

TRIZ's Problems and Prospects by A.Zakharov

You can never solve a problem on the level on which it was created.

A. Einstein¹

Abstract

In connexion with beginning of discussion about TRIZ essence, TRIZ place among sciences, and because of practically not mentioned prospects of TRIZ future development, a few concepts are being suggested:

- TRIZ Definition
- Analysis of situation in TRIZ
- Directions for TRIZ development
- What is done in TRIZ development

Keywords: trends, evolution, nature, inventive problem, solution, universality, civilization, problem, singularity, artificial intelligence

Introduction

TRIZ is the activity on revealing and studying of objective (natural) trends of evolution (theoretical part); development of recommendations, rules, and techniques of trends' use (methodological part), and use of these recommendations for creation and/or development of mainly engineering systems (practical part).

The knowledge of trends and their use is the tool of problems' solving² in technology, in manufacturing (industry and other branches), in society and in nature.

To define, even if it did right, what is TRIZ (what its function, set of parts and structure) only for today – is absolutely not enough! The progress, movement, evolution, future -- this is the point, of what we ought to talk about. It is especially important, if we wish to find place for TRIZ among other tools of knowledge and transformation of the nature, i.e. among the traditional sciences and their applications.

In accordance with V.Turchin "Phenomenon of Science,"³: "... the transition to the next stage occurs by multiplication of such systems and integration of them - by joining them into a single whole with the formation of a control system headed by a new subsystem, which now becomes the highest controlling device in the new stage of evolution."

In TRIZ we know this process very well and we use it constantly under name "transition onto Supersystem." But if conditions permit, but transition to a new hierarchical level is absent, it says that something is wrong in TRIZ evolution.

¹ <http://www.brainyquote.com/quotes/quotes/a/alberteins143191.html>

² Problem solving in any system is a transformation (conversion, change, **hand-made evolution**) of this system from its problematic state into system without problems, or a new system creation by means natural (objective) **trends of evolution**.

³ http://oraclearion.files.wordpress.com/2008/02/phenomenon_of_cybernetics.pdf, p. 55

Where is TRIZ today?

Unfortunately, questions such as «What is TRIZ? » or statements «My TRIZ Understanding» till today are at the hierarchical level of TRIZ itself, in a situation of «...no-crossing the established border...».

My TRIZ Understanding⁴ by N. Shpakovsky

- The area of TRIZ application is defined clearly: it's complete solution of inventive problem – from a situation's description up till obtained solution;
- It is necessary to specify set of TRIZ parts and TRIZ structure, without any additional 'theories', by collection into one system all necessary elements for solving inventive problem.

So, What Is TRIZ⁵ by V.Lenyashin and A.Kynin

- TRIZ is a theory, which is established on objective trends of technology evolution; TRIZ describes the process of new technology creation by mankind.
- We intentionally don't include even mention about TRIZ use at non-technology fields; the theoretical basis of TRIZ is set of trends of technology evolution, so, TRIZ use in non-technical fields is seemed, at least, incorrect.

Author's Comment

G.Altshuller didn't see problems in use of TRIZ tools outside of technology: «...ARIZ gets features of universality; it is being used for problem solution in science, art, etc. »⁶

Or one more citation: «... Besides technological ones, there are also other systems: scientific, art, social, etc. Evolution of all systems is controlled by similar trends, therefore many ideas and tools of TRIZ can be used for development of theory of non-technological problems' solving. Such work is being carried out... ».⁷

My TRIZ Understanding⁸ by V.Mitrofanov

TRIZ is a science and art...

In Short, What Is TRIZ?⁹ by I.Devoyno, A.Skuratovich

TRIZ is a science, which studies evolution of technological systems, and develops methodology for synthesis, development and prognosis of such systems.

Respond on N.Shpakovsky's "My TRIZ Understanding"¹⁰ by V.Minaker

TRIZ isn't a science but a set of concepts. These concepts do not create the whole unity, in contrast to many applied methodologies and theories. The knowledges and concepts, which are included into TRIZ, one may consider as the specific art.

