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Features of TRIZ applications for solving organizational and management problems: schematization of an inventive situation and working with models of contradictions.

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

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Chelyabinsk, 2020

Content

General characteristics of the study

This work belongs to the Theory of Inventive Problem Solving.

The dissertation consists of 2 sections and Annexes.

The first section is devoted to schematization which is recommended by the author at the stage of analyzing an inventive situation (a situation characterized by the need to satisfy the demand of a particular super-system without a clearly defined set of problems for further solving or directing problem solving [42]) in the process of solving organizational and management problems. It was proven that the majority of problems in organized social systems are set by the task owner in a form which is not sufficiently informative for its further processing with the use of TRIZ tools. It is also typical for tasks in any other area, for example: “to increase the capacity of the manufacturing line by 5%”. Such tasks are always featured by high uncertainty, since resources to achieve goals in these tasks are typically drawn from soft systems, such as people and their interactions.

According to the author, the most convenient way of the initial presentation of organizational and managerial tasks in a form convenient for further processing is the schematization initially suggested by the followers of G. Schedrovitsky, which was originally developed by the Moscow Methodological Circle for the analysis of this class of problems. This section describes in detail how the TRIZ tools fit together with a preliminary analysis of the problem using schematization, the author makes clear advantages and disadvantages of schematization using and shows ways to prospective improve of this method. The author compares schematization with another analytical TRIZ tools and analytical methods to investigate business systems.

The second section is devoted to the choice of the operational zone and resource allocation of the operational zone. In TRIZ, operational zone into technical systems is a part of physical space where a conflict emerges, or an undesirable effect presents which generates an inventive situation [42]. It is essential to note that an area where the conflict emerges is not necessarily defined as a point or are of physical of space in solving the organizational and managerial problems. The dissertation indicates the scope of application of this tool and explains why this approach is preferred for this class of tasks. Notice: M. Rubin highlights this phenomenon in own papers: «The character of element’s interaction in business-systems is a cause another nature of time and space into a conflict area. The conflict zone into business systems is not physically determined area like we think about technical systems. It’s multidimensional space or area-variety, assembled with elements, witch consist of it selves and connections between them [44].

The paper indicates the scope of this tool and explains the advantages of this approach for this class of problems. It is also shown that the use of this approach allows ARIZ to be used to solve organizational and managerial tasks, since in such tasks it was the search for resources that caused difficulties.

The Appendix demonstrates practical application of the described techniques. The comparison between proposed approach and other analytical tools is below.

Relevance of the research topic

Since the 1990s, the question of applying the methodology for solving problems in social systems has been actively discussed in the TRIZ environment ([1], [2], [3], [4], [5], [36], [37] and many other sources). Several TRIZ specialists successfully apply its tools in projects applied to business systems and other organized social systems, for example, to the evolution of creative teams [37], as well as to non-profit organized social systems (government offices, military departments, the police, legal offices, health care, etc.). During this time, TRIZ specialists have accumulated enough successful cases related to solving problems in social systems. It indicates an intensive development of TRIZ in this direction (in a number of works, business systems are not referred to social [5], but to information systems [1]). Some examples of the application of TRIZ to business objectives are presented on the author's website [6].

Since any artificially created (organized) system of a social system tends to the increase of entropy over time [23], [38], management becomes an obligatory function in such systems. It is important, that control action must be organized artificially [41]. During execution of the management functions under conditions of a dynamically changing super-system, modern managers face many tasks that the author calls organizational and managerial [11]. The term “organizational and managerial task” will be further elaborated below.

Most of these tasks, as a rule, do not cause difficulties for managers and are solved by analogy, since most of the situations that a manager faces in everyday practice are typical [10]. However, in the conditions of today's rapidly changing economic and social reality, the manager faces a lot of inventive situations [39], which are difficult to resolve using conventional methods [11]. It is worth noting that the use of TRIZ for solving organizational and management tasks is still not structured, up to the initial positions. Take at least an emphasis in defining business systems: a number of authors (N. Khomenko [37], V. Korolev [5], B. Shmakov [8], etc.) call such systems social, and for example, E. Sosnin and B. Poisner [1] - informational). In a number of works, such systems refer to some indefinite set — the so-called “non-technical systems” (for example, [7]) or business systems, which is somewhat more accurate [2]. Although, of course, business systems, albeit important, still are subsystems of a larger system — organized social systems, which, as mentioned above, are not only systems aimed at making a profit. Organizational and managerial tasks may arise in any of the listed types of organized social systems, since in any of these systems there is a management function, during the execution of which inventive situations arise.

Many attempts have been made to transfer the TRIZ tools developed to solve the problems of improving technical systems to solving organizational and managerial tasks. Some of which have settled well, and some are the product of a direct, but ineffective transfer from one area to another. Therefore the successful use of such tools is doubtful, for example, the "direct translation" of the contradiction matrix developed by G.Altshuller to the language of business systems [8] (it should be noted here that, along with attempts to directly but ineffectively transfer methods for resolving technical contradictions, there are also deeply developed versions for solving problems in business, for example, matrix by D. Mann and his associates, the author of *Hands-on Systematic Innovation for Business and Management* "[9]). However, the techniques can be applied only after formulating a contradiction, which is still difficult at the beginning of work on the organizational and management problems.

In general, the problem of studying an inventive situation before applying the TRIZ toolkit is a separate large-scale task. In many ways, the use of TRIZ for solving such problems is “lame” precisely because of the lack of a reliable tool for analyzing the inventive situation.

In addition, there is an assumption that the term “business system” [2] includes in part (but does not absorb) both social systems and information systems. However, this classification does not delineate the sharp boundaries of such systems, and it is difficult to understand where a social system ends and the information one begins. Since the systems described by the above concepts are very intertwined and the boundaries between them are blurred, the author does not consider it appropriate to single out social, separate information subsystems in the business system. It is enough to understand that business systems are part of a larger system: organized social system. The author believes that it is easier to deal with the concept of organizational and management tasks. This term shows that the task is set in any organized social system by a subject who has a goal to make a definite improvement in the interaction of elements of a business system that are involved to informational and social relationships [40].

