trends
- New innovative ideas can be produced in a systematic way by reusing previous experience and patterns of previous solutions

An answer to the question "Why does TRIZ work for other areas?" resides in understanding the underlying mechanisms of our thinking when we deal with non-ordinary problems – solutions to which are unknown and a problem-solving method is not available. Does our brain use different mechanisms to solve two seemingly different problems which require resolving two, again, seemingly totally different conflicts? At the first glance, yes – but is it true? For instance, we can use the same brainstorm or a method of analogies to solve very diverse problems in different areas, why not to suppose that there is a more exact method for solving different problems in a systematic way? And as TRIZ proves, such method exists.

Let us have a look at two problems. The first problem comes from technology: to launch and bring a spaceship to an orbit, the ship needs to overcome the Earth gravity force. Which means the ship has to carry many tons of fuel to reach the speed needed to break the gravity barrier. But after the largest part of fuel has been burned, the remaining part has to carry the entire ship including very large and massive empty fuel tanks! This drastically decreases the useful load of the ship.

Now let us have a look at the second problem. When a start-up company enters the phase of growth, its board decides to aggressively invest to marketing activities. But all of a sudden the expected marketing budget is cut and the company's marketing executive has been confronted with a problem: he already defined a size of a new marketing team which would be needed to reach the targets and even started to hire, but then under the new budget limitations the company would not be able to participate in all exhibitions that were planned. And vice versa, if the size of the marketing team remains small, the company would participate in all exhibitions, but then the overall performance of the marketing team would not be as desired by the end of the next year. To increase the budget was not possible.

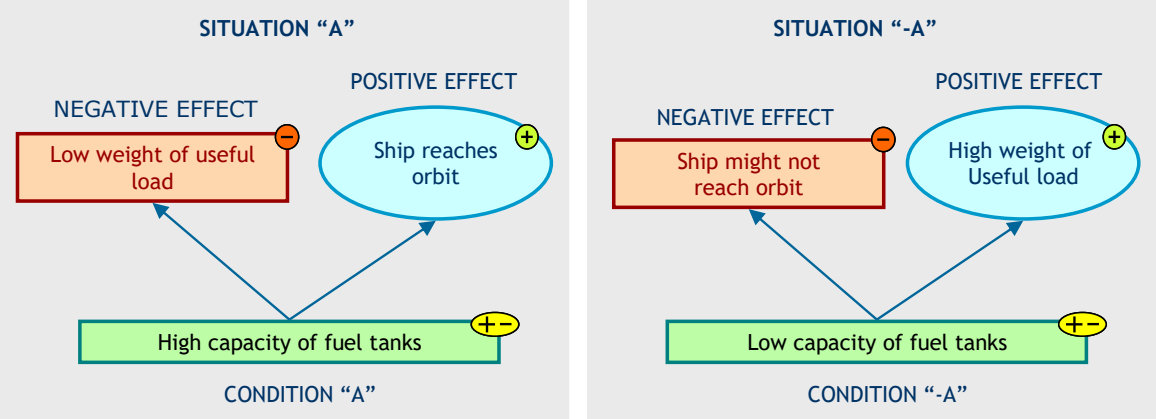
There are two ways to approach both problems. The first way is to apply optimization. We can find an optimal ratio between the capacity of fuel tanks and the weight of useful load in a spaceship. In the second case, we can optimize a number of hired specialists and the number of exhibitions. Most likely, both solutions will not satisfy us since they offer trade-offs. We sacrifice either the useful load of the ship in the first case or the performance of the marketing team in the second case. Probably, optimal solutions will work, but only to a certain extent. When an optimal solution stops meeting our growing demands, we should come up with a breakthrough. How? We need to forget about optimization and apply breakthrough thinking.

Before TRIZ, this part remained a mystery. There was no any systematic method to support problems solving process except brainstorm, which is still completely based on trials and errors. None of the psychological methods of boosting our creativity deal directly with a problem – they deal with our creative capabilities, imagination, and divert us to explore different directions that we would not look at with "ordinary" thinking. However what directions to explore and how – remains completely unclear in these methods.

In fact, Genrich Altshuller was the first who applied empirical scientific approach to understand how we solve problems which require creative thinking and which can not be handled with formal methods. During many years he studied hundreds of thousands solutions from different areas of technology and made a conclusion that a seemingly great diversity of inventive solutions complies with a relatively small set of abstract solution patterns. He also identified what a "breakthrough solution" means. The breakthrough solution emerges as a result of eliminating a contradiction: a major barrier which does not let us to solve a problem. We used to think in terms of optimization and trade-offs, while breakthrough solutions require breakthrough thinking.

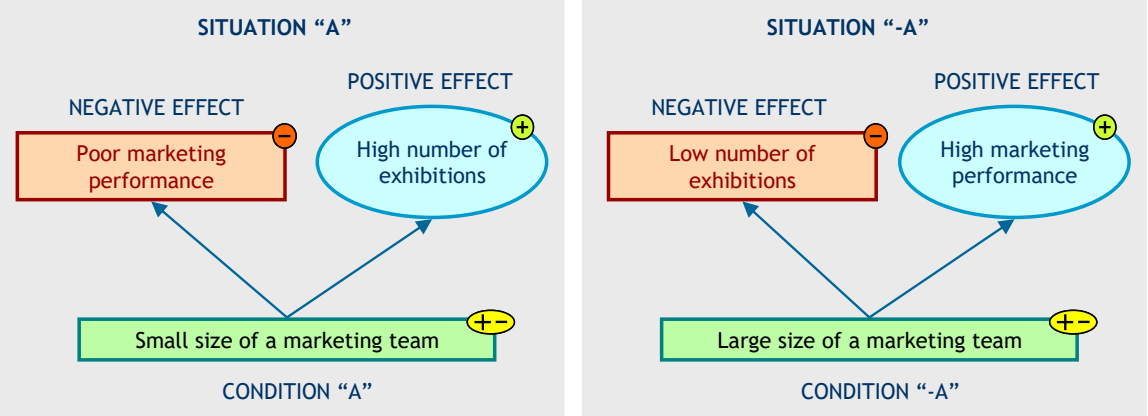
Breakthrough thinking is difficult for many reasons. First of all, we all (or at least, most of us) are the prisoners of "psychological inertia" inherent to every human being. To bring our thinking out of the box, we need to distract ourselves from concepts associated with a specific problem that we try to solve, forget about existing solutions (which won't help anyway), to see a problem under a new angle, or even many new angles. Brainstorm and its modifications were introduced to help with this process. However, brainstorm is not guiding us towards solutions. For relatively simple problems, brainstorm works pretty well. For more complex and difficult problems we have to make thousands of trials, and there is no guarantee that we find a solution we want.