Author's Comment

Hey, where you are - the system's evolution, which reflects problem solving process?

⁴ <http://www.metodolog.ru/01279/01279.html>

⁵ <http://www.metodolog.ru/01008/01008.html>

⁶ History of ARIZ Development by G.Altshuller 1986 <http://www.altshuller.ru/triz/ariz-about1.asp>

⁷ Summary "TRIZ-88" by G.Altshuller <http://www.altshuller.ru/engineering16.asp>

⁸ <http://www.metodolog.ru/01291/01291.html>

⁹ <http://www.metodolog.ru/01296/01296.html>

¹⁰ <http://www.metodolog.ru/01298/01298.html>

If for definition and in description of TRIZ there will be an emphasis on problems' solution, nothing will be changed! The fuzzy idea about 'dark' subconsciousness, which gives us a solution, will be used again and again. ☹

Let's remember B.Zlotin's answer¹¹ for following question:

- Is TRIZ (of course, specialist with TRIZ knowledge) able to solve the ANY problem?

- No, it isn't. But TRIZ (specialist with TRIZ knowledge) is able to improve ANY system.

Let's emphasize here – we need to use “ANY system's improvement” expression, when we are talking about TRIZ's description or definition. Namely with that, we can move from fuzzy support of subconsciousness to solid ground of objective reality.

Here it is – the system, which is given for us by our senses, the system, which we need to improve. Let's touch it, disassemble it, describe its functions, reveal its harmful effects and develop cause-effect chain, discover element, which is responsible for found earlier key harmful effect, and, at last, change this “bad” element...

The knowledge of this technology prevents us from waiting hints from subconsciousness or from going to bed with words that “an hour in the morning is worth two in the evening.”

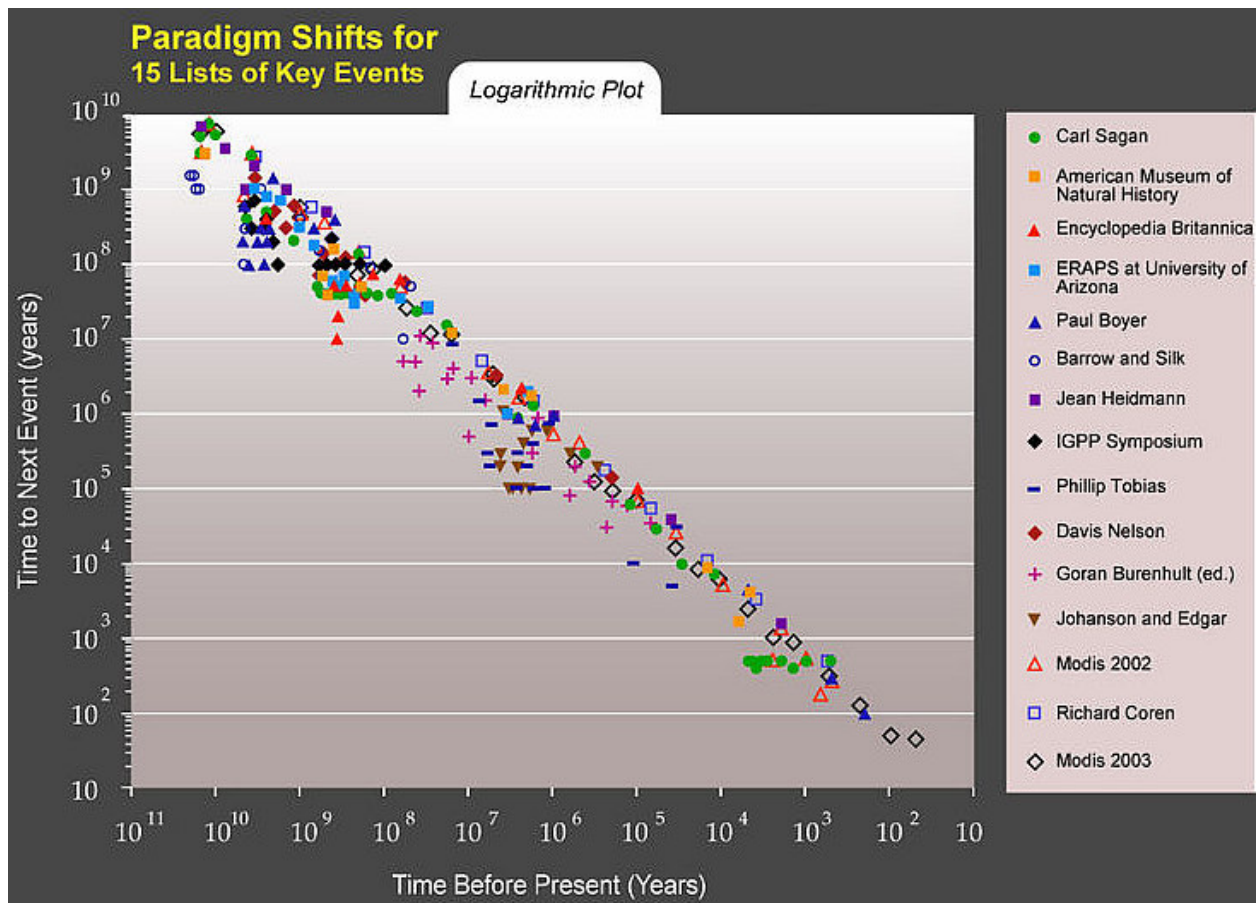
If idea didn't come after elemental, structural, functional or other types of analysis, it means that analysis wasn't done carefully or there was lack of knowledge. So, go to deeper level of system research, and do not blame a psychology...

