Super-short introduction into Classical TRIZ and OTSM

2005, Nikolai Khomenko

Table of Contents

Preface

Within the framework of the OTSM approach, theories are viewed as models created to simplify the process of creating effective instruments to be used in practice. We need scientific theories to increase the predictability of the results obtained on the basis of a given theory in comparison with a result that can be obtained through the ordinary method of randomly sorting through alternatives.

Good (effective) theories allow obtaining the best results while spending less time.
For example, there are known cases when specialists in a particular problem area working with OTSM-TRIZ experts managed to obtain, in six days of work, ideas of better quality than the results they obtained after several years of working without applying OTSM-TRIZ. This happens because the assortment of instruments for practically applying the theories of TRIZ and OTSM helps to clearly identify the root of a problem and to concentrate, before everything else and with minimal costs, on eliminating the cause of the problem.

This article contains brief information about the classical TRIZ and OTSM. Both theories are described according to one scheme:

1. Theoretical theses.
2. Instruments for using theories in everyday practice.

The theoretical aspects, in their turn, are described as briefly as possible according to the following scheme:

1. The problem, for solving which the theory was created (a problem is often phrased as a question to which the author of the theory would like to find an answer).
2. The driving contradiction of the theory.

From the point of view of the classical TRIZ, a problem is difficult because it has a contradiction to be identified and resolved in order to find a solution for the problem situation. This is why we give a description of problems which may be solved through TRIZ and OTSM, through the prism of contradiction that drives the evolution of these theories. This class of contradictions emerged in OTSM and serves to simplify the process of entering the area of information that is new to the problem solver, or to help in identifying the core of the familiar areas of information.

3. Ideal Final Result.

It is the result that must be obtained through resolving a specific contradiction. It is not always attainable and serves as a reference point in the evolution of theory, as a goal that theory strives to achieve through evolution. While a contradiction, within the framework of TRIZ and OTSM, is a model for describing the Initial Problem Situation (beginning), the IFR is a model for describing the goal (finishing line) to reach. As they say, there is no favorable wind for ships which don't know where they are going. The IFR serves precisely to aid one in understanding where to go from the initially posed problem.

4. Fundamental ideas, assumptions, and models of the Theory.

To cover the distance between the “start” and the “finishing line” of the intellectual journey, some fundamental ideas, assumptions and models are necessary, on which, further on, the entire theory and its instruments will be based. These ideas, assumptions and models undergo continuous evolution as a result of Theory development. Further on we are going to describe the state in which they are today.

We imagine the evolution of the Theory as a cycle:

1. Examining and developing the theoretical foundation.
2. Constructing an assortment of instruments to be applied in practice.
3. Applying the instruments in practice.
4. Reflection: Analyzing the effectiveness of applying the theoretical foundation in practice.
5. Examining and revising the theoretical foundation.
6. Revising the assortment of instruments to be applied in practice.
7. Reflection: Analyzing the effectiveness of applying the revised assortment of instruments.
8. Moving to step 5, to the new coil of the evolutionary spiral.

This is in general the manner in which many scientific theories and practical instruments were created. TRIZ and OTSM are not an exception: they came into existence and developed according to the same scheme.

Further on we will list the most general and fundamental ideas and models of the classical TRIZ and OTSM. These ideas seem, in fact, too general and far removed from practice. This is why their descriptions may only be rarely found in the “pragmatic” descriptions of the classical TRIZ. At the same time, without this information, it is nearly impossible to fully understand the construction of instruments that are used in TRIZ for analyzing problems and synthesizing solutions, and there is nothing to do in situations when it seems that instruments do not work and OTSM-TRIZ cannot help. Being familiar with the essential foundations of any Theory, as a rule, gives one the ease and freedom of possessing its tools for practical application.

This material is meant to be the first step for those who desire to reach a more profound understanding of the theoretical foundations of TRIZ and OTSM, as well as to learn to employ their instruments with ease for the broadest range of purposes. It may be helpful to one studying the modern condition of OTSM-TRIZ on the stages of reflecting upon and systematizing the mastered material.