Let us see how we can model both problems in TRIZ terms. A contradiction in TRIZ is represented by a couple "positive effect vs. negative effect", where both effects appear as a result of a certain condition. For instance, if we make the fuel tanks of large capacity, we will be able to bring a ship to the orbit, but at the same time the useful load will be low (Situation "A" at the picture). Both positive and negative effects will be replaced by each other if we design fuel tanks of small capacity (Situation opposite to "A", we indicate it as "-A"):



As we can see, to satisfy both demands the fuel tanks to have both high and low capacity at the same time. This does not seem to be possible, so we need to find a solution which will satisfy both demands in some other way.

The same way of modeling can be applied to the problem with the marketing team:



After we have identified the contradictions, the next step is to solve them. Not to compromise or optimize, but to eliminate each contradiction in a "win-win" way. To help with that, TRIZ proposes a range of tools which can be applied depending on a complexity of a contradiction. The most popular technique for a majority of problems is a collection of *40 Inventive Principles* and so-called "*Contradiction Matrix*" which provides a systematic access to the most relevant subset of Inventive Principles depending on a type of a contradiction. Although 40 Inventive Principles look similar for both Technology and Business applications, the matrices are different. While the Matrix for Technology and Engineering was originally developed by Altshuller in the 1960s, a Contradiction Matrix for TRIZ in Business and Management was developed by Darrell Mann and introduced in [6,7]. If a contradiction can not be resolved with a Matrix, there are more sophisticated techniques to deal with contradictions, such as ARIZ (stands for Algorithm for Solving Inventive Problems).

Suppose, we identified the following solution pattern which can be applied to both above mentioned problems: Inventive Principle #2: "Taking Away" (only "business" definition of the principle is shown):

#2: TAKING AWAY

Strategies and recommendations

- If some part of your system or your process interferes with other parts or creates a negative effect, remove ("take away") the interfering part of your system (or activity of your process) by separating it from the system or the process.
- Isolate interfering part of a system or a process from the rest of the system or a process.
- If some property of your system interferes with other properties of functions of the system, find out what part of the system is a carrier of the property and separate it from the system by creating another system or transferring the property to some other part of the system.
- Remove the necessary property of a system or your process by creating a system or a process which has the required property only.

Examples

- Outsourcing non-core parts of business systems and business processes.
- Separating development and production activities.
- Separating manufacturing and reparation.
- Taking away an interfering part of the business process.
- Performing marketing studies directly at customer side.
- Locating development teams in geographic areas with concentration of top competence.
- Removing dangerous manufacturing unit outside the city.
- Increasing sales by bringing a product to a customer's side.
- Letting customers exclude those parts of the product that they do not need before purchase.
- "Isolate" in time or space a part of a business system or a process that creates tension.
- Distant learning.
- Working from a home office.
- Lean manufacturing.
- Activity-Based Costing instead of allocation cost accounting.
- Establishing a number of new companies with new products which promote the same brand.

As seen, an Inventive Principle does not offer an exact solution. Instead, it proposes a number of rather generic strategies and recommendations, which still have to be translated to a specific solution. However, these strategies and recommendations already successfully resolved similar contradictions in the past, which means that by re-using them we significantly increase our chance to find a needed solution. Now our task is to apply these recommendations and come up with new ideas within the context of our problems. Examples of using 40 Inventive Principles in various non-technological areas can be found in [9].

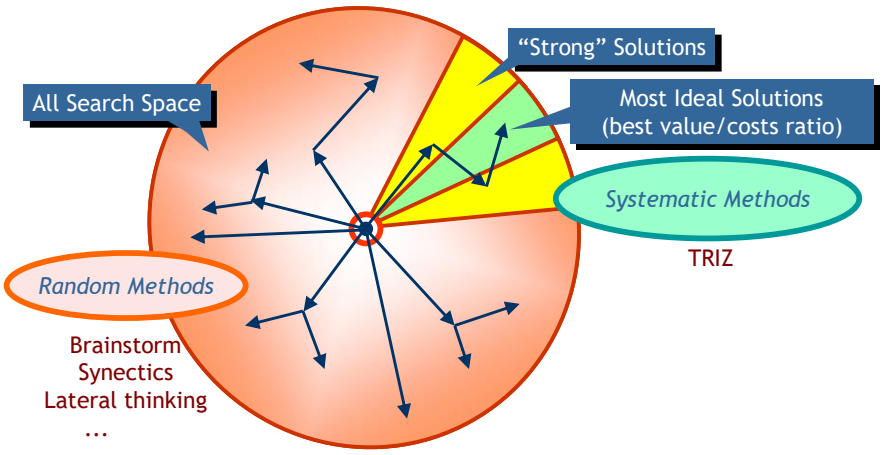
According to the Inventive Principle shown above, if the fuel tanks have high capacity and thus are too heavy, they simply have to be "taken away" from the spaceship. A solution proposed by Robert Goddard, one of the pioneers of space flight, was to make the launch boosters detachable, so that they are separated and thrown away right after all fuel in them burned out. Thus the useful load could be increased not just few per cent, but by orders of magnitude.

Now, what to "take away" in the second problem? Exhibitions are needed to expose products of the company. Therefore the products should be taken away! A solution to the marketing problem was to complete the marketing team as planned, and participate in full only in most important exhibitions with the company's own booths. As soon as new marketing professionals joined the company, they were requested to search for those businesses which would be willing to share a booth and co-promote products, thus significantly cutting expenses for the exhibition fees. Was contradiction resolved in a win-win way? Certainly yes, since the company increased their marketing force just as planned, and at the same time exhibited their products at all exhibitions, exactly as planned. Of course, someone can argue that co-promoting products might decrease the marketing performance, but this is already a new problem which again might require breakthrough thinking. How to make co-promotion of products to be more effective? Even more effective, than just promotion of a single product? Is this problem solvable? Absolutely, yes. We just have to find how, and we have tools for that. To some, the solution with co-promotion might seem to be to far away from the recommendation "take away". It is not so if you know TRIZ. First of all, the inventive principles serve as triggers to activate our creative imagination. But second, if you know TRIZ well, you know one of the underlying mechanisms of systems evolution: integration to more complex structures by merging two or more systems. This knowledge helps to come up with best ideas much quicker. We will discuss TRIZ trends of systems evolution below in the article.

