

First step into the new science

The first step into the New Science of TRIZ was made in the summer of 1956. An article «Psychology of innovative creativity» was published in soviet journal «Psychology Questions» #6, 1956, p.37-49. The authors by G.S. Altshuller*) and R.B Shapiro*) (Baku city).

The process of solving innovative problems, as well as the process of developing new technical systems, was always of interest. Moreover, the notion technique (technology) does not only refer to automobiles, ships or cellular phones. It also describes actions taking by a football player or a boxer, playing violin and painting a composition.

*Technique – it is all the instruments
that a man designed for altering nature.*

Certainly, articles and books about how techniques developed and evolved have been published before. However, they described one sided process: either purely psychological, social or purely naturalistic. The world of technique, undoubtedly, was created by the world of humans from the world of nature, but it is a separate world in itself. It has specific objects, which can be described with specific models that are governed by specific laws.

G.S.Altshuller and R.B.Shapiro were the first to talk about this in their article. With this work they opened a door into a new science

*) *The phonetic transcription of surnames: [al'tju:ller], [japi:ro].*

Analogues situations are present in other sciences as well. For example, the formulas that A.Einstein used to describe his Special Theory of Relativity were known long before and were published by different scientist. Yet, A.Einstein was the first to point out the importance of these formulas, which in turn discovered new laws of nature (speed of light is constant in all frames of reference). So A.Einstein is considered the scientist who discovered the Theory of Relativity.

TRIZ - it is a science, which studies the development of techniques as co-action of humans and nature.

The co-action of nature, humans and technique can be demonstrated with the problem of three intertwined rings. With a careful look, one can see that only together the three rings form a system. If even one of the three elements is removed the system falls apart. Each of the rings 'retains individuality', since it is not tied or connected to the others, but only together they form a reliable and stable system.



This is similar to the three poles that are used for a base of a **tipi**.*) Each pole is held up by the other two and cannot stand on its own.

One of the characteristics of TRIZ is the detection and application of **contradictions**, simultaneous «presence-absence» of some action.

*) *A tipi – a version of a wigwam, dwelling of aboriginals of America.*

So going back to the original publication, the following quotation demonstrates the vital changes that authors made:

«...The study of psychology of the innovative creativity cannot be done separately from studies of general laws of technique development. The objective of the inventor should be directed towards creating new inventions, the inventor is part of the technical progress. Hence, the mentality of the innovative creativity is understood only with extensive knowledge of the laws of technique development. The above mentioned certainly does not indicate that the researcher must only be involved in studying the mechanism of the technical progress. Unique psychology of the innovative creativity, as with any scientific discipline lies in the necessity to simultaneously take into consideration objective interconnections among technical development and subjective, psychological factors. First of all, the psychology of the innovative creativity is a subsection of psychology. Thus, the centre of its attention is the psychological actions taken by the inventor, inventor who perfects and completes the technique. The psychology of the innovative process is a bridge between the subjective world of human psychology and the objective world of technology and so it must take into account in the studies of the innovative process the laws of technique development.

The process of developing a new invention has two sides: the materialistic and psychological. In order to identify the materialistic side of the invention it is necessary to know the history of how the technique developed and understand the basic laws of a technical process. Studying such history material and analysis of specific inventions happen to be one of the most important sources of psychology of technical process.

In order to identify the psychological laws of invention systematic observation of the process of the innovative work by the inventor is necessary, as well as generalizing the innovator experience and experimental examination of the innovative creation process through experiment conduction in conditions closest to genuine ones...»

Take a closer look at the last paragraph. It introduced some terms that are important to experimental research of creative processes. It is natural to expect some tool to be developed for such research, but first some of the important basic principles of creative work must be formed:

«...Every creative solution of a new technical problem, regardless of which area it belongs to, has three core moments:

1. The posing of the problem and identifying the contradiction, which prevents solving the problem using a common, well known approach.

2. Eliminating the cause of the contradiction with the goal of achieving a new – more involved – technical effect.

3. Introducing other elements of the perfected system in accordance with the changed elements (the system takes on a new form, corresponding to the new purpose).

In consensus with this, the creative solving process of technical problems typically includes three – different according to their goal and method – stages, which can be conditionally called analytical, operational and synthetic.»

