

**The International TRIZ Association**

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**«ELABORATION OF INNOVATION PROBLEM SOLVING STRATAGY  
AT THE MAIN STEPS OF THE PROCESS»**

**Author's Abstract of thesis for the Master's Degree in TRIZ  
(TRIZ Master)**

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## **General description of the work**

The present work is related to one of the fields of technical creativity, namely to Theory of Inventive Problem Solving (TRIZ).

The work is devoted to development of general approach and methodology of objectives assigning at the main steps of innovative problem solving process.

The work consists of five main sections.

The first section is devoted to identification of main steps of innovative problem solving process goals definition.

The other four sections describe developed methodologies of problem solving process goals definition and its further elaboration during the process.

The steps described in the developed methodologies present the key moments which define the strategy of entire innovative problem solving process.

Although all four sections are parts of a single approach and are connected in a single chain, each of them at the same time acts as a relatively self-consistent direction and thus can be used separately.

## **Relevance of the thesis subject matter**

A lot of statements about importance of correct problem definition are known. Authors of many different articles emphasize the idea that if the problem as it was stated has no solution then the problem statement is not correct and it should be reformulated.

In TRIZ also are described several different approaches of "attacking" unsolvable problem "from the other side":

- to check if the problem really exist;
- to define the parameter of the system under consideration which should be improved;
- to define a new task which should be fulfilled in order to achieve the same goal for which the initial task was formulated;
- to define a task for elimination of new "root-cause" disadvantage discovered in the course of initial problem analysis;
- to define a new perspective direction or area of search for problem solutions;

There are also exist different opinions about the best time for initial problem statement specification:

- at the very beginning of innovative problem solving process;
- after completion of initial problem analysis and revealing of system disadvantages and cause-effect relationship between them;

- after fruitless attempts to solve initial problem.

Analysis of approaches mentioned above shows that each of them is substantiated enough. At the same time it is obvious that each of these approaches is just a fragment of some single general approach of objectives definition at the main steps of innovative problem solving process.

However there is still no single approach and methodology of decision making at these very important points.

Each of existing methodologies describes only one of the steps listed above and all of them do not fit to each other. Which is more these methodologies are either not specific enough or conversely are too detailed and thus too complicated. In both cases their practical use is not easy enough.

There is also no criteria for making a decision at each of these steps.

Taking into account importance of the problem under consideration and from the other hand absence of its sufficiently elaborated solutions the subject matter of current work seems to be quite relevant.

## **Goals of research**

The main goal of research is development of an integrated methodology of objectives definition and refining at every main stage of innovative problem solving.

For this purpose the following tasks were intended to be accomplished:

- to develop general approach to objectives definition and refining;
- to define main steps of this objectives refining process;
- to develop explicit methodology of objectives definition and refining at each defined step within developed general approach;
- to define criteria of making a decision at each stage of objectives defining;
- to illustrate all main statements of developed methodology by examples from accomplished consulting projects.

## **Scientific novelty of research**

Scientific novelty of research consists in development of several methodologies of objectives definition combined in an integrated system by a single general approach and decision making criteria.

In particular, the author considers as new steps the following:

- definition of four different stages of problem statement process as the cornerstone steps in elaboration of innovative problem solving strategy;
- methodology of Main Parameters of Value definition which includes:

- definition of requirements for "MPV candidates";
- general approach to a definition of "MPV candidates" for different stakeholders;
- methodology and step-by-step algorithm of "MPV candidates" definition;
- methodology and step-by-step algorithm of "hidden MPV" definition;
- methodology and step-by-step algorithm of quantitative evaluation of "MPV candidates" level of significance;
- a conclusion that usage of criteria "non-triviality" at all stages of objectives definition not only improves the quality of solution as it is stated, but also acts as essential condition to get any acceptable solution;
- objective parameters of subjective criteria "non-triviality" definition;
- definition of different cases of physical contradiction existence in initial inventive problem;
- methodology of Key Problems definition for each of defined cases of physical contradiction existence in initial inventive problem;
- general concept, methodology and step-by-step algorithm of development of Aprioristic Conceptual Directions which directions should be defined at the beginning of innovation problem solving process in order to evaluate practicability of application of each TRIZ analytical tool to specific problem solving;
- general concept and methodology of definition of Conceptual Directions of Key Problems solving.