An example of products co-promotion between Nintendo and Pepsi in conjunction with the Japanese launch of Pepsi Twist

Another important issue is what to consider as "business innovation". In technology, innovation means successful introduction of an invention to the market, which is a patented or a patentable solution thus unknown to anyone in the past. In business, a particular solution can be new if it has never been used before in an organization, and as long as it solves a problem, it can be also regarded as innovative. For instance, the idea of product co-branding is well known in the business world, but each new case of co-branding be treated as innovative as well. But the degree of "innovativeness" of solutions can be different. TRIZ recognizes 5 different levels of innovative solutions [1], and their description can be found in almost every introductory TRIZ text.

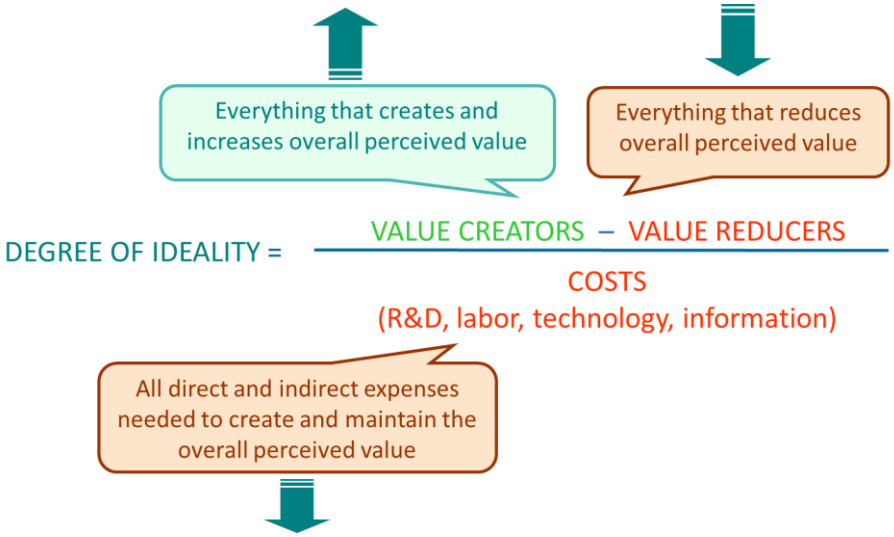
The bottom line: working with TRIZ on difficult and complex problems, instead of time-consuming and often inefficient exploration of all possible ideas, we are directly guided towards the area of so-called "strong" solutions, and, ultimately, to the area of solutions with the highest degree of ideality.



Dealing with psychological inertia. With random methods, we might be looking for a black cat in a dark forest without a flashlight. The bigger the forest is, the less chance is to find the cat. With TRIZ, we are directly directed to the area of solutions which are most relevant to our problem.

THINKING WITH IDEALITY

Ideality is one of the key concepts of TRIZ. The degree of ideality indicates a ratio between the perceived value delivered by a certain system, product or service and all types of expenses and investments needed to produce this value. In short, the degree of ideality is defined as useful functionality of a system minus all negative factors that diminish its value, and divided by costs.



For instance, if I plan to purchase a notebook PC and I find one with excellent performance, but it is too heavy and noisy, I probably will not buy it. I will also avoid buying a very lightweight, silent but slow notebook PC. In fact, I want a notebook PC with great performance, extremely lightweight, with a battery which lasts not hours but years, which never breaks, and preferably for free! Which means, in the TRIZ terms, I want an "ideal" notebook PC. In TRIZ, the formula of ideality is qualitative, and usually serves to compare different solutions to the same problem.

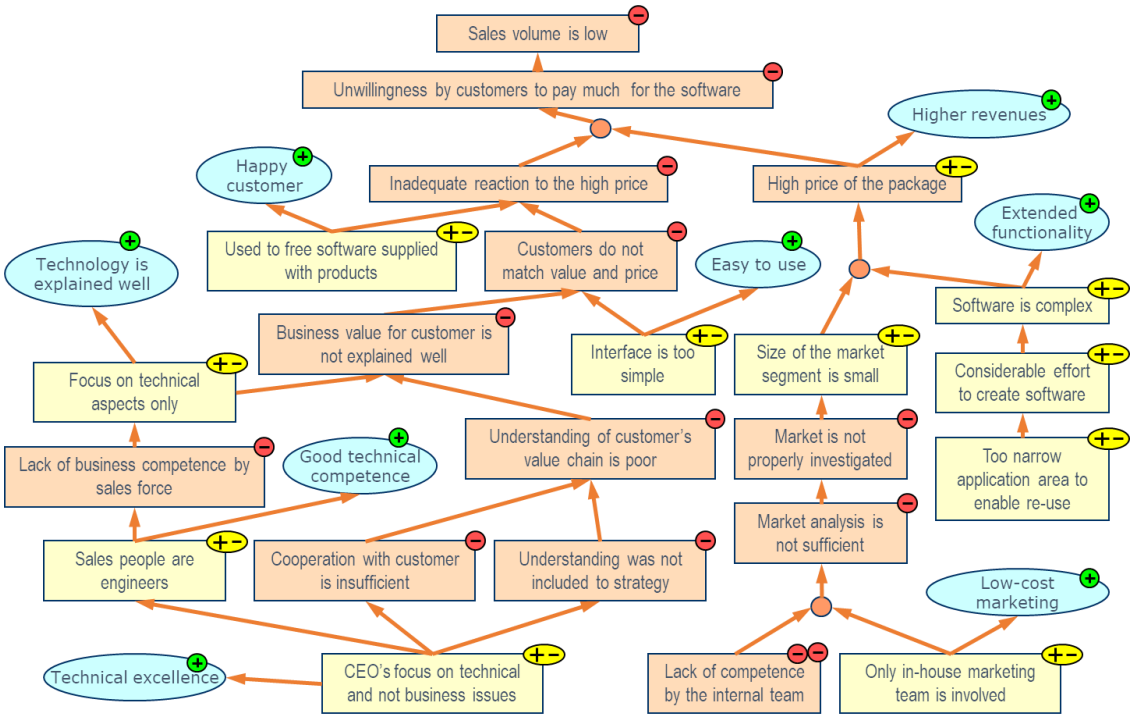
Ideality is a powerful concept since it requires defining an ultimate system – an "ideal" system. An ideal system is a system which does not exists, but its function is delivered. Altshuller noted that increasing of the degree of ideality is a trend which governs evolution of almost each technical system. The same happens with business systems: the more we can deliver with less, the more effective and efficient the system will be. For instance, introducing IT support helps businesses to greatly reduce expenses by automating business processes. Using web-based marketing through social networks helps entrepreneurs reach millions of potential customers around the globe without leaving a house. Of course, a completely ideal system may not exist due to the law of energy preservation, but keeping the concept of ideality in mind when solving problems or designing new systems provides a platform for the "right thinking". Although modern management methods, such as "Lean" and Six Sigma also increase the degree of ideality, they only do it within certain limits, while TRIZ techniques help to provide disruptive changes to drastically increase the degree of ideality of systems. This is why many Six Sigma specialists take TRIZ training and integrate TRIZ with Six Sigma practices; see, for instance [3].