So now there exists an instrument for practical work:

«Based on everything described previously, the creative process scheme can be presented as follows:

I. Analytical Stage

- 1. Select a problem.*
- 2. Determine the goal of the problem.*
- 3. Identify the contradiction preventing the solution.*
- 4. Determine the cause of the contradiction.*

II. Operational Stage

1. Examine the typical solution approaches:

- a) in nature*
- b) in technology*

2. Search for new solution approaches through modifying:

- a) within the limits of the system*
- b) in the surrounding environment*
- c) among the connected systems*

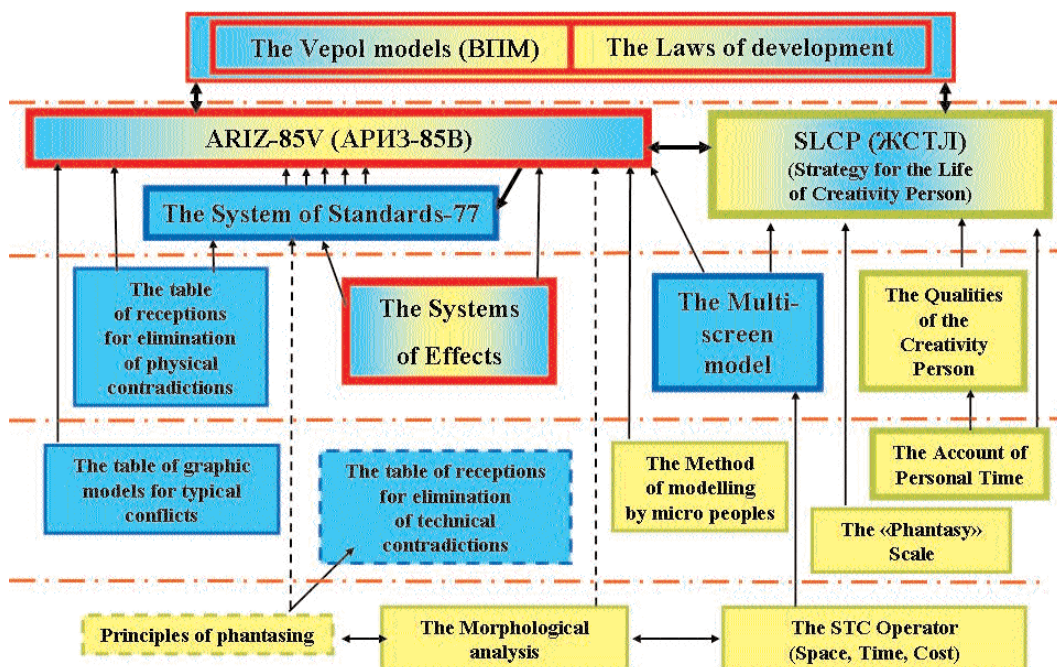
III. Synthetic Phase

- 1. Introduce the functionally favourable changes into the system.*
- 2. Introduce the functionally favourable changes into the methods of using the system.*
- 3. Assess the applicability of the principle to the solutions of other creative problems.*
- 4. Evaluate the new invention.»*

This citation describes the very first ARIZ (Algorithm for Solving Innovative Problems). This classification appears in G.S.Altshuller's works a few years later, but even in the original publication it is a real working instrument. Of course it differs from the modern model ARIZ - 85V in the same way the plane built by brothers Wright differs from a modern aircraft. Nevertheless, it has (even if they are not very prominent) all the important elements of an instrument: process of identifying and eliminating contradictions, control over the psychological factors, and usage of previously obtained information.

From the very beginning of TRIZ, ARIZ was and still remains its most important instrument. As science develops, the old instruments change and some new ones are introduced; however, not all of them are equally effective.

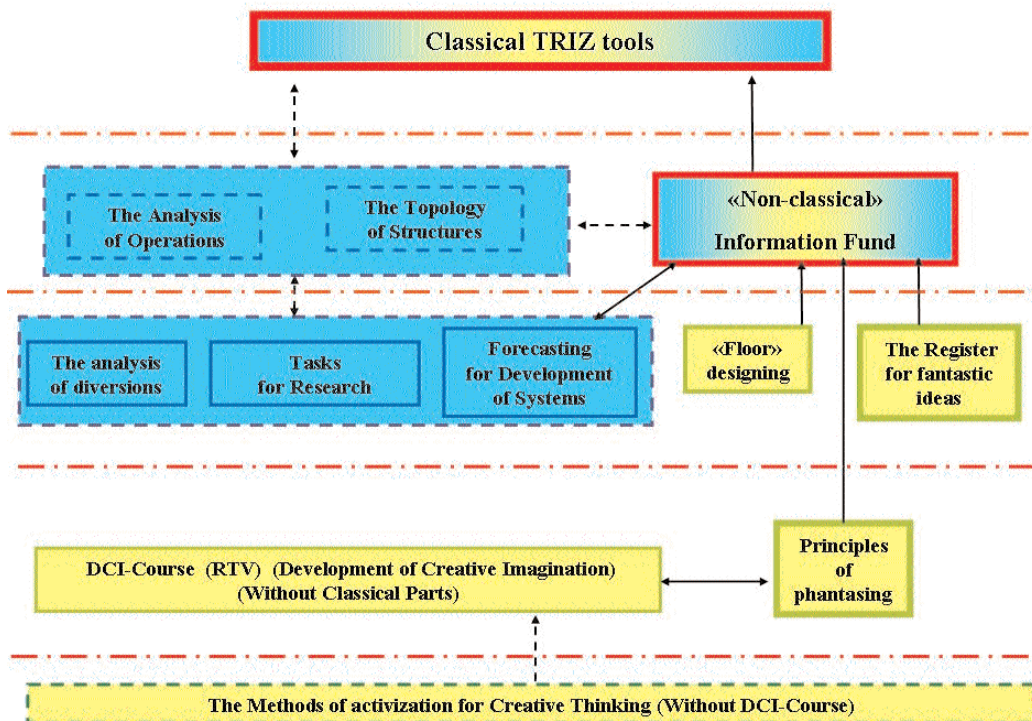
Some of the instruments always give positive results (that is if they are used properly). They are «**classical**» instruments of TRIZ. As a rule, this effectiveness (besides other factors) is ensured by successful application to many problems in different TRIZ-groups. Other instruments, even when used correctly, cannot guarantee such reliable results. They are «**non-classical**» instruments of TRIZ. They may be new and so must undergo active crosschecking to eventually become «classical». Although it is possible that they are the old, merited, formerly «classical» instruments, which reached their improvement quota and migrated into the other group.