TRIZ -- what is the further way?

By consideration, that TRIZ is one of the mankind's tools for civilization problems' solution, we ought to go to higher level of system hierarchy and see – where is the civilization itself, what are the historical perspectives for civilization?

Studies are showing that the shrinkage of periods of evolution is clearly seen. As a result, in 2020 (or a bit later, in historical scale) the transition to new quality of mankind will happen, and the singularity point will be crossed.

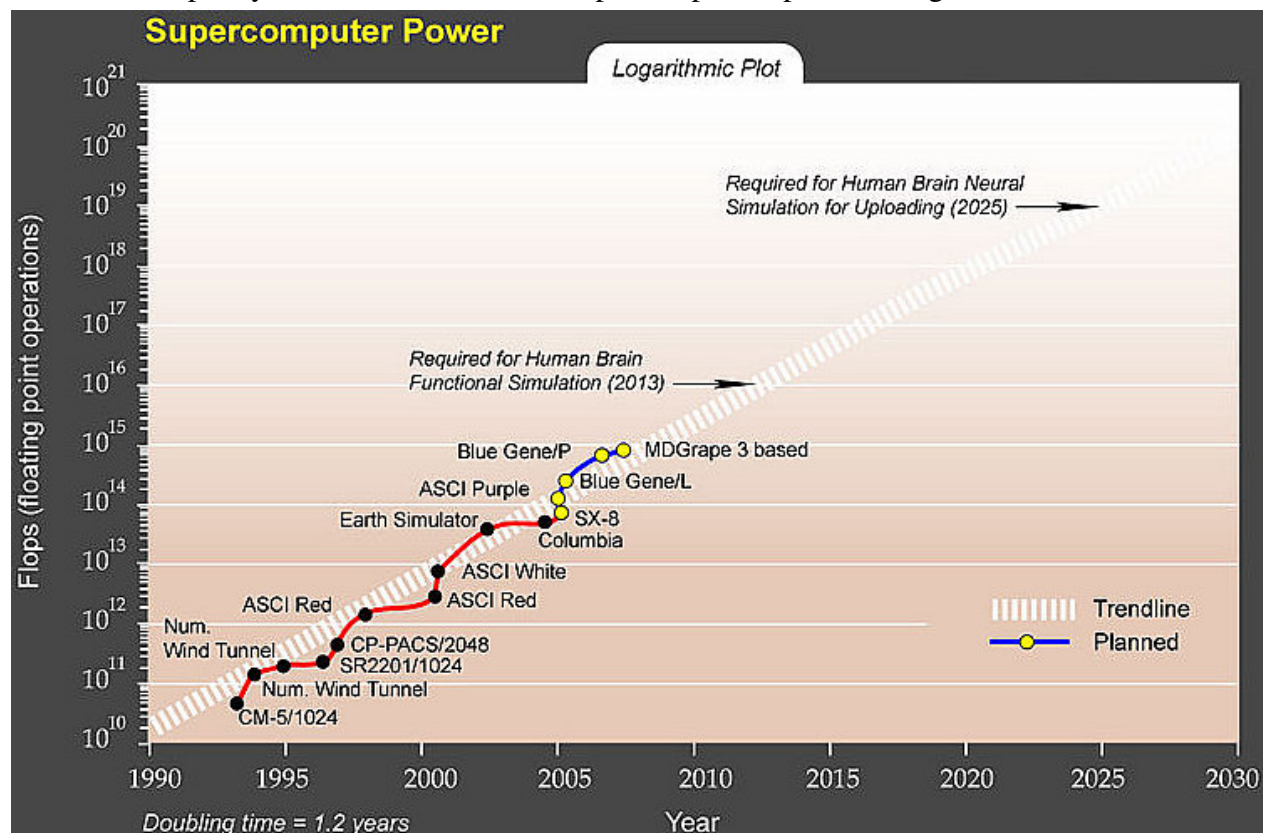
¹¹ Or other TRIZ Master, sorry, if I've made a mistake ☹