Why does the author call this type of tasks organizational and managerial? It is known that organizational tasks are related to the optimization of the allocation of resources in terms of obtaining the maximum impact from utilizing these resources. Later it will be shown that organizational tasks can be set at the level of both aggregated objects and instances in a business system (definitions of aggregated objects and instances are given below). Organizational tasks are connected with the organization of connections between aggregated objects in a business system and filling of the aggregated objects with the most relevant instances, taking into account their properties. Management tasks are tasks related to improving the performance of the elements of a business system that are in certain relationships with each other. Since, according to the condition of the problem, the subject usually needs to improve the effectiveness of the business system or some of its subsystems, it most often resorts to both organizational changes and managerial influences. In the literature, these types of effects are not often distinguished (for example, [23]), but these concepts are sharply separated in the works of G. Shchedrovitsky [10], therefore, the author proposes to focus on this classification and talk about organizational and management tasks if it is necessary to increase the effectiveness of any organized social system (in particular, a business system) or one of its subsystems. Later, the author uses the term “organizational and managerial tasks” in the context of tasks related to improving the efficiency of an organized social system or its subsystems.

It is worth noting that the author has not met yet generally accepted terminology that clearly describes such systems, except for the generally accepted position that the design of an organized social system is performed to achieve the customer’s goals (short-term, medium-term or long-term). The terms which describe the structure of organized social systems, in addition to the generally accepted classification that describes the hierarchy of the internal structure (e.g. organization, TOP management, departments, divisions and project groups [26], [28], [32]) are not known to the author.

Thus, there is an urgent need to study the inventive situation when setting organizational and managerial tasks with the aim of further analysis, therefore, a method of preliminary analysis of such tasks is required provided that the majority of solvers receive such tasks in an insufficiently formalized form. It should be noted that not only TRIZ specialists face the problem of formalizing organizational and managerial tasks. Members of the Moscow Methodological Circle under the direction of G. Schedrovitsky [10] actively worked on this issue, and a technique of schematization of such problems appeared [41] as a result of their activity. It copes with this problem perfectly but generates another problem: the tool perfectly helps with the initial “entry into the task”, that is, during the initial analysis of the inventive situation, but it is practically useless for its further solving. However, the problem of “solving in depth” organizational and managerial tasks through the

identification of contradictions and their subsequent resolution is perfectly handled by the mechanisms of TRIZ. This thesis is confirmed by the experience of the author, together with representatives of the methodological school G. Schedrovitsky in a number of projects.

It should be noted that, first in the USSR, and then on the territory of the post-Soviet space, approaches to analyzing the inventive situation with the use of schematization were actively developed. Over the past 30 years, similar work has been carried out in other countries, similar methods of analysis in Western practice are called "Soft Systems Methodology (SSM)" [49]. During the practical application of schematization [10] and SSM [49], a significant number of cases have been accumulated showing the advantages and disadvantages of the method. One of the main drawbacks of the method is a poorly worked out sequence of actions for reaching solutions to a problem situation, analyzed using this tool. Therefore, the author aims to show how this tool, originally developed for analyzing a problem situation in organized social systems, can be combined with TRIZ approaches that allow formulating and resolving contradictions.

In fact, what is the cause this paper does not recommend using existing TRIZ tools for the initial analysis of the problem? The author conducted benchmarking of both TRIZ analytical tools and a number of analytical tools traditionally used for analyzing business systems and made conclusions, which can be found in detail on pages 13-39 of this dissertation.

In addition, when trying to apply the operator «Ideal Final Result» to resolve contradictions in organizational and management tasks [11], a problem solver inevitably faces difficulties with defining the operational zone and determining resources that can be mobilized to find the most efficient solution, since the operational zone boundaries are outlined as abstract concepts, rather than the physical space of the conflict, as in technical problems. In this dissertation, an attempt has been made to formalize the allocation of operational zone while resolving contradictions in the managerial tasks. The author shows how it is possible to delineate the operational zone not at a point or area of physical space, as is done in technical tasks, but in the plane of abstract concepts that are often used in describing conflict in organized social systems (motives, incentives, reaction, values, desire, competences, key performance indicators, etc.), which is the core of a number of organizational and management tasks [11]. The use of such approach, including the use of a shortened version of an algorithm for solving the inventive problem and its elements for solving such problems, is presented in a number of actual cases on the author's website [6].

The practical need for the preparation of organizational and managerial tasks for further analysis using TRIZ tools has long been overdue. There is also an obvious need for proposing a simple and convenient mechanism for defining the operational zone, since the lack of a methodologically developed mechanism for determining the operational zone hampers the use of the algorithm for solving the inventive problem for this class of tasks [11]. The author believes that short versions of the algorithm for solving the inventive problem (in 6-7 steps) are an excellent tool for solving organizational and managerial tasks. It has managed to prove itself in practice as a reliable tool that gives a stable result.

Goals and objectives of the study

Purpose of the study:

To benchmark methods for preliminary processing of an inventive situation in organizational and managerial tasks and propose a prototype that best meets the requirements of such an analysis.

To propose a method for finding resources for using ARIZ in solving organizational and management problems. Link the proposed prototypes with the existing TRIZ tools.

The task of this work is:

- Conduct benchmarking of TRIZ analytical tools and analytical tools that are traditionally used for analyzing business systems and offer a way to formalize business tasks that is as free as possible from the identified shortcomings.
- Develop ways of transition from the proposed tool for analyzing the problem situation to TRIZ tools, including at the level of terminology.
- Develop a method to search for resources in organizational and managerial tasks, to take into account the specifics of the formulation of conflicting elements in such tasks in order to use the ARIZ apparatus for solving such tasks.

Proposed methods description

1. The author has developed a method of applying schematization for the preparation of organizational and managerial tasks for the further use of the mechanisms of TRIZ as an indispensable condition for the analysis of the inventive situation in the area of organizational and managerial problems.
2. The author conducted a detailed analysis of the works of G. Schedrovitsky, and on the basis of the material studied, developed a sequence of schematization for analyzing an inventive situation, which simplifies the further use of TRIZ tools to solve such problems. The author considers analogs of this approach which are used in TRIZ (system operator and functional modeling when performing functional analysis) and concludes: schematization proposes a unique mechanism for determining management hierarchical levels, as well as concepts of an aggregated object and its instance. It provides new opportunities for setting particular tasks when solving organizational and managerial tasks, with the ability to scale solutions obtained as a result of solving such tasks. These capabilities are absent in the existing set of TRIZ tools, thus significantly hampering the use of TRIZ mechanisms for solving organizational and management tasks:

    - Identify a problem situation.
    - Define a conflict area and identify conflicting pairs (objects and subjects of the organizational and management problems)
    - Define system elements around the conflicting pair, bring them to a schema, and identify the secondary problem situations pertaining to the problem.
    - Determine the links between the system elements at the level of "aggregated objects" ("aggregated object" is a term established in G. Shchedrovitsky's methodology, which is described in detail in the text of the dissertation.) The term does not replace but complements the concept of a "system element", and it is a subsystem of the system element). If necessary, identify the processes.
    - Determine the immediate elements of the system, including "regulators".
    - Identify conflict areas of aggregated objects and instances.
    - Determine the gaps in the schema obtained within the boundaries of the functioning model of the system.
    - Set up a system of tasks.