This material, also, invites its readers to the conversation about fundamental approaches in the area of problem analysis and solution synthesis, in the context of specific problem situations.

1. Classical TRIZ

1.1. Theoretical background of Classical TRIZ

1.1.1. The key problem to be solved by the classical TRIZ

1.1.2. We need to increase the effectiveness of searching for ideas to solve a specific problem situation, to which we do not know any acceptable professional standard solutions.

Or:
How can we significantly increase the effectiveness of arriving at a solution for one or another specific problem situation?

Explanation:
Today, the education for professionals is aimed towards studying standard solutions found by the previous generations of specialists in that area. This is why, when a specialist faces a problem to which he has no standard solution, he undergoes great difficulties, which often leads to high levels of stress. TRIZ is intended to be helpful in situations such as this one. In many cases, TRIZ may even help to improve the solutions that are based on standard solutions from a paticular subject area.

1.1.3. The driving contradiction that underlies the Key Problem of the Classical TRIZ.

One of the still-existing stereotypes about problem solving states that one must be able to generate as many ideas for a solution as possible, and then to choose suitable ones. Today, this stereotype is still the ruling idea in the area of problem solving. However, this approach contains a fundamental contradiction, which cannot be solved through methods oriented only towards the generation of ideas:

If we have an infinitely great number of ideas, then, certainly, we have among them the very best idea for solving the problem in question; however, as a result, we cannot identify this idea in the infinite number of the obtained ideas.

We can easily choose an idea if there is only one idea available; however, then we cannot be sure that it is the best one possible.

G. Altshuller has proposed the three fundamental ideas of the classic TRIZ, which suggest some ways to solving this contradiction (see below).

1.1.4. The Ideal Final Result for the Driving Contradiction which underlies the problem being solved by the Classical TRIZ.

We need an Instrument (Method) that would allow us to come to a single – the very best in the specific situation – solution to the problem, without spending time on generating a great number of ideas and choosing the best solution from among the generated ideas.

1.1.5. The three fundamental ideas of the Classical TRIZ for overcoming the driving contradiction and approaching the ideal final result.

1.1.5.1. Objective laws, according to which technical systems transform (evolve))

When technical systems evolve, they do it not chaotically, but in accordance with the laws of evolution. Powerful ideas for solving technical problems should correspond to the laws according to which the technical systems evolve (transform).

When developing a methodology, the solutions to problems must be based on the laws of technical system evolution. After all, essentially, solving a problem means moving to a new evolutionary step of development for a given system. And the evolution proceeds according to certain laws, which may be identified and used in problem solving.

1.1.5.2. The Postulate of Contradiction

Technical systems develop when contradictions emerge, are intensified and resolved.

Powerful technical solutions always must overcome contradictions. A problem solving methodology must always include mechanisms of identifying, analyzing and resolving contradictions. A problem is difficult because the relations between the properties of a system are contradictory and do not allow improving every property that needs improvement. To solve a problem, we must find a way to destroy these relations without harming the system.

1.1.5.3. The Postulate of Specific Situation

The development of systems proceeds under the influence of the specific situation and is determined by the specific resources available to the system for its development (the resources of the system itself and the resources of the person who is developing the system).

A powerful solution to a problem always arises from the specific character of the situation at hand. A problem solving methodology must include mechanisms for analyzing and utilizing the resources of a specific problem situation.

1.1.6. The basic model of the classical TRIZ which describes both the thinking process and the mechanism of describing an element of a problem situation

1.1.6.1. Model for describing an Element of a problem situation.

Many-screened scheme of powerful thinking, which uses at least three axes:

- **The axis of Hierarchy** (Reflects the system-bound[1] interrelations between the components of a problem situation)
- **The axis of Time** (Reflects various changes in time for the entire hierarchy of the elements of the problem)
- **The axis of System/Anti-system** (Reflects the development, in time, of the conflicts between the elements of the hierarchy)

Within the framework of approaches of the classical TRIZ and OTSM, the model, according to which technical systems evolve, is based on the three fundamental ideas of resolving the driving contradiction of the classical TRIZ on all the three axes of the many-screened scheme, as well as on the laws of technical system evolution proposed by G. Altshuller.