The tendency is very clear – the constant acceleration of biological evolution, and then – the technological one;¹² the qualitative change of civilization evolution is closer and closer. Singularity is near.

¹² Accelerating change http://en.wikipedia.org/wiki/Law_of_Accelerating_Returns

It's interesting to compare the mentioned above Paradigm Shift picture and diagram of calculation capacity of mankind in form of supercomputer's power rising:¹³



About 2020 (or a bit later) supercomputer will be equal to human brain.

The Singularity is the technological creation of smarter-than-human intelligence. Several technologies are often mentioned as heading in this direction: Artificial Intelligence, direct brain-computer interfaces, biological augmentation of the brain, genetic engineering, and ultra-high-resolution scans of the brain followed by computer emulation. Some of these technologies seem likely to arrive much earlier than the others, but there are nonetheless several independent technologies all heading in the direction of the Singularity.¹⁴

Accelerated evolution brings new problems: «Seeds of the future global revolution slowly sprouted for many years, which became witnesses of such qualitatively new factors of mankind progress such as complexity and uncertainty. Influence of these factors becomes superior to possibilities of controls».

Too many signs of problems surround us: the last published book (2006) by E.Laszlo is **Global Survival**; sustainability is standard buzz term in media; countless conferences and symposiums with sustainable evolution as agenda; World Problems and Global Issues Project website; A.Gore Noble Prize in 2007, etc.