3. A method was developed for determining the operational zone in the organizational and management problems, which are characterized by a high degree of abstraction of

descriptive features. As a result, it is often not possible to delineate the area of space where a conflict exists (unlike in the majority of technical problems). The method proposed makes it possible to use the algorithm for solving the inventive problem to resolve contradictions in organizational and managerial tasks:

- Formulate a couple of technical contradictions;
- Choose a working technical contradiction;
- A conflicting pair of the chosen technical contradiction forms the operational zone which includes the tool, the product, and additionally the environment of their interaction.
- Then we further proceed with the logic of ARIZ: we determine the Ideal Final Result, explore and extract resources of the product, the tool, and the environment, and so forth.

4. A method has been developed for defining an operational zone in organizational and managerial tasks characterized by a high abstraction of descriptive characteristics, that does not make it possible to properly delineate a part of the space where a conflict develops (unlike in most technical tasks). This method makes it possible to use the mechanism of ARIZ to resolve contradictions in organizational and management tasks with a high degree of abstraction. The novelty resides in the fact that using the method developed by the author, a problem solver is not limited to only defining the operational zone as physical contour of space (it is worth noting that this possibility enhances the use of schematization, where it is very convenient to highlight such areas), but can also define the operational zone directly from the working technical contradictions, and later allocate resources of the operational zone and use them to solve the task by using the IFR operator. The ability to allocate resources as a group of Factors of Impact which define state of a system and properties of the technical contradiction is the most important skill in solving organizational and management tasks, since the physical contour of space may not be available to the solver [11]:

   - Formulate a pair of TP;
   - Select a working TP;
   - The conflicting pair of the selected TP forms an operational zone, including: the tool and the product;
   - Identify resources as a set of Factors of Impact which influence the product and the tool;
   - Next, we work in the ARIZ logic: assign IFRs, allocate the resources of the product and the tool, etc.

5. It is worth noting that the author was faced with the opinion some TRIZ specialists that using the term “technical contradiction” with respect to organizational and managerial problems is not correct. Some experts on TRIZ believe that it is necessary to single out market, organizational, interpersonal and psychological (intrapersonal) contradictions [40]. The author does not agree with this principle of division, since technical contradiction is a form of conflict representation, and these contradictions do not relate to the form of information presentation, but to the level of solving the problem (in TRIZ, the macro and micro levels were originally designated as the levels of solving problems, and technical contradiction is a form of conflict description. If the concept of “technical contradiction" introduces some embarrassment, one can apply the already well-established concept of "dialectical contradiction of the first kind") [11]. Of course, the understanding of typical levels of the formation of contradictions in solving organizational and management problems is important to a problem solver, since it simplifies formulation of contradictions. However, the terms which describe the levels in the organizational and management problem and the concept of “technical contradiction” are not identical, and, therefore, interchangeable.

Scientific novelty of research

The scientific novelty of this work is as follows:

1. The application of schematization for the upper-level analysis of the business system is proposed.
2. The method of control questions is proposed and that allows analyzing the constructed scheme to identify problems that are suitable for using TRIZ tools.
3. The author clarified the rules for constructing schemes, especially in the context of the separation of elements by hierarchical levels.
4. Approach to identify resources in organized social systems has been proposed, which makes it possible to apply ARIZ approaches to solve problems in organized social systems.

Results of the study

1. The proposed methodology of schematization for the purpose of formalizing the organizational and management problem enables the following:

    - To define the boundaries of a system without missing important details.
    - To exclude "extra" elements of a system taking into account the goals of the task at hand through system visualization and allocation of the position of a problem solver.
    - To avoid missing critical information – to identify the main gaps within the boundaries of the functioning model of the system and define the system of tasks for further solving with the means of TRIZ.
    - To considerably reduce time required to provide communication within a team when analyzing an inventive situation and defining a problem.

2. The method of defining an operational zone (OZ) from a contradiction proposed and a method of identifying resources as a set of Factors of Impact on the elements of the operational zone helps:

    - To reduce communication time for defining an operational zone. In the past, long discussions were required to properly identify the operational zone of ARIZ was used to resolve a contradiction.
    - To identify resources of the operational zone as factors which produce on a product and a tool without identification of the objects of a business system. It considerably simplifies speed of analysis and increases quality of future innovative solutions.

All this makes the methods proposed suitable for practical use in consulting projects. The detailed examples of the application of the proposed methods in consulting projects confirm their practical value (see Appendix, as well as the sources [6], [11]).

3. Benchmarking of the proposed method was carried out with other TRIZ tools used in the analysis of organized social systems, as well as with a number of methods traditionally used for the analysis of business systems.

Basic provisions to be defended

1. SCHEMATIZATION ACCORDING TO THE SAMPLE ACCEPTED IN THE METHODOLOGY OF G. SHCHEDROVITSKY.
    - Goals of applying schematization for solving business problems.
    - The method of defining a business problem through the application of schematization.
    - Schematic terminology.
    - Area of application of the schematization and its application in conjunction with other TRIZ tools.
    - Conclusions on the use of schematization with other TRIZ tools.

2. THE METHOD OF DEFINING OPERATIONAL ZONE FROM TECHNICAL CONTRADICTION FOR ORGANIZATIONAL AND MANAGEMENT PROBLEMS.
    - Goals of identifying an operational zone in organizational and management tasks.
    - In what cases it is required to identify an operational zone in business-related problems.
    - Difficulties with identifying an operational zone in in business-related problems.
    - Method of identifying an operational zone from the model of technical contradiction.
    - Identification of a product and a tool and extraction of resources from the operational zone as a set of Factors of Impact on the product and the tool.
    - Conclusions on the application of the method of identifying an operational zone from the model of technical contradiction and amply it with ARIZ.

Personal contribution of the candidate

1. Application of the schematization, developed in the Moscow Methodological Circle under supervision of G.P. Shchedrovitsky for preliminary processing of poorly formalized organizational and management tasks in order to obtain a system of particular problems, which can be solved by using the TRIZ problem-solving tools.
2. The use of the concepts "Aggregated Object" and "Instance" in order to obtain scalable solutions when using TRIZ tools for solving organizational and management problems (the terms "aggregated object" and "instance" are explained in the dissertation. Briefly: "aggregated object" and "instance" are subsystem elements of the system. These concepts clarify the concept of "system element" and are of great practical importance during the analysis of organizational and managerial problems).
3. Development and approbation of the method of identification of the operational zone in organizational and management problems to simplify the application of ARIZ-like tools to such problems.