Powerful thinking must see the process of evolution through all of these three axes, and every component of the problem must be described and examined as it develops along these three axes.

The problem solving methods (instruments) must be constructed on the basis of the many-screened scheme of powerful thinking.

1.1.6.2. The model of a Problem Solving Process

Within the framework of the classical TRIZ, the process of problem solving is viewed as a series of transformations:

"A problem situation
=> An individual problem[2]
=> A model of an inventive problem
=> An ideal solution
=> A physical solution
=> A technical solution
=> A calculated solution».

[1] In this case, the term "system-bound" refers to a number of properties or interrelations that may seem random, but, from a certain point of view, appear to be bound into a system of interest.
[2] In this case, the problem situation is understood as consisting of a network of individual problems, into which it is then separated.

1.2. Fundamental instruments of the Classical TRIZ

The fundamental instruments of the classical TRIZ are based on the three key ideas (described above) for resolving the Driving Contradiction of the Classical TRIZ and determining the evolution of technical systems. All the three ideas are present in every fundamental instrument of the classical TRIZ.

The classical TRIZ contains two types of instruments:

- Instruments for solving problems which can be described by the solver as standard problems that have corresponding general solutions, generally described and therefore simplifying the process of looking for a necessary instrument (Standards, Principles and other methods used in TRIZ)

- The instrument for working with problems that do not have standard solutions either within the framework of specialized knowledge or among meta-standard solutions, represented by the standard solutions in TRIZ. This is the fundamental system-forming instrument of the classical TRIZ – the Algorithm of Solving Inventive Problems, ARIZ-85-B, created by Altshuller. It should not be confused with the numerous modifications, suggested by various authors.

1.2.1. Instruments for solving standard problems in TRIZ

1.2.1.1. The system of laws of technical system evolution and the system of inventive standards or standard solutions

In the mid-70s, Altshuller proposed a system of laws of technical system evolution based on the multi-year research. The existence of technical systems is broken down into three stages:

- Stasis (Reflects the originating of the system);
- Kinematics (Reflects the maturation and development of the system);
- Dynamics (Reflects the change of generations of the system and within the system).

At every stage, a different group of laws is prevalent.

Originally, Altshuller proposed a system of eight laws (G.S. Altshuller. About the laws technical system evolution. 20.01.1977 (Manuscript)):

Stasis.
- The law of completeness of system parts.
- The law of “energy conductivity” in a system.
- The law of rhythm co-ordination of parts in a system.

Kinematics.
- The law of increasing degree of ideality in a system.

- The law of irregular development of the system parts.
- The law of transferring into a super-system.

Dynamics.
- The law of transferring from a macro-level to a micro-level.
- The law of increasing degree of multi-functionality.

Next, in the process of its own evolution, the system of laws grew into a system of standard inventive solutions. This instrument of the classical TRIZ ensures more effective application of general laws of system evolution when practically solving specific problems.

ARIZ is also based on the laws of technical system evolution, but, in that case, they manifest themselves in a more covert fashion.

In the process of evolution of TRIZ and as a result of attempts to apply TRIZ in areas other than technical, it was discovered that the system of laws proposed by Altshuller also reflects the development of many non-technical systems. This opened new perspectives in the development of the classical TRIZ.

1.2.1.2. Indexes of effects for inventors

Indexes of effects, created by TRIZ developers, help to find necessary physical, chemical and geometrical effects which assist in problem solving.

1.2.1.3. Matrix of Technical Contradictions

The matrix of contradictions historically emerged as the first TRIZ-instrument for working with standard problems. The matrix serves to simplify working with a set of 40 inventive methods for transforming technical systems; these methods were identified by analyzing a great number of inventions.

Starting from the mid-80s of the 20th century, the matrix has, for all intents and purposes, passed out of use for TRIZ-professionals.

And yet, many beginners in TRIZ use this instrument, since it is the simplest one to master. This instrument can assist in solving problems that pose real difficulties for narrow specialists of some subject areas, either in engineering or in another field.