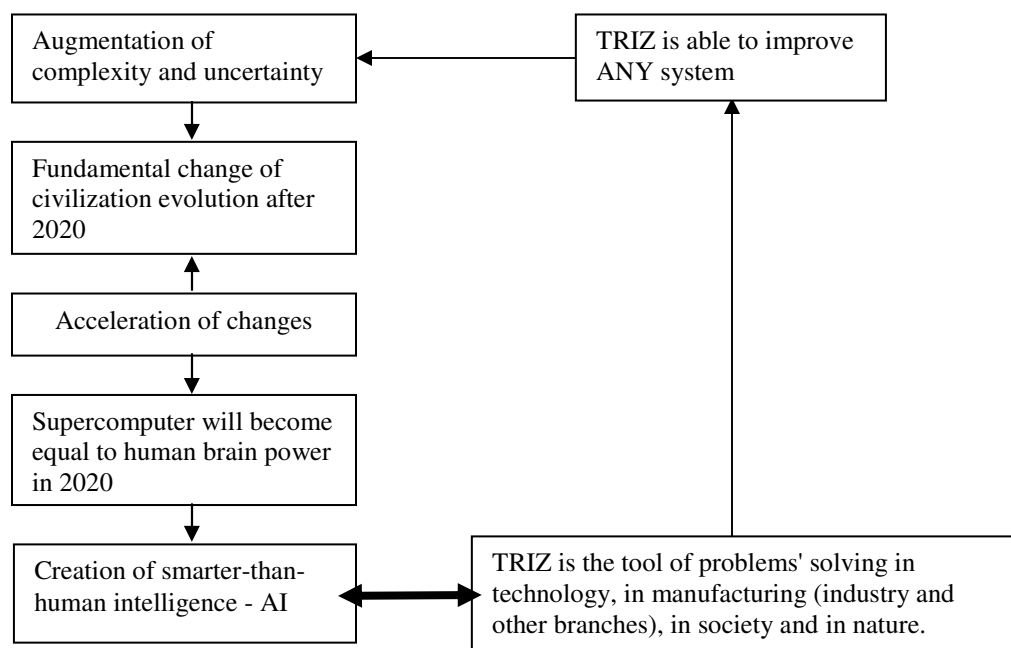
Generalization of mentioned above statements, definitions and claims are as follows:

¹³ Accelerating change http://en.wikipedia.org/wiki/Law_of_Accelerating_Returns

¹⁴ What is the singularity? by E.Yudkowsky <http://www.singinst.org/upload/siai-info.pdf>

1. TRIZ is the activity on revealing and studying of objective (natural) trends of evolution; development of recommendations, rules, and techniques of trends use, and use of these recommendations for creation and/or development of mainly engineering systems
The knowledge of trends and their use is the tool of problems' solving in technology, in manufacturing (industry and other branches), in society and in nature.
2. Fundamental change of civilization evolution after 2020.
3. The Singularity is the technological creation of smarter-than-human intelligence. One technology is often mentioned as heading in this direction: Artificial Intelligence...
4. Complexity and uncertainty are qualitatively new factors of mankind progress. Influence of these factors becomes superior to possibilities of controls.

This generalization can be presented in flow-chart form:



Thus, even it sounds too unexpected; TRIZ has a possibility to become a core of Artificial Intelligent (AI) system. About such possibility speaks, for example, invariantness of a content of «Client - Device X» dialogue.

As Device X can act:

- A wise man (if ancient time is taken), i.e. the person knowing a life and the nature, and on the basis of the experience offering the problem solution;
- An expert (it's a reality of the past and today), i.e. the person knowing trends of development of some branch...;
- A TRIZ expert (it's a reality of today), i.e. the person knowing laws trends of development...;
- AI (I want to believe that it's not so long from today), i.e. the software, which includes knowledge of trends of the nature, and examples of successful transformation of systems, and on

the basis of this knowledge offering problems' solution, i.e. the methods of transformation of system with problems into problemless system.¹⁵

Dialogue with Device X has the 'question – answer' form:

Client provides Device X information about problematic system,

Device X tests the entered information from the point of view of adequacy to trends of evolution, asks, if necessary, additional questions to Client.

In this manner the Client and Device X together discover the real problem, which ought to be solved, etc., till problem solution.

This dialogue looks like Turing (or reasonableness) test – if as a result of the dialogue the problem solution, i.e. the true way of transformation of problem system into system without problem, was found, to Client it doesn't matter - who talked with him, who asked questions and offered the solution – the machine (program) or the human being.

What is done for development of Device X?

Forecast of TRIZ development was developed as series of steps: Classical TRIZ (human being approach, separated software for non-linked TRIZ's tools) → Universal Scheme of Evolution (human-computer software USESoft) → AI System¹⁶

The following changes were made:

- Original list of evolution trends from classical TRIZ **was added** by trend of sustainability increasing (trend of survivability) of system;
- Trends of evolution “transition from Macro- to microlevel” and “human being elimination out of system” **were presented as mechanism** of system's dynamization trend; these trends are specific methods of system conversion;
- Some trends **were excluded** out of USE:
 - Trend of development in accordance with S-curve, because S-curve is illustration of system's parameters time behavior;
 - Trend of energy conducting by system, because the ability to conduct substance, energy and/or information is the ordinary parameter (feature, characteristics, property) of system;
 - Trend of uneven development of system's elements, because it's simply recommendation which should be considered during the order of studying system's elements;
 - Trend of human being elimination out of system, because human being, when functioning inside system, is the standard element of this system.