FINDING A RIGHT PROBLEM IS A PROBLEM TOO

In many situations, just to define and attack a single contradiction might not be enough. Difficult problems and complex challenges are usually featured by many interrelated contradictions. In many cases, resolving one contradiction might not necessarily provide us with expected results. Changing one part of a system usually causes changes in the other parts too, therefore we need to recognize and deal with system complexity to move in a right direction, and try see "a whole picture" as much as possible. The better we define all involved and underlying sub-problems which compose an overall problem, the easier it will be to understand the roots of contradictions and find exactly at what level a problem has to be solved.

TRIZ proposes several tools and techniques to recognize and present problems within systems. To define problems in terms of contradictions, at ICG T&C, we introduced a technique called "*Root-Conflict Analysis*" *(RCA+)*. The technique helps with top-down decomposition of a general problem defined as a negative or ineffective result to a tree of interrelated contradictions [16,18]. Depending on a problem, a resulting RCA+ diagram can include from one to 20-30 and even more contradictions. RCA+ also includes specific recommendations how to select contradictions to solve the problem in most effective and efficient ways.

Although RCA+ was introduced only a dozen years ago, it has been already successfully applied to over thousand of real-life projects from both technological and business areas. In addition to its modeling power, the use of RCA+ considerably structures and clarifies thinking with TRIZ, and helps to learn TRIZ faster.

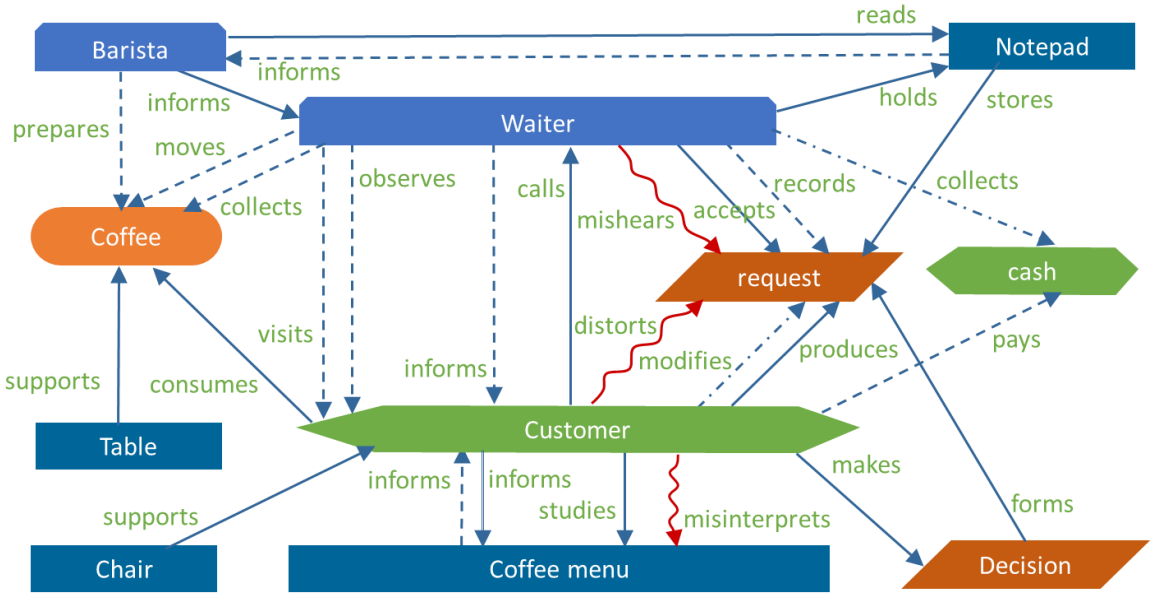


A typical RCA+ Diagram of a business problem

Another TRIZ tool is known as *Function Analysis* [20]). This technique helps to identify negative, insufficient, or poorly controllable interactions within a system, and locate "sore" points in various types of systems. The techniques can be applied in technology, supply chains, organizations, business services, and so forth. What is important, analysis of functional interactions helps to reveal "hidden" undesired interactions which either lower the system's performance or can be sources of potential failures, thus uncovering potential for further improvement.

In addition, TRIZ-based Function Analysis helps to rank functions delivered by systems components and create functional hierarchy which establishes different levels of functional value delivered by system components involved to business processes.