1.2.2. TRIZ-Instrument for working with non-standard problems

1.2.2.1. Altshuller’s ARIZ (ARIZ-85-B)

ARIZ is based on laws of system evolution and includes both instruments for carefully analyzing an inventive situation and mechanisms for overcoming psychological inertia. Thus, it allows the solver to consciously control subconscious creative processes, which are traditionally considered to be uncontrollable.

ARIZ is also based on the model of the inventive problem solving process (see paragraph 1.1.2.5. of this article) as well as on the three fundamental ideas of the classical TRIZ (see paragraph 1.1.4 of this article).

All this allows ARIZ users to effectively analyze a chosen problem, identify and analyze the resources that may be used for solving this problem, posing the goal for the solution and identifying the contradictions that interfere with reaching the posed goals through using the available resources. ARIZ also offers standard solutions for solving these contradictions and other standard mechanisms of working with problems.

1.3. Conclusion

1. The theoretical background of the classical TRIZ allows its user to resolve the driving contradiction of the problem-solving process. This background is also helpful in creating and developing the practical instruments of problem solving.

2. The assortment of instruments based on the theoretical background of the classical TRIZ significantly increases the probability of finding a solution and makes this process more efficient. This statement is supported by more than fifty years of world experience of applying TRIZ practically.

3. The efficiency of the TRIZ-based process of problem solving increases because the TRIZ instruments use both divergent and convergent types of thinking.

4. In the long run, using both types of thinking allows the problem solver to consciously control subconscious creative processes which are traditionally considered uncontrollable.

5. The TRIZ-OTSM-based process of problem solving and its rules are co-ordinated with the patterns of technical system evolution.

2. OTSM

In the mid-70ies, Altshuller came to a conclusion that TRIZ has a potential for development and must grow into a more general and universal approach, which would allow working with problems while being dependent on the area in which these problems arise. As TRIZ was developing and spreading through the USSR and Eastern Europe, by the mid-80s this conclusion became quite obvious to many members of TRIZ-society. At various times before, Altshuller suggested that the society begins developing in this direction. In June of 1997, Altshuller was given a demonstration of the first results in the field of OTSM. Both the results and the direction of research were approved by the author of TRIZ, and received his personal permission to use the acronym he proposed – OTSM, - on the conditions that mentioning the acronym will be accompanied by the account of its origin.

2.1. Theoretical background of OTSM

2.1.1. The Key problem to be solved by OTSM

The problem, through solving which the General Theory of Powerful Thinking evolves, may be formulated in the following way:

How is it possible to work on complex non-standard problems, which, essentially, may be represented as networks of numerous interdisciplinary non-standard problems, which, in their turn, develop and change over time? At that, the speed of these changes is commensurable with the time necessary for solving the problem.

This means that it is necessary to create a universal solving instrument for managing not only the problems that already exist, but also those problems that may emerge in future, as well the areas of knowledge that are absent today.

The problem formulated in the previous paragraph is obtained by using one of the rules of the classical TRIZ, which states that a problem must be intensified before a solution may be obtained, formulated in a way that might seem absurd. This rule allows to significantly increase the efficacy of working with a problem when added to the three fundamental principles of the classical TRIZ.

2.1.2. The driving Contradiction that underlies the Key Problem of OTSM.

The above-described problem may be imagined as the driving contradiction of OTSM, with the theory developing as it is attempting to overcome this contradiction:

The rules and methods of problem solving must be as general as possible, so that they can be as universal as possible, regardless of the areas of knowledge required for solving the problem. However, general rules permit receiving only general solutions, which are not always applicable to a specific problem situation.

This is why – so as to be effective for solving specific problems – rules must be as specific as possible, tightly linked to specific areas of knowledge necessary for solving problems. However, then these rules, methods and techniques will lose their universality.

2.1.3. Ideal Final Result for the Driving Contradiction

From the above-described system of contradictions, the following Ideal Final Result (IFR) may be derived:

Rules must be as general and universal as possible, ensuring, at the same time, solution of any specific problems that are being solved in specific situations.

2.1.4. General Ideas underlying OTSM

The general idea of solving the above-mentioned driving contradiction of OTSM was obtained in accordance with one of the principles of resolving contradictions in the classical TRIZ: The elements of a system have one trait value, and the system as a whole has another – opposite – value of the same trait.