Approbation of the work

1. The book «TRIZ. Solving business problems», A. Kozhemyako. Moscow: Synergy University, 2017. 288 pp.
2. Scientific conference "TRIZ. The practice of using methodical tools. " Moscow, 2016.
3. Scientific conference "TRIZ-Summit", Minsk, 2019.
4. Training in the program "TRIZ" in the traditional and remote formats, trained more than 200 specialists. In the course of training, students solved their problems from their practice under the guidance of the author of the dissertation and applied these tools in their projects.

5. At the time of writing the dissertation, the author carried out more than 50 consulting projects using these tools.
6. A. Kozhemyako: Features of the use of TRIZ in organizational and managerial problems. Moscow TRIZ conference 2019, Moscow.
7. A. Kozhemyako: Aims and methods of technical contradictions in managerial problems, how to use technical contradictions while sorting out the managerial problems. Business TRIZ online 2020.

Publications on the topic of the dissertation

1. Kozhemyako A. TRIZ. Solving business problems. Moscow: Synergy University, 2017. 288 pp.
2. Kozhemyako A. Non-technical TRIZ: experience with solving organizational and management problems, limitations and tools. Materials for the VIII anniversary conference "TRIZ. The practice of applying methodological tools and their development ", 2016.
3. Kozhemyako A. Ideas of joint application of TRIZ and SMD for solving business problems. Part 1. Available at: www.bmtriz.ru, last checked: June 2018

4. Kozhemyako A. Ideas of joint application of TRIZ, SMD and Theory of Constraints for solving business problems. Part 2. Available at: www.bmtriz.ru, last checked: June 2018.
5. A. Kozhemyako. “Benchmarking. How to choose the right comparison criteria and ... create an innovation?” - publication in the magazine "Sales Management".
6. A. Kozhemyako. «It is a little about system thinking of the head of sales department. Apply system analysis» - publication in the magazine "Sales Management".
7. A. Kozhemyako. «Morphological analysis for solving business problems» - publication in the journal "Management Today".
8. Comparison of three different TRIZ tools for a business problem analysis considering the example of the mentiring problem in a sales department. TRIZ Review: Journal of the International TRIZ Association – MATRIZ. Vol 2/1. April 2020.

Structure and scope of the dissertation

The dissertation consists of an introduction, three main sections, conclusion, and three annexes, including examples of practical application of the proposed methodologies, outlined on 109 pages; includes 35 drawings, 10 tables, a list of literature from 49 titles, including the author's books on the topic of the dissertation, glossary.

Sources of information:

1. Sosnin E., Poizner B. Working book on social design (interdisciplinary project) - Tomsk: publishing house of Tomsk University, 2001.
2. Souchkov V. TRIZ and Systematic Business Model Innovation, 2010. Bergamo University Press. ISBN: 978-88-9633359-4
3. Meerovich M., Shragina L. Technology of creative thinking. Moscow: Alpina Business Books, 2008.

4. Korolev V. Fundamentals of the system-process theory of convenience and activities of organizations. The manuscript was deposited in the TRIZ Foundation CHOWNB, Chelyabinsk.
5. Korolev V. Modeling of social objects. The manuscript was deposited in the TRIZ Foundation CHOWNB, Chelyabinsk. 2004.
6. Examples of application of TRIZ to organizational and management tasks. http://bmtriz.ru/articles/categories/1/, Last seen: June 2018
7. Khomenko N. Fundamentals of the General Theory of Strong Thinking. 1997. The manuscript was deposited in the TRIZ Fund, Chelyabinsk.
8. Shmakov B., Shchepetov E. Compliance of indicators of technical and social systems. Chelyabinsk State University.
9. Mann D. Hands-on Systematic Innovation for Business and Management. IFR Press, 2004. ISBN 1898546738.
10. Reus A., Zinchenko A. A Guide to the Methodology of the Organization, Handbook and Management. Reader on the works of G. Schedrovitsky, Moscow: Alpina Pablisher, 2012.
11. Kozhemyako A. TRIZ: Solving Business Problems. Moscow: Synergy University, 2017.
12. Mann D. Physical Contradictions and Evaporating Clouds (Case Study Applications of TRIZ and the Theory of Constraints), 2000…

A complete list of sources referenced by the author in the thesis is given at the end of the full text of the thesis (49 references in total).

Appendix

COMPARISON OF THREE DIFFERENT TRIZ TOOLS FOR A BUSINESS PROBLEM ANALYSIS CONSIDERING THE EXAMPLE OF THE MENTORING PROBLEM IN THE SALES DEPARTMENT

Abstract

Managers are used to solving sales management problems by using their own experience. In the extreme cases, if the decision is ambiguous, there is always an opportunity to discuss with colleagues or invite consultants. As a result, most of the problems in the field of management are solved.

But not all problems are solved easily. What to do in such cases? If one must solve a difficult managerial problem, one should use the system analysis methods. In this article, the author will show how it is possible to "decompose to details" almost any problem with the use of TRIZ.

In addition, the author compares different methods used in TRIZ for solving organizational and managerial problems on the basis of analyzing the same problem and providing solutions that emerged in each case.

Keynotes: *TRIZ*, *Root Conflict Analysis*, *Functional Analysis*, *Schematization*, *Contradictions.*

A Problem

Let us consider a case. In the sales department of a company engaged in the sale of rolled steel (B2B market), the process of skill transfer from more experienced employees to newcomers suffered. Therefore, the head of the sales department decided to intensify the mentoring process.

However, the problem appeared: if inexperienced employees conduct mentoring, then the newcomers learn slowly and reach the planned indicators within long time, because they make a large number of mistakes, which have to be corrected by the manager.

On the other hand, if mentoring is conducted by experienced employees, the process runs significantly faster and provides a higher quality, but experienced employees spend their valuable time with the newcomers rather than spending it with clients they are responsible for working with (the most experienced employees are in charge of key accounts, e.g. clients of category “A”). Their resource is much wasted... What to do?

We have a contradictory problem: mentoring should be conducted by the experienced employees in order to bring the newcomers to the result required (achievement of the sales plan) relatively quickly, and mentoring should be done by less experienced employees to avoid distracting the experienced ones from their primary functions - working with the most important clients.

Thus, we can draw up a model of technical contradiction:

Mentoring should ***be conducted by the experienced employees in order to quickly bring the newcomers to the result, but at the same time the experienced employees reduce the time of interaction with key accounts, which is not acceptable.***

As seen this contradiction, one attribute refers to the new employees (students), the other corresponds to the experienced employees (if they are involved as mentors), but both are important properties of the system under study from the point of view of the KPI implementation by the sales department. It is important to note that it is the sales department of the trading company.