TRIZ-based Function Analysis is also used to create more simple and ideal business systems by extracting potential candidate components for trimming and function sharing,



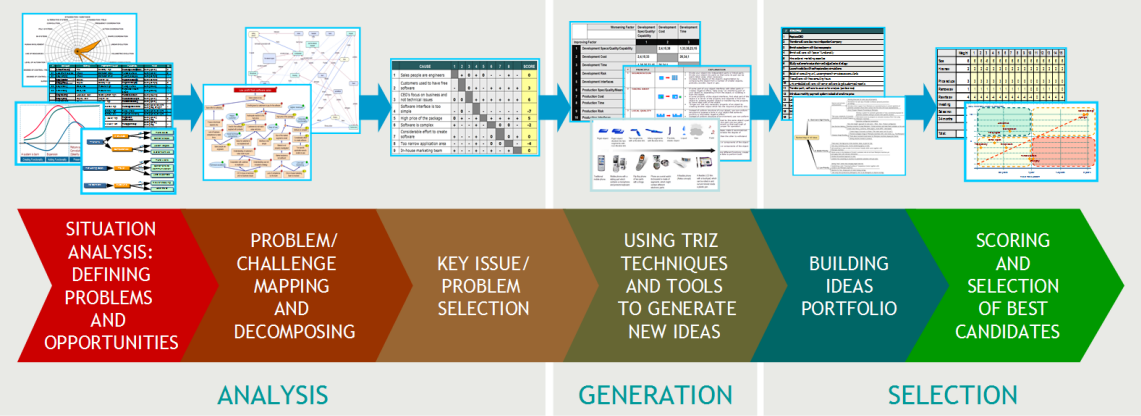
A fragment of a typical diagram of Functional Interactions created by TRIZ-based Function Analysis. Dotted, dashed and red lines represent undesired effects resulting from interactions.

Another technique which is based on exploring a system functionality to extract problems and based on causal approach is "*Problem Formulator*", developed and introduced by Ideation International. There are reports available about successful application of this technique for Business Process Improvement [12,13].

"Basic xTRIZ" PROCESS

To support a problem solving process with TRIZ for Business and Management, we developed a process called "Basic xTRIZ":

1. **Situation analysis: defining problems and opportunities**: understanding what a problem situation is, documenting a problem, defining solution criteria, demands, constraints, goals, and targets.
2. **Problem/challenge napping and decomposing**: application of RCA+ or Function Analysis to decompose a general problem and create a map of manageable sub-problems in terms of contradictions.
3. **Key issue or problem selection**: Identifying what critical conflicts (contradictions) should be resolved to achieve the expected results.
4. **Using TRIZ techniques and tools to generate solution ideas**: application of TRIZ techniques, such as Contradiction Matrix and Inventive Principles to eliminate selected conflicts, generation of new solution ideas.
5. **Building ideas portfolio**: composing a tree of generated ideas.
6. **Scoring and selection of best solution candidates**: applying Multi-Criteria Decision Matrix, TRIZ criteria of ideal solutions, and Ideas Landscaping technique to evaluate the Idea Portfolio and identify best solution candidates.



This process supports a logical transition from a problem to a portfolio of innovative ideas. Each phase of the process provides outcome which serves as input data for the next phase. A case study with Basic xTRIZ is presented in [18].

THERE IS MORE IN TRIZ: CREATING WHAT'S NEXT

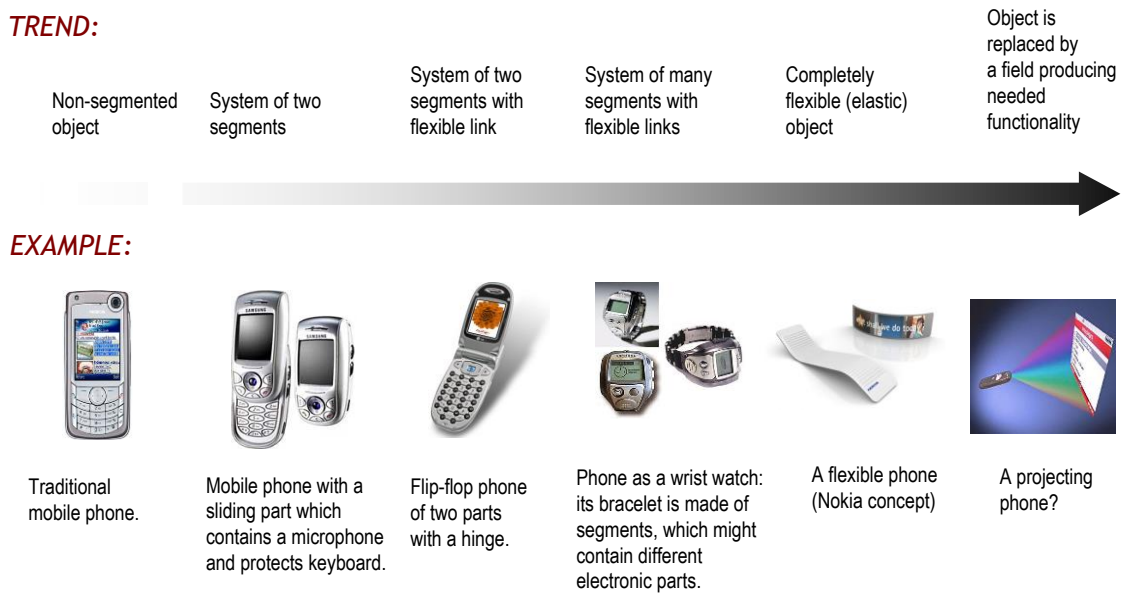
In the previous part of the paper we investigated how the "problem-solving" part of TRIZ can be used for business problems. However, TRIZ is not only about problem solving. In fact, problem solving in TRIZ is regarded as a part of a process of systems evolution, and therefore a large part of modern TRIZ foundations is formed by the Theory of Technical Systems Evolution. This theory studies patterns, trends, and regularities which govern evolution of the technological world [19]. Again, both technological systems and business systems are examples of artificial systems created by a human mind; therefore we can assume that again, the underlying principles of systems evolution are if not identical, then at least similar. During evolution, these systems experience similar types of barriers, and we use quite similar patterns to overcome these barriers. Many people with TRIZ knowledge and experience can quickly recognize the patterns of "classical" TRIZ in virtually every area of human activity.

Breakthrough solutions, which are sometimes called "disruptive" innovations, do not appear out of the blue: they emerge as a response to the necessity to go beyond limitations and constraints imposed by old solutions. Just like digital photography replaced analog photo films and disrupted the photo industry, a new business model of combining Apple's iPod™ with iTunes™ service disrupted already existing market of digital music players. iPod™ itself was not a big innovation – there were already dozens of brands on the market, but it won over thanks to Apple innovative business model.