### **Practical significance of research**

Developed approach and methodology of objectives definition significantly increases the effectiveness of innovation problem solving due to its following peculiarities:

- it allows to avoid nonproductive time and other resources application on solving "wrong" problems and on search of solutions in unpromising directions and areas;
- it is convenient in practical use due to the following peculiarities:
  - conciseness and simplicity of including single methodologies;
  - their logical interconnections and noncontradiction between themselves and with other TRIZ tools;
  - presence of practical examples which vividly illustrate specifics of every developed methodology and algorithm implementation.

## **Major issues to be defended by the author**

- revealing of four main steps in objectives definition as key points in elaboration of innovative problem solving;
- methodology of Main Parameters of Value definition which includes:
  - definition of requirements for "MPV candidates";
  - general approach to a definition of "MPV candidates" for different stakeholders;
  - methodology and step-by-step algorithm of "MPV candidates" definition;
  - methodology and step-by-step algorithm of "hidden MPV" definition;
  - methodology and step-by-step algorithm of quantitative evaluation of "MPV candidates" level of significance;
- a conclusion that usage of criteria "non-triviality" at all stages of objectives definition not only improves the quality of solution as it is stated, but also acts as essential condition to get any acceptable solution;
- objective parameters of subjective criteria "non-triviality" definition;
- definition of different cases of physical contradiction existence in initial inventive problem;
- methodology of Key Problems definition for each of defined cases of physical contradiction existence in initial inventive problem;
- general concept, methodology and step-by-step algorithm of development of Aprioristic Conceptual Directions which directions should be defined at the beginning of innovation problem solving process in order to evaluate practicability of application of each TRIZ analytical tool to specific problem solving;
- general concept and methodology of definition of Conceptual Directions of Key Problems solving;
- practical examples which vividly illustrate specifics of every developed methodology and algorithm implementation.

## **Personal contribution of degree-seeking candidate**

All the items listed in section "Major issues to be defended by the author" represent personal approach of degree-seeking candidate.

## **Testing of research results**

Fundamental issues of the thesis were reported by the author at international conferences TRIZ Summit-2008, TRIZFest-2009 and TRIZ Summit-2010

The proposed approach and methodologies were used by the author in consulting projects performed by Algorithm, Ltd. / GEN3 Partners. Inc.

### **List of published works related to the subject matter of thesis**

1. A. Efimov. Extension of the problem scope for increasing the probability of its successful solution. A.B. Ефимов. Conference proceedings. TRIZ Developers Summit Library Volume 2. St. Petersburg 2008.
2. A. Efimov. Struggle for correct wording.. <http://www.metodolog.ru/node/350>
3. A. Efimov. Methodology of MPV analysis.  
<http://www.metodolog.ru/01472/01472.html>
4. A. Efimov. Alternative approaches to new generation of ARIZ development. International Research Conference "TRIZ Fest 2009". Coference proceedings. St. Petersburg, 2009
5. A. Efimov. Approach to combined system of TRIZ Laws- Standards- Tools development. International Research Conference "TRIZ Fest 2009". Coference proceedings. St. Petersburg, 2009
6. A. Efimov. Technical forecasting based on combined system of TRIZ Laws- Standards- Tools. Conference proceedings. TRIZ Developers Summit Library Volume 3. St. Petersburg 2010
7. A. Efimov. A.B. Ефимов. Definition of Key Disadvantages and Key Problems using Cause-Effect Chains analysis. <http://www.metodolog.ru/node/993>

### **Structure and volume of thesis**

The thesis consists of introduction, four main chapters and conclusion. The total volume of thesis is 63 pages including 16 Figures, 4 Tables and list of 79 references.

Although all the main chapters are the parts of an integrated approach and are connected into a single chain, each of them can be considered as a relatively independent direction.