It is crucial that the contradiction shown above can be identified as “an upper level contradiction”, which means that this contradiction is defined on the basis of the initial conditions of the problem and requires further detailed analysis. If we try to resolve this contradiction by using standard TRIZ tools [1], for example, with well-known 40 Inventive Principles, then we will certainly come up with some solutions, but there is a high probability that such solutions will be rather weak.

Therefore, let us try to perform analysis of the problem in three different ways: with RCA+, Function Analysis, and Schematization.

Application of Root Conflict Analysis (RCA+)

If we decide to analyze the problem deeper by using RCA+, first we would need to formulate the target negative effect, for which we determine the working technical contradiction from the pair of the technical contradiction model shown above.

Correspondingly, we have two contradictions to choose from:

- Mentoring should **be conducted by the experienced employees in order to quickly bring the newcomers to the result, but at the same time the experienced employees reduce the time of interaction with key accounts, which is not acceptable.**
- **Mentoring should be conducted by less experienced employees (usual employees), because they are not in charge of working** with key accounts, but at the same time the quality of training of the newcomers is lower than by the experienced employee and the newcomers mentored take a long time to achieve their results, which is not acceptable.

Which contradiction we must choose?

From the point of view of business goals, it is more important for us that new employees quickly reach planned targets and work reliably in the interests of business; therefore, we accept the working contradiction 1:

Mentoring should be conducted by the experienced employees in order to quickly bring the newcomers to the result, ***but at the same time the experienced employees reduce the time of interaction with key accounts****, which is not acceptable.*

Now we determine the problem which we have to analyze in depth, but we set up the conclusion of mentoring should be conducted by the experienced employees. Such a problem would be:

The mentoring process absorbs time of the experienced employees (which they could spend on working with key accounts otherwise).

After we have selected the target problem, we build a cause-effect chain (Fig. 1).

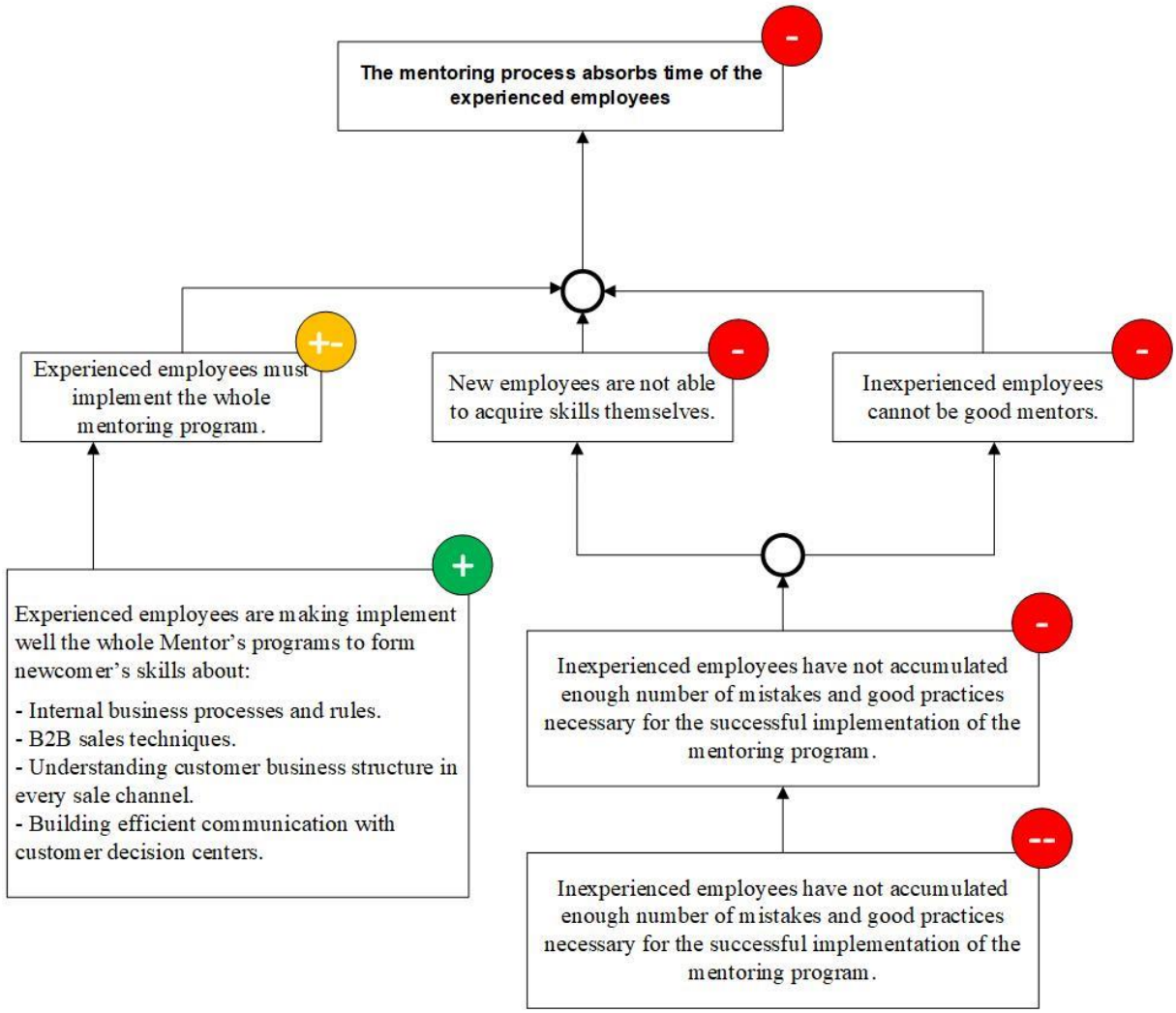

Fig. 1. Application of RCA+

In principle, we do not have to go on the deeper analysis of the chain resulted. A solution becomes obvious: you need to disassemble the mentoring program into components for each of the listed blocks:

- Internal business processes and rules.
- B2B sales techniques.
- Understanding customer business structure in every sale channel [4].
- Building efficient communication with customer decision centers.

Next, we will need to determine which blocks of the mentoring processes can be converted to the online format so that the participants can study them on their own; which ones have to be supported by less experienced employees (for example, some nuances of filling in the fields of CRM system, reports in the CRM system, warehouse inventory database, general approaches to communication with clients, work with a matrix of commercial advantages, etc.), and which ones have to be supported by the most experienced mentors, for example, developing a transaction strategy, the nuances of effective communication with decision centers of company's clients.