A question is: are such changes predictable? And the answer is, yes. This is due to the fact that TRIZ explores not only certain specific trends, but generic lines of evolution which specify successive transformations experienced by a system's or some system component structure from the moment of starting delivering the needed functionality to delivering functionality with the highest degree of ideality. Compare the first Ford car and a modern Ferrari. Or a start-up company and a major player on the global market it wants to eventually become. During evolution, both systems experience many qualitative transformations to

respond changing and growing market demands – quality, safety, reliability, comfortability, and so on. Yes, both systems operate on radically different principles: a car is based on the laws and principles of physics and chemistry, while a company is based on business, psychological, market, and social laws and principles. But when we consider both systems at a higher plane, we will see that both a car and a company can be presented as networks (systems) of generic components which deliver certain functions, process either material or information, are engaged in transactions, interact with other components of outer systems, provide reactions and feedback, and so forth. If you feed wrong oil to a car engine, the car will break. If you feed wrong information to a company, the company will break, too.

Thus a while ago, we formulated a daring hypothesis: many of the generic evolution lines which were uncovered by "technological" TRIZ could be successfully used within the business systems and environments. Over the time, it appeared to be true. Let us have a look, for example, at one of the trends of evolution of classical TRIZ: a so-called "Trend of Dynamics Growth", which states that "*A component of a system, which experiences the ever-growing demands of environment, tends to increase its degree of dynamics (or, degree of freedom in other words) during evolution*." This line of evolution for technical (physical) systems looks as follows:

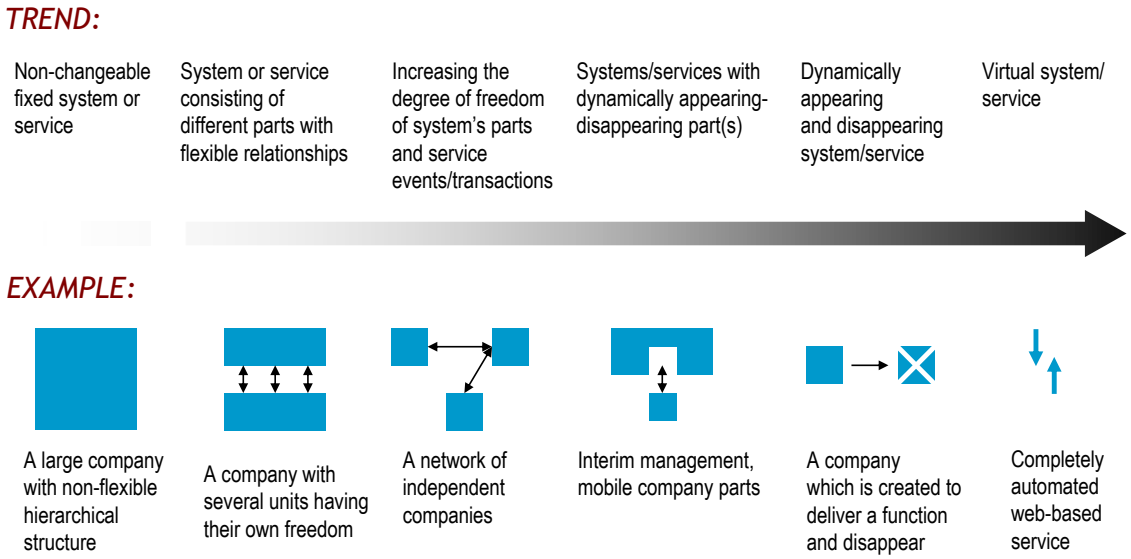


One of the contradictions driving evolution of a mobile phone is a size of a phone vs. ergonomics and functionality. A particular contradiction is that we want to have a large screen, but we do not like to increase the overall dimensions of the phone. This contradiction is being solved in many different ways, and one of them is to increase the degree of dynamics of the phone. For instance, a "flip-flop" design of the phone makes it possible to have both a large screen and large keypad, and to avoid increasing the overall sizes of the phone when the phone is not used. Finally, a screen of the phone can be reduced if we can use a projecting system which projects image on a wall or any other available surface.

This line of evolution does not mean that products created at each new step will replace products created at the previous steps, since all depends on the ideality and purposes of newly

proposed solutions. It is not always the case when a new product will be superior in every aspect, therefore both new generations and previous generations can co-exist and take their own niches on the market.

Now, the same trend of Dynamics Growth for business systems and services. Its formulation is slightly different from the "technological" trend:



Let us have a look, for example, at the evolution of a news media company: from a large company of the beginning of the 20th century which used numerous staff to gather news, and then printed and distributed newspapers, to a network of companies which delivered different functionality and, as one of the possible scenarios of the nearest future – to a completely web-based media company which uses sophisticated software and numerous bloggers to present and comment on the latest news. Will this be the final step in evolution of mass media delivering news? No. Because thanks to TRIZ we know how systems tend to evolve even when they reach a final phase of evolution along a certain trend.

In a "flat" world [4], where the borders of a physical world are quickly removed, only dynamic business structures will succeed. If yesterday a circle of potential clients for a one-man consulting business could be reliable protected by geographic location, today, thanks to the Internet, a consultant in Boston can lose against a consultant from Singapore if the latter takes a higher position among search results produced by Google or Yahoo. But application of this trend should always be considered at both macro- and micro-scales: When we look at the first phase of a system – non-dynamic system, we can talk about both some large company itself and a small group in that company. They both can be considered non-dynamic and follow the evolutionary path defined by the trend of Dynamics Growth. As well as a large business process and any its smaller event.

Why iPod™ won over other music players? Not only because of design and sound quality. But because in combination with online services, it offers great dynamics and flexibility. You can quickly find and upload songs, delete songs you do not like, shuffle, create play lists, watch video, connect, etc. Should business services be similar to iPod™? Certainly. They

already tend to become more and more dynamic. These companies which will permanently upgrade their services, add new parts to the existing service, eliminate unneeded parts, customize configurations, involve third parties and users to the process will win, or, at least, stay alive.

Therefore it is not a surprise that the Trend of Dynamics Growth complies with one the rules defined by Jack Welch's (former CEO of General Electric) key business strategy:

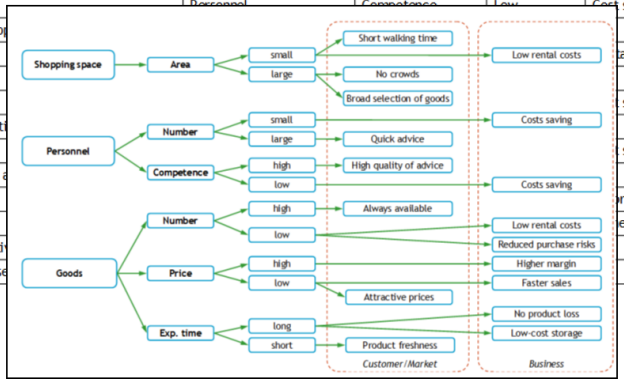
> "*Business leaders who treat change like the enemy will fail at their jobs. Change is the one constant, and successful business leaders must be able to read the ever-changing business environment.*" [11].