This chart demonstrates the correlation between the «classical» instruments of TRIZ. Blue frame corresponds to technological instruments, green - organizational instruments, red - informational instru-

ments. A more detailed explanation of the differences between these instruments will be given in later sections. A **broken frame** indicates that this instrument is starting to lose its effectiveness and becomes a "candidate" for transfer to the other group. **Broken arrows** between instruments also indicated insufficient effectiveness.

The red horizontal dashed-dotted line separates different levels of instruments. The most important instruments are higher up on the chart. Hence, strictly speaking from the chart it follows that **laws of development** and **Vepol models** are more important than **ARIZ**. It is true that these elements are very important, but they are no longer considered to be just instruments. They are now intended for identifying new directions in science, where as solving problems is a job for a fundamental instrument, such as ARIZ.

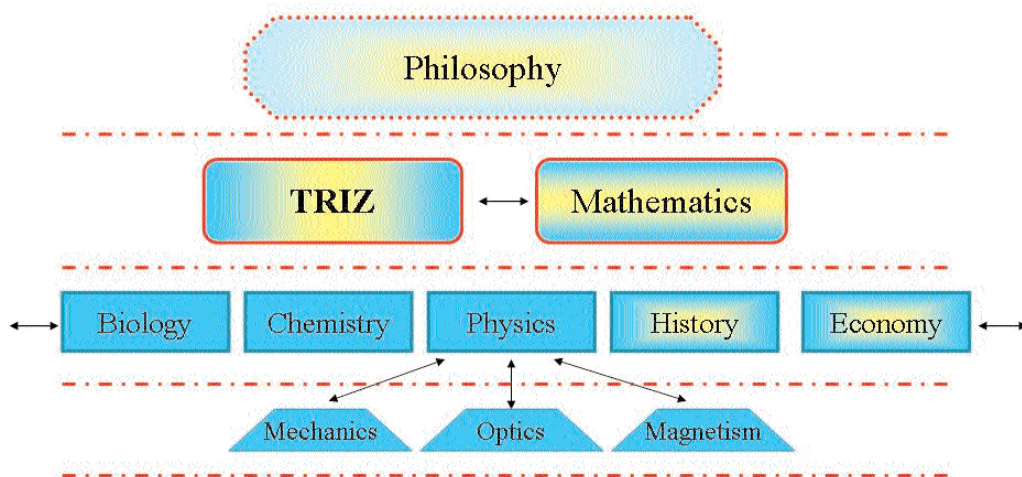


The «non-classical» instruments chart has quite a few **broken lines**. Most of these elements require a serious and time consuming confirmation.

An exception is methods of activation of innovative imagination, which did not become part of the CID (Creative Imagination Development). These **quasi-instruments** have no future in TRIZ.

***TRIZ - it is an applied dialect,
mathematical philosophy.***

Such an understanding of this science did not come with the first day. Far too many years, for different people, TRIZ remained simply a convenient method of solving problems. The proper place of science of TRIZ in the complete hierarchy of science will be understood only after one is familiar with its fundamental instruments. So the chart given below is for now only a chart and it will be justified later...



This book is a very short version of the history of instruments of TRIZ, a guide for first time introduction. The next step into this science would be solving a spectrum of different problems, but first, let's discuss the backbone present in every science – ***information funds***.