Now let us try to identify additional tasks (added to the list below) on the obtained cause-effect chain by using the operator of negation (using the negation operator provides to pose problems on the causal chain implies that we do not accept the consequence, while accepting its cause, thus forming a paradox):

1. How to make it possible that inexperienced employees COULD implement the mentoring program in a quality manner, even if they have not accumulated sufficient list of mistakes and good practices necessary for the successful implementation of the mentoring program?
   Solution: typical errors can be identified and described in advance, including in the form of interactive simulators or tests in the LMS-system, which will reduce time spent by experienced employees on working on typical errors**.**
2. How to make it possible that experienced employees IMPLEMENT the whole mentoring program, even if the mentoring program does not include essential subjects of theory and practice?
   Solution: it is also about the transition to digital learning with interactive simulators. Moreover, we have to foresee some sessions with experienced employees too.
3. How to make it possible that the mentoring program does NOT include an essential block of theory and practice, but new employees will successfully study all 4 blocks of the program?
   Solution: part of the blocks of mentoring program must come from outside. For example, to change the conditions for the reception of employees and to give priority to the hunting of employees from competitors with similar processes (this solution has significant limitations, although it is quite useful).

Conclusion: RCA+ is a useful and effective tool for primary processing of a business problem, which can be successfully used to solve organizational and managerial tasks. It is confirmed by our experience with using this tool. In addition, RCA+ can show clearly the hidden contradictions in investigated business system.

Through the use of the negation operator, the list of solutions according to the results of applying a RCA+ can be valuable. An operator of negation could help to draw up some useful additional problems to work out (types of paradox).

Unfortunately, this TRIZ tool has a significant drawback because it does not have internal means for working with the structure of a system. Therefore, when conducting a RCA+, it is easy to miss elements of the system and supersystem that are essential from the point of view of a problem. It is why in TRIZ, RCA+ is often used after the application of other tools, e.g. Function Analysis in order to clarify the causes of a particular function.

RCA+ can be used as a standalone tool, but there is a risk of missing a significant element of a system, it is why there is a risk of narrowing the potential solutions space.

Application of Function Analysis

The problem is drawn from the main contradiction drown up above: **the mentoring process absorbs time of the experienced employees** (which they could spend on working with key accounts instead).

An example of the detailed functional analysis using organizational and management tasks is described in the author's book “TRIZ. Solving Business Problems" [3]. In this article, the solutions are presented without explanation of how exactly they were generated.

Note: If to apply Extended Function Analysis for business systems to this problem in the version proposed by V. Souchkov [5] instead “classical” TRIZ-based Function Analysis” [6], the results could be much better than in the case of applying the "classical" Function Analysis.

Component Analysis:

Table 1. Component Analysis (previously).

Investigated system	Subsystems	Supersystems
Mentoring system	1. Mentor 2. Mentoring program	1. New fellow workers 2. Market environment: a. Clients. b. Rivals.

Function modeling and ranking of functions (with final definition of system elements):

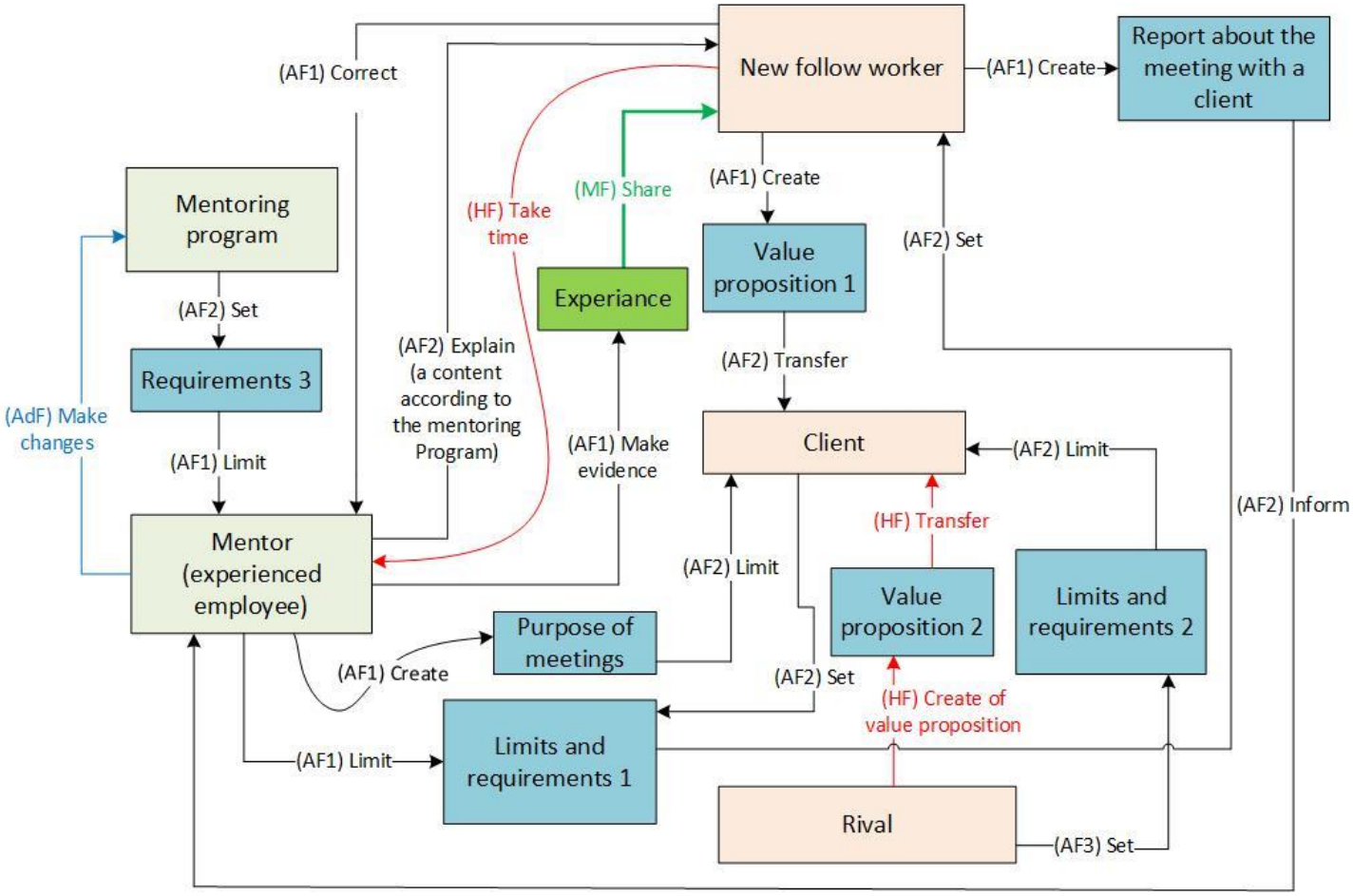

Fig. 2. Functional model of the mentoring problem.