ROADMAPPING THE FUTURE

Thanks to TRIZ, now we better understand mechanisms of evolution of man-made systems. Knowing TRIZ trends of evolution we can evaluate where our business system or business product is today, how it has been evolving, what contradictions drive evolution of the system and identify its evolutionary potential.

To decide what part of our business model or our value proposition we would like to innovatively improve, we use a tool "Value-Conflict Mapping" which helps to extract barriers existing within a business model which prevent from meeting critical current and future demands [21]. VCM is performed by completing a table which matches customer demands and market trends with certain parts of a system and their properties responsible for fulfilling the demands and trends. The methods helps to establish the contradictions between the key market demands and trends and the components of a current system being analyzed.

#	MARKET DEMAND	SUBSYSTEM	PROPERTY	VALUE	BUSINESS DEMAND
C1	Short walking time	Shopping space	Area	Small	
C1	No crowds	Shopping space	Area	Large	
C1		Shopping space	Area	Small	Low Rental costs
C1	Broad selection of goods	Shopping space	Area	Large	
C2	Products freshness	Goods	Expiration time	Short	
C2		Goods	Expiration time	Long	Avoid product loss
C2		Goods	Expiration time	Long	Low-cost storage
C3	Quick advice from the personnel	Personnel	Number	High	
C3		Personnel	Number	Low	Cost saving
C4	High quality of advice	Personnel	Competence	High	
C4		Personnel	Competence	Low	Cost saving
C5	Fun sho				
C5					tal costs
C6					
C6					saving
C7	No waiti				
C7					saving
C8	Always a				
C8					roduct loss
C9					er margin
C9	Attracti				
C9	Broad se				



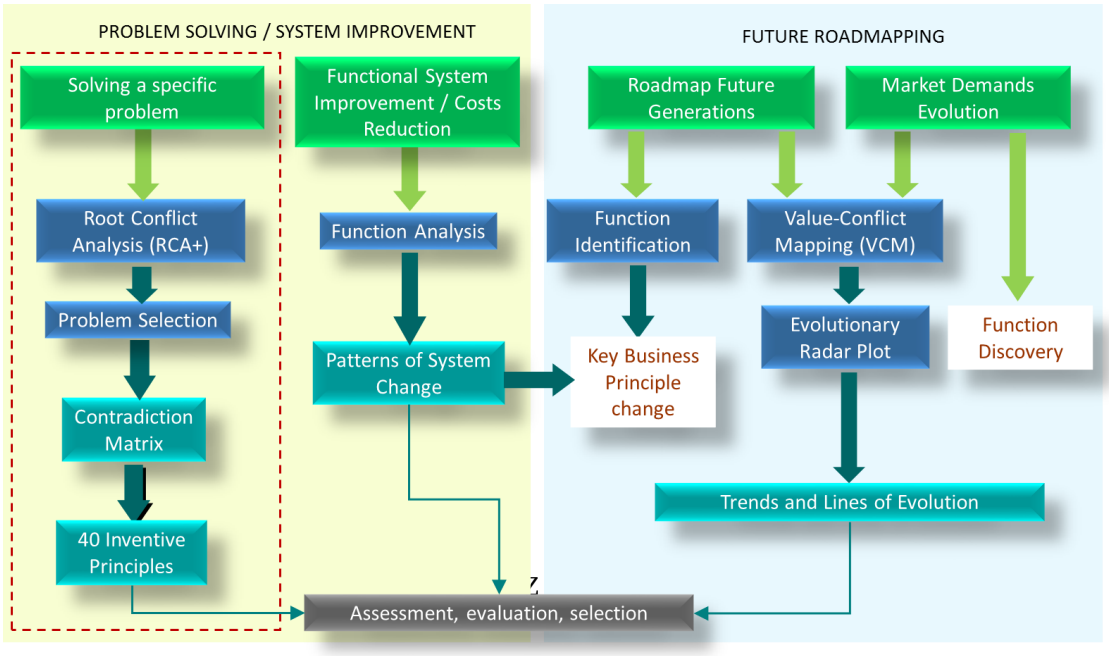
Using Value-Conflict Mapping to identify critical contradictions in a system

Understanding the underlying mechanisms of man-made systems evolution, knowledge of the trends and patterns of evolution help us to organize and establish a process of forecasting what will happen next with our system, product, or service. But this is not exactly a forecast process. By applying the patterns of evolution, we come up with new ideas and solutions during the process. Therefore we do not merely forecast but create new ideas during the process, and the output of such process is a roadmap with a number of new ideas on what to turn our system into in the future.

TRIZ FOR BUSINESS AND MANAGEMENT: A ROADMAP

TRIZ is not a single technique or a method, therefore we need a roadmap which helps to select which techniques of TRIZ should be used to deal with one or another situation and define a strategy in each particular situation. A sample roadmap which we introduced at ICG T&C divides all situations to four categories and proposes a relevant set of tools/techniques together with a process for each category. Some parts of the Roadmap are already well elaborated, and some require additional research and polishing.

This roadmap is only limited to presenting key techniques of TRIZ for Business and Management, and each process might include a number of additional tools which are used during the process, such as Multi-Screen Diagram, Comparative Ranking, Multi-Criteria Decision Matrix, and so forth.