A metal watchband may serve as an example. Every link of the band is rigid and inflexible. However, the more links the band has and the smaller the links are the more flexible the band is.

By analogy with this example we can formulate the general model of resolving contradictions in OTSM:

Every rule (method, technique) in OTSM should be as general and abstract as possible – this will ensure the universality of their application.

The overall system into which they are all connected ensures the solution of the specific problem situation in specific circumstances.

Some stipulations should be made here.

1. Neither the classical TRIZ nor the modern OTSM are capable of replacing the knowledge in a specific area of human activity. They can only provide a system of organizing this specialized knowledge or showing why a problem cannot be solved and which type of information is necessary for solving it, even if this information lies outside of a particular field or is unknown for humanity.

2. Both theories – the classical TRIZ and the modern OTSM – work with information on the qualitative level, offering systems of models for providing specialized qualitative information. They are not intended for quantitative evaluations, but may help in developing methods of quantitative evaluations that are not yet known in mathematics.

3. The modern OTSM is based on the classical TRIZ and has absorbed the latter into itself as one of its components, developing, coordinating, expanding and clarifying the theoretical theses and practical methods of the classical TRIZ.

2.1.5. System of OTSM Axioms

The development of OTSM, which has, as its goal, resolving the previously mentioned contradiction and reaching the proposed IFR, is moving within the framework of the following assumptions (restrictions), represented as the System of Axioms in OTSM.

These axioms, essentially, are rules of thinking, of the highest degree of generalization. This is why, in addition to setting the limits for application of OTSM, they also serve as maximally general problem-solving instruments used where more specific rules, methods and techniques do not produce results.

It seems that these axioms can be viewed as paradigms on which the modern OTSM is based. As time passes, these paradigms may change and re-form. OTSM is a dynamic and continuously developing theory, which exists in touch with the practice of solving complex interdisciplinary non-standard problems through the assortment of instruments, developed on the basis of this theory.

In this article, we will not give the detailed wording of the axioms or describe their implications, but only provide the terms for them, as well as some comments.

2.1.5.1. The key Axiom: Axiom of descriptions (models)

This axiom, per se, is the only one. The two groups of axioms given below are, essentially, implications of this one. However, for a number of reasons, as OTSM evolved, these implications had to be gathered into groups of axioms.

The axiom of descriptions (models) states that a person thinks through descriptions (models) of elements of a problem situation. These models only reflect a certain part of reality and never describe it completely. Therefore, to increase the efficacy of thinking, and by that – the efficacy of solving problems, it is necessary to be able to construct models that can most effectively ensure the process of thinking.

It should be noted that, within the framework of the theoretical approach of OTSM, an assumption is made that thinking may be viewed as a process of problem solving. The solver may be clearly aware of the problem, in which case it is formulated, or, on the other hand, completely unaware of (not reflecting on) it, which significantly complicates the process of solving this problem. From here the Axiom of Reflection is derived, which belongs to the group of the Axioms of Thinking.

Why are the axioms, described below, sorted into two groups?

As we have just said, thinking, within the framework of OTSM, is viewed as thinking on the subject of a conscious or unconscious problem, the components of which are both material and non-material elements of our world. In accordance with the axiom of models we should clarify our position both with the models of thinking (the models of the process of problem solving) and with the models of the world (the image of the world), in which problems to be solved through thinking arise.

2.1.5.2. Group of Axioms about OTSM problem solving process:

2.1.5.2.1. Axiom of the Core (Roots) of problems

2.1.5.2.2. Axiom of Impossibility

2.1.5.2.3. Axiom of Reflection

2.1.5.3. Group of Axioms about OTSM world vision:

2.1.5.3.1. Axiom of Unity

2.1.5.3.2. Axiom of Variety

2.1.5.3.3. Axiom of Connectedness of Unity and Variety

2.1.5.3.4. Axiom of process

2.1.6. Main Models of OTSM for describing the thinking process and components of a problem.

Just like in the case of axioms – the most general rules (theses, assumptions, models), the fundamental models are represented by two models. Both of them are, essentially, systems of models, which ensure their specific application in a specific problem situation.