Where:

- Green rectangle: an element carrying a main mentoring function.
- Pink rectangle: elements of supersystems from table 1.
- Grey rectangle: elements of supersystems from table 1.
- Blue rectangle: elements which are created due to analysis during drawing up the functional model, fig.2

Function model in the matrix form:

Table 2. Functional model in the matrix

№	Function description	Type/rank	Function performance	Notes
1. Mentoring program				

F1.1	Sets requirements to the experienced employee	AF2*	N*	
2. Mentor (experienced employee)				
F2.1	Makes evidence of his experience	AF1	E	Many not useful details
F2.2	Explains the content to new employee according to the mentoring program	AF2	E	This activity does not require high mentor's qualifications
F2.3	Creates purpose of the meeting	AF1	E	This activity does not require high mentor's qualifications
F2.4	Set limits and requirements according mentoring goals	AF1	N	
F2.5	Makes updates to the mentoring program	AdF	I	Mentor often forgets it
3. New employee				
F3.1	Creates value proposition through mentoring process	AF1	I	Lack of experience → new employee has a mentoring process
F3.2	Prepares a meeting report due to special formes	AF2	I	Himself / herself. Lack of experience → new employee has a mentoring process
F3.3	Corrects the transfer of experience by an experienced employee	AF3	N	new employee corrects the work of a mentor according to his activities
F3.4	Spends mentor's time	HF		It's our goal.
4. Client				
F4.1	Sets limits to an experienced employee	AF1	N	Client sets the scope within which mentor's actions are possible.
F4.1	Sets limits to a new employee	AF1	N	Client sets the scope within which new employee's actions are possible.
5. Rival				
F5.1	Creates value own value proposition	HFp		A rival is trying to provide its proposition.
F5.2	Sets limits to the client	AF1	N	A rival creates additional restrictions in which the client acts.
6. Mentor's experience				
F6.1	Shares with a new employee	MF	N	
7. Value proposition 1				
F7.1	Transfers to client	AF1	N	It's enough to mentoring process.
8. After meeting report				
F8.1	Informs mentor about particularities of meeting with a client	AF2	N	It's enough to mentoring process.
9. Purpose of meetings by mentor				
F9.1	Limits client's responses	AF2	N	

10. Limits and requirements 1				
F10.1	Sets requirements to the new employee within the meeting time	AF2	N	
11. Limits and requirements 2				
F11.1	Sets rival's requirements to the client within the meeting time	AF2	N	We can only respond to them
12. Limits and requirements 3				
F12.1	Sets program's requirements to the mentor	AF1	N	
13. Value proposition 2				
F13.1	Transferring of rival's value proposition to the client	HF		

Where:

- MF – main function.
- AF – auxiliary function with rank 1…n.
- AdF – additional function.
- HF – harmful function.
- I – insufficient function implementation.
- E – excess of function implementation.
- N – normal (sufficient) function implementation.

The system of tasks which resulted from the assessment of the function model:

1. How to make it possible that the mentor does not broadcast the content of the program to the new employee?
   Solution: E-learning; a new employee plans a lesson with a mentor, guided by a well-known mentoring program.
2. How to make it possible that the mentor does not spend time explaining the purpose of the meeting to the client?
   Solution: the employee does it on his own, when the mentoring program includes a block for explaining the purpose of the meeting with the client (the new employee draws up the explanation according to the given complementary materials).
3. How to make it possible that the mentor does not forget to make updates to the program, while not wasting time making them? This is an important task, as the company loses important information that is the property of the mentor. **It is a separate task that needs to be solved additionally**.
4. The mentor spends the main time (F3.4) to help the employee to implement the F3.1 function in a high-quality manner. This is the main purpose of mentoring!
   Solution 1: to integrate as much as possible the implementation of the F3.1 function into F3.2, that is, in the process of preparing for the meeting and preparing reports to the mentor, the new employee plans his dialogue with the client in the direction of creating value by points. These subjects are defined as a meeting preparation and report template. During further discussion with the new employee, the mentor checks those points of the new employee's report where the new employee achieved success and those points that need to be improved.
   Solution 2: an electronic "journal" of mentoring, which allows you to see the subjects of creating value in which the new employee achieved success and the points in which the progress of the new employee is visible. The mentoring journal needs to be harmonized with the sales funnel and KPI accepted in the sales department.
5. Setting up tasks from the position of element elimination (trimming). We try to remove the element "mentor".

6. The mentor overcharges the new employee with many details which are not useful.
   Solution: mentor has to transfer own experience according the checklist with titles of key notes due to such forms of activity that they are training now.

Table 3. Remove an item from the system.

Rule	Rule description	Task after element elimination
Rule A	If there are no new employees, then a mentor in the system is not needed.	1. How to eliminate the stuff turnover in the sales department? 2. How to do that when expanding the business of the company, the sales department does not become enormous?
Rule B	New employee educates himself.	How make it possible that a new employee quickly achieves KPIs in the allotted time for this without mentor assistance?
Rule C	Other elements of the system train a new employee, namely: a. mentoring program. b. client. c. competitors. d. other new employees. e. more experienced colleagues.	1. How to organize correct feedback from clients on the quality of employees' work with experience up to one year to correct their skills quickly? 2. How to get feedback from competitors on the work done by new employees with clients? 3. How to organize mutual training of new employees? 4. How to involve more experienced colleagues (not mentors) in the training process so that they do not spend time on mentoring?

Solutions:

Rule C, p. 2: it is easy to get feedback from competitors through interaction with them within the framework of entrepreneurial social communities; or within the framework of accelerators, if joint participation is planned, etc. The exchange of experience must be included in the agenda of several events.

Rule C, p. 3: organize periodic meetings of new employees to exchange experiences (one time per month) under the supervision of a mentor (the mentor's time is won because he spends time not on a single person but immediately on a group). The secondary task: how to organize a high-quality reflection of experience at such meetings to use it in your company?

Rule C, paragraph 4: you need to organize a convenient removal of statistics from the CRM-system so that new employees can see:

a. The dynamics of the development of the client (project), which the more experienced colleagues see too.

b. A summary report which shows the dynamics of the development of clients (projects) in the context of their management by several employees, as a result of which the actions leading to the progress of the sales funnel (visible in comparison) immediately on the CRM system [4].