With consideration for additions, changes and exceptions **the whole, consistent, rigid and natural sequence** (circuit, scheme) **trends of evolution was developed.**

¹⁵ It's so-called «view of the world». View of the world is the image, which reflects the naturally developing material systems of the nature; picture of the world is constructed by means of consistent, unequivocal and simple sequence of trends of evolution known for today in TRIZ.

«Evolutionism becomes a core for a view of the world. Reasons of development are natural and are defined by objective trends of the nature» - by E.Vitol in “Scientific View of the World and Study of Future” http://www.intelros.ru/2007/08/20/jea_vitol_nauchnaja_kartina_mira_i_issledovanie_budushhego.html

¹⁶ TRIZ Future Forecast by A.Zakharov <http://www.triz-journal.com/archives/2004/08/05.pdf>

At the beginning this scheme was named the “Trends of Engineering System Evolution Scheme” (TESE Scheme), and later – Universal Scheme of Evolution or USE.

In course of time was revealed, that USE describes evolution of objects of the organic and non-organic nature, process of designing, decision-making process (management), evolution of collectives and organizations, a scientific method, genetic algorithm, error-trial method and non-algorithmic methods of activization of creative thinking, all tools of classical TRIZ, evolution of the art systems, cortex memory's structure, etc.¹⁷

Software USESoft is developed and used constantly. It means that the logic of evolution trends was “groped.”

The dialog with USESoft really looks like as conversation with a wise man, to which you came to ask an advice. Or this dialog looks like the described earlier conversation with the specialist, with the TRIZ expert, or with AI system. View of the world (in form of the Universal Scheme of Evolution), which is contained in all specified “interlocutors”, make the dialogs invariant, not dependent on the carrier of view of the world. It allows to state that TRIZ in the form of USE and 'wrapped' in USESoft is the core of Artificial Intelligence (AI) system.

Let USESoft now is only on 1% artificial (logic of program and interface), and on 99% natural (user). The observance of trend of human being elimination out of software will do its part.

Conclusion

“TRIZ is changing qualitatively. The first stage is TRIZ itself; II stage is TDCP¹⁸; III stage - ? We're leaving technology behind us. Sometimes the nostalgic feelings for technological problems are appeared, but trend of transition to Supersystem operates without dependence on our will. The basic interest should be a humanitarian component.

The main problem is in the human being. I am convinced that it is the main road to the future. The product of the future will appear only here. Already tomorrow the center of events will be at TDCP stage, and then the third stage will come.

What will be there? I still do not know...”¹⁹

I muster courage to say that all described here will be the answer to G.Altshuller's question.

TRIZ was born, is being developed and used as the tool of the decision of problems in technology, in manufacturing, in society and nature. The base of TRIZ is objective trends of nature evolution. So, TRIZ is a theoretical, methodological and practical part of the general theory of evolution.

Trends, which were revised, rethought and presented in new form, will be put in a basis of creating of next generation of TRIZ – universal computer program, which is intended for research of evolution of any systems. The traditional name for such program is Artificial Intelligence.

Function of AI is help to civilization to solve a problem of Singularity. The TRIZ in the form of AI gives the world a chance...

February 19, 2008
Brighton, Massachusetts, USA

¹⁷ The list, of course, is unbelievable. But it is exactly what I've got.

¹⁸ Theory of Development of Creative Person (TDCP)

¹⁹ Prospects of TRIZ Development by G.Altshuller Appeal at meeting of Board of TRIZ Association Journal of TRIZ 1990 Vol. 1 № 2 p. 4