APPLICATION AREAS OF USING TRIZ IN BUSINESS AND MANAGEMENT

Since 1999, I have been more and more involved to developing and using TRIZ for Business and Management Applications. The list below is based on real experience and highlights some real projects where TRIZ was used:

- Increasing sales effectiveness (industry)
- Generating a new marketing concept which helped to increase sales (IT services)
- Resolving a number of conflicts within a supply chain (industry)
- Inventing a new business model (marketing services)
- Resolving conflicts during corporate merger (telecom industry)
- Increasing performance of a training process (financial services)
- Discovering a new market for a service (agriculture)
- Defining a range of new business products and combinations "product-service" (agriculture)
- Increasing the degree of ideality of a service: increasing value while lowering costs (automotive services)
- Predicting potential failures of a new business model (financial services)
- Generating radically new advertising concepts (IT industry)
- Predicting short- and long-term evolution of a specific service (IT services)

CONCLUSIONS

This paper was supposed to provide a reader with a very brief overview of what TRIZ can bring to the business world to enhance and accelerate business and management innovation. Although introduced very recently, TRIZ for Business and Management has proven its effectiveness on a number of successful case studies. We need to further study business-specific trends and patterns of business systems evolution, create business-specific databases, and so forth. But the same applies to TRIZ itself – it has been ever-evolving science. And as practice shows, even with a current body of TRIZ knowledge for Business and Management we can successfully solve problems and come up with new innovative solutions. The power of analytical tools of TRIZ is that they can be used to identify broad range of problems and challenges, while TRIZ patterns and problem solving techniques can help to generate better ideas. TRIZ can also be integrated with other methodologies, like QFD, FMEA, Technology Roadmapping, Six Sigma.

But what really matters is not amount of information in the TRIZ databases, but a new way of breakthrough thinking proposed by TRIZ: coming up with successful innovative ideas through eliminating contradictions towards ideality. Instead blind search and jumping to ideas and conclusions too fast, we thoroughly analyze a situation, reveal contradictions, and resolve them in "win-win" way. Understanding the mechanisms of systematic evolution and can help businesses to define strategic development based on a scientifically-grounded approach rather than on guesses, trials and errors. This way of thinking will enrich everyone who wants to stay at the leading edge of innovation. TRIZ for business and management can be used at both large multinational enterprises and small businesses run by entrepreneurs.

REFERENCES

1. Altshuller G., *Creativity as an Exact Science*, Gordon and Breach Publishers, 1994, ISBN: 978-0677212302
2. Altshuller G, *The Innovation Algorithm. TRIZ, Systematic Innovation, and Technical Creativity*. Translated, edited and annotated by L. Shulyak and S. Rodman, First Edition. Technical Innovation Center, Inc., Worcester, 1999, ISBN: 978-0964074040

3. Averboukh E. "I-TRIZ for Six Sigma Business Process Management", *The Online TRIZ Journal*, December 2003. http://www.triz-journal.com/archives/2003/12/i/09.pdf
4. Friedman T., *The World Is Flat: A Brief History of the Twenty-first Century*, Farrar, Straus and Giroux; Expanded and Updated edition, 2006, ISBN: 978-0374292799
5. Kim Jung-Hyeon & Lee Jun-Young South, "The Acceleration of TRIZ Propagation in Samsung Electronics", in Proc. *ETRIA TRIZ Future 2005 Conference*, Graz, Austria, November 16-18, 2005, Leykam Buchverlag, 2005.
6. Mann D. & Domb E., "40 Inventive (Management) Principles With Examples", *The Online TRIZ Journal*, September, 1999. http://www.triz-journal.com/archives/1999/09/a/index.htm
7. Mann D., *Hands-on Systematic Innovation for Business and Management*, Lazarus Press, 2004.
8. The Online TRIZ Journal, http://www.triz-journal.com
9. Contradiction Matrix and the 40 Principles for Innovative Problem Solving, *The Online TRIZ Journal*, http://www.triz-journal.com/archives/contradiction_matrix/
10. Ruchti B. & Livotov P., "TRIZ-based Innovation Principles and a Process for Problem Solving in Business and Management", *The Online TRIZ Journal*, December 1999. http://www.triz-journal.com/archives/2001/12/c/index.htm
11. Slater R., *29 Leadership Secrets From Jack Welch*, McGraw-Hill; 1 edition, 2002, ISBN-10: 0071409378
12. Smith H., What Innovation Is - How Companies Develop Operating Systems For Innovation, SCS White Paper, 2004 http://www.csc.com/features/2004/uploads/innovation_update05.pdf
13. Smith H., "P-TRIZ Formulation", #2 in a series, *BPTrends.com*, March 2006. http://www.aitriz.org/ai/articles/InsideTRIZ/0207.pdf
14. Souchkov V., "M-TRIZ: Application of TRIZ to Solve Business Problem", Insytec white paper, 1999.
15. Souchkov V., Accelerate Innovation with TRIZ, ICG T&C White Paper, 2005, http://www.xtriz.com/publications/AccelerateInnovationWithTRIZ.pdf
16. Souchkov V., "Root Conflict Analysis (RCA+): Structuring and Visualization of Contradictions", in Proc. *ETRIA TRIZ Future 2005 Conference*, Graz, Austria, November 16-18, 2005, Leykam Buchverlag, 2005.
17. Souchkov V. Annotated List of Key TRIZ Components. ICG T&C White Paper, 2006, http://www.xtriz.com/Annotated%20list%20of%20main%20TRIZ%20tools%20and%20techniques.pdf
18. Souchkov V., Hoeboer R. & van Zutphen M., Application of RCA+ to Solve Business Problems, *The Online TRIZ Journal*, February 2007, http://www.triz-journal.com/archives/2007/02/06/
19. Zlotin B. & Zusman A., *Directed Evolution: Philosophy, Theory and Practice*, Ideation International Inc, 2001.
20. Goldfire Innovator™, www.invention-machine.com
21. Souchkov V., "Value-Conflict Mapping to Structure Innovation Strategy", in *Proceedings of Int. Conference TRIZ Future 2008*, University of Twente, Enschede, The Netherlands, 2008, p. 235-242.

About the author:

Valeri Souchkov, certified TRIZ Master has been involved with TRIZ and Systematic Innovation since co-founding Invention Machine Labs in Minsk, Belarus in 1988. Since that time he partnered with several organizations and trained and consulted customers worldwide, among which are a number of Fortune 500 companies. He is the author or RCA+, a technique which is used to support analysis of innovative situations. In 2000, he initiated and co-founded the European TRIZ Association ETRIA and since 2003 heads ICG Training and Consulting (www.xtriz.com), a company in the Netherlands that develops, uses and promotes techniques and tools of Systematic Innovation for commercial and government organizations in technology and business areas. Valeri Souchkov is also an invited lecturer of the University of Twente and TIAS Business School on TRIZ and Systematic Innovation. He can be reached at valeri@xtriz.com