The first model is a model that serves to describe those elements of the world that take part, in some way, in the problem situation.

The second model is a model of the process of thinking that takes places as the problem is being solved.

2.1.6.1. OTSM ENV model for describing an Element of the world

OTSM-ENV model (Element-Name of Property-Value of Property) serves to describe those elements of the world that are in some way connected with the problem situation under analysis. The given model lies in the basis of all other models of OTSM, both theoretical and those intensively used in practice when working with a problem situation.

A model, well-known in Artificial Intelligence work ("Object-Attribute-Value of Attribute"), has served as a prototype for it; however, in comparison with the prototype, the model proposed by OTSM is significantly revised.

Within the framework of OTSM-approach, every element, both material and non-material, is viewed as a vector in a multi-dimensional space of parameters of infinite dimensions. At that, every axis of this space can be decomposed into an independent multi-dimensional sub-space of parameters.

Using the ENV-model, among other things, significantly simplifies the fusion of OTSM-approach with many other methods of planning, lowering the costs, and raising the quality of products: Axiomatic Design, QFD, Six Sigma, Taguchi Methods, etc.

2.1.6.2. OTSM Fractal model of problem-solving process.

This model is based on an earlier model, which Altshuller has proposed within the framework of the classical TRIZ. However, Altshuller's model has been revised and expanded in accordance with OTSM-approaches and requirements for working with networks of problems.

In the OTSM Fractal Model of solving complex problems, the problem situation is imagined as a network of problems. Every problem from this network may be potentially solved in some manner, which, in OTSM-approach, is referred to as a partial solution.

Sets of partial solutions, in their turn, are connected into networks of partial conceptual solutions, which help to arrive to a solution that can be applied in practice. In OTSM, this solution is referred to as a final conceptual solution.

Therefore, the process of solving a complex non-standard problem is imagined as a network of problems, which gradually grows into a network of partial solutions. The final conceptual solution, which is suitable for being applied in practice, is constructed out of these partial solutions.

Furthermore, the network that describes the initial problem situation may be, if necessary, viewed as one of the problems from the network of a higher class.

A model is fractal when every problem from the initial network may be viewed as an independent network of problems and partial solutions.

Thus, a problem situation is described as a structure of networks that reminds one of a fractal:[3] every apex may be viewed as a network, identical in structure (a network of problems plus a network of partial solutions) to the initial network that describes the problem situation.

Taking all this into consideration, as well as the fact that all these networks transform, as the problem is being analyzed, into the final concept solution, this model was given the name of Self-Organizing Problem Flow Networks, or, for short, Problem Flow.

The word “Self-Organizing” in the title reflects the effect which appears when, while working on a problem, rules and methods of OTSM and classical TRIZ, reworked in accordance with OTSM-approach, are being systematically applied.

2.2. Practical Instruments in OTSM

Each of the four technologies described below is intended for fulfilling a certain purpose in the course of the process of problem solving.

2.2.1. New Problem Technology

The technology “New Problem” organizes rules and methods of the classical TRIZ and OTSM into a system that ensures a transfer of the description of a problem situation into

[3] Every level of the system looks identical to every other level and the system on the whole; i.e. every part is identical to the whole.

the form of fractal network of problems, contradictions and parameters. This allows to identify the specific roots of a specific problem situation and begin working on constructing a solution.

It should be noted that the OTSM-approach to problem solving is characterized by not searching for a solution but, instead, gradually constructing, as analysis goes on, the problem situation on the basis of OTSM-technologies.

This technology is based on the idea of driving contradictions, in other words, the contradictions that drive and control the process of system evolution.

2.2.2. Typical Solving Technology

The problems posed as a result of applying the technology "New Problem" can be solved through standard solutions and methods developed in TRIZ and OTSM, as well as through methods and techniques accumulated by specialists in the specific subject areas. Individual solutions for individual problems, as a rule, cannot solve the problem situation on the whole, especially since individual standard solutions often give rise to new problems.

The technology "Standard Problem" makes it possible to begin accumulating a fund of partial conceptual solutions. Partial solutions may be seen here as a kind of building material for constructing the final conceptual solution.

This technology is based on standard solutions of the classical TRIZ.

2.2.3. Contradiction Technology

If no standard solutions is known for a problem in question, then the technology "Contradiction" is used, which is based on the fundamental instrument of the classical TRIZ – Altshuller's ARIZ. In OTSM-approach the steps of this algorithm have received their own reading and were supplemented with OTSM-recommendations and the rules for carrying them out.

Within the OTSM-approach, an extended, in comparison with the classical TRIZ, system of contradictions is offered, as well as a system of classification for the principles of resolving physical contradictions (as they are called in the classical TRIZ). The new system of principles of combining opposites, which principles allow to resolve contradictions, is based, in OTSM, on the model ENV (Name of Element – Name of Property – Value of Property). This significantly simplifies the fusion of OTSM-TRIZ with other methods of design and allows to significantly increase the degree of formalization in the process of problem solving.

This technology is based on G. Altshuller's ARIZ.

2.2.4. Self-Organizing Problem Flow Technology (or Problem Flow Technology)

The technology of Problem Flow is intended for constructing the final conceptual solution out of partial conceptual solutions; for evaluating obtained solutions, developing a network of problems on the basis of new information obtained in the process of working on a problem situation, and constructing a solution.

This technology is based on certain assumptions, which present the process of problem solving as endless evolution of systems that are interacting and forming the evolutionary conditions for one another.

*   *   *

All four technologies are closely intertwined and work concurrently, helping one another to carry out their functions. Essentially, here we are dealing with a non-linear technology, the steps of which are not always carried out in the same order, and the order is determined by the specific problem situation under analysis. This is why the model is referred to as Self-Organizing Flow of problem networks. Naturally, all this is controlled by the system of general rules in OTSM. As a result, the rules retain their universality, and, at the same time, ensure analysis for specific problem situations, which are often interdisciplinary.

Both TRIZ and OTSM are, in essence, very simple, but many of their assumptions and methods of work go against some of the modern world's hardened stereotypes. This creates some difficulties for those people who are only beginning to master these theories and their instruments. To overcome these difficulties and to help people develop the skills of practically applying the entire assortment of knowledge of OTSM-TRIZ, we have developed special non-linear technologies of teaching.

Summary

1. The classical TRIZ and OTSM are based on the laws of system transformation. This allows proposing a number of alternatives for resolving driving contradictions, which lie within problems of planning and searching for new solutions for complex interdisciplinary problems, which do not have standard solutions.
2. Models, rules, methods and technologies developed in classical TRIZ and especially in OTSM allow significantly increasing the degree of formalization in the process of problem solving in comparison with the methods of solving creative problems.
3. Due to the factors previously listed, OTSM-TRIZ is proven to be a favorable foundation for constructing methods of solving various problems that arise in everyday life of various organizations, such as, for example, developing strategies of product development and organization on the whole; organizing science research; constructing a system of increasing the professional skill level in personnel; and many others.

4. Neither the classical TRIZ nor OTSM can replace the specialized knowledge, but only can help to organize it more effectively from the point of view of constructing a solution for a specific problem situation.
5. Thus, OTSM may be viewed as an interdisciplinary language of providing specialized knowledge about a problem situation, with the purpose of analyzing this knowledge and constructing a solution for the specific problem situation in the specific circumstances.
6. Models, developed in OTSM-approach, contribute to transferring the system of knowledge management in an organization to a qualitatively new level, simplifying the process of solving strategic and tactical problems faced by the organization.
7. Therefore, OTSM provides an opportunity of viewing the entire assortment of problems faced by the organization, as a single problem in the general context. This, in turn, provides the management with new instruments that can be used to increase the efficacy of activity in the organization on the whole.
8. Efficacy of TRIZ and OTSM is ensured by the solver consciously controlling his/her own subconscious thinking processes.
9. TRIZ and OTSM use both convergent and divergent thinking. Owing to that, the process of thinking becomes more open to being controlled by the solving, opening before him/her new horizons of creativity, which, earlier, seemed unreachable.