Conclusion:

In this example, Function Analysis made it possible to uncover significantly more particular problems in the system under study, and therefore, allowed more interesting solutions to be found than with causal

analysis. It is worth noting that when conducting RCA+ while realizing several projects, we built much more detailed cause-and-effect chains. Respectively, with the help of such cause-effect chains a significant amount of determined problems provided many tasks and found a lot of interesting solutions, so the comparison of the number of tasks does not seem to be correct.

But one thing is clear: RCA+ sometimes requires construction of huge cause-and-effect chains when solving business problems. On the one hand, it is not convenient and on the other hand, it is quite difficult to determine the elements of an organized social system which represent the starting points to carry out research through RCA+. That is why there is a strong recommendation to use RCA+ when you analyze the ordinaire problem only. Using the RCA+ with a functional analysis would be conveniently, either using CECA with FA.

It is worth paying special attention to the degree of quality of the problems found by using Function Analysis. Solving a system of problems obtained as a result of Function Analysis allows us to obtain solutions with a high degree of detail. It is very important when solving organizational and managerial problems because when having deal with problems similar to these, we often get the directions of transformation at the output only, but not specific ideas that can be implemented in the company without long discussions to elaborate these ideas.

Advantages:

Function Analysis is a powerful TRIZ tool for analyzing organizational and managerial tasks. The advantages of this method from the point of view of solving organizational and managerial problems include a significant depth of problem analysis and obtaining a system of particular problems, solving which allows us to obtain solutions with a high degree of readiness to use, solutions that are sufficiently cleared of “information noise” (there is a lot of information noise in business tasks), and therefore, more powerful solutions.

Disadvantages:

The disadvantages of Function Analysis include the high complexity of the method, which complicates its application to organizational and managerial tasks, characterized by many factors affecting each of the elements of a business system under consideration. Many factors complicate definition of functions in business system. The author estimates that the use of this method for analysis of organizational and managerial tasks is a very promising approach, but is recommended either for small business systems or for individual sections of more complex organized social systems (in particular, business systems), where a time-consuming analysis is justified in terms of the impact on final result.

Application of Schematization

Schematization is a method similar to Function Analysis which has one significant difference. Schematization allows us studying elements of a business system according to the logic of management hierarchy in the business system. The method was proposed by the author based on the previous works of G. Shchedrovitsky. This method is described in detail in [3].

Before applying this method, we recall the task once again: **the mentoring process absorbs time of the experienced employees** (which they could spend on working with key accounts instead).

We construct the model of the problem in accordance with the concepts of systems (Fig. 3).

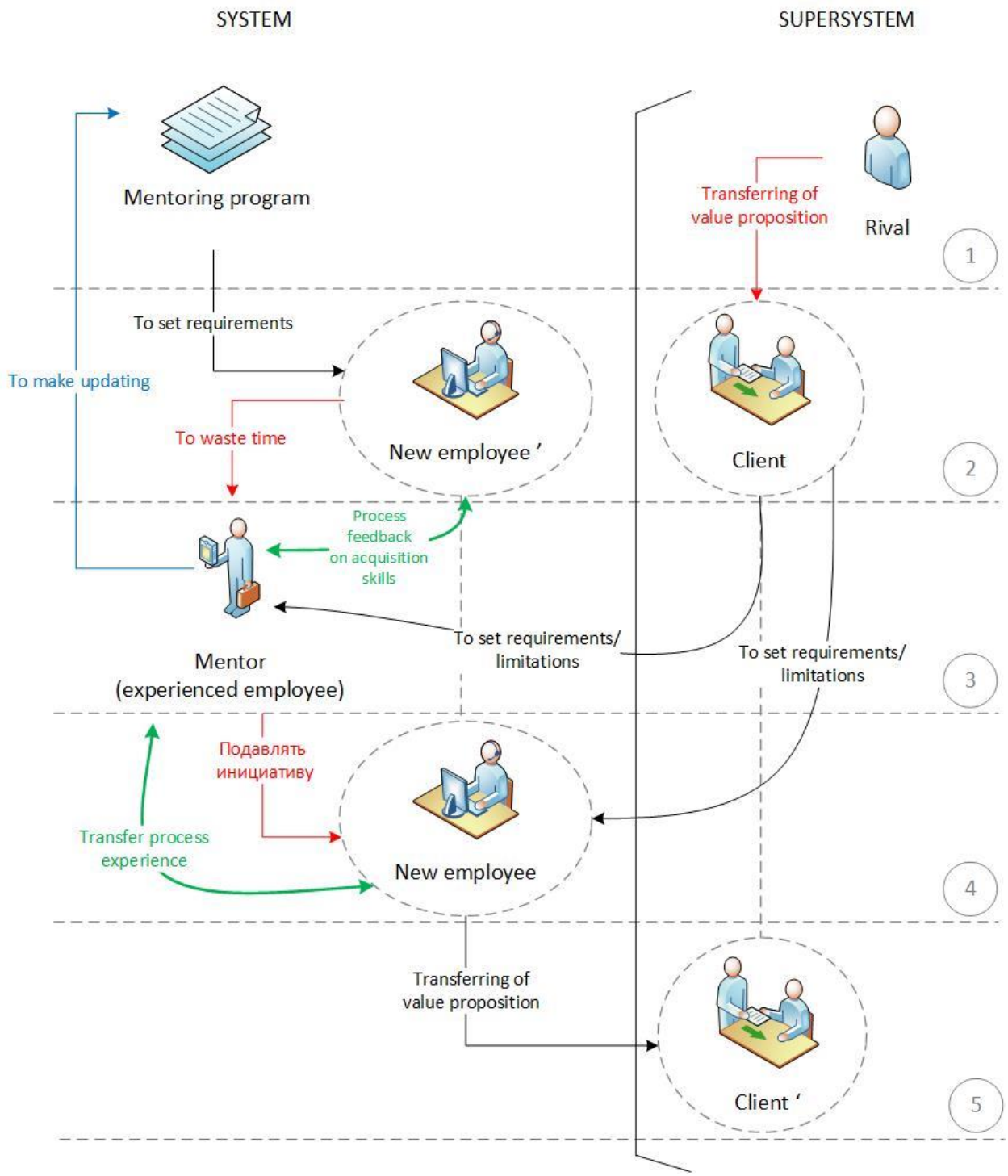

Fig. 3. Schema of problem situation.

The concepts of systems were defined by G. Shchedrovitsky in [7]:

- Elements of the system (subsystems, supersystems) - subjects and objects.
- Hierarchical levels on the schema.
- Types of relationships between elements:
  - Connections.
  - Processes.
  - Functions.

- Generalized objects.
- Content of generalized objects.
- System framework.

Principe of problem statement as a result of schema's analysis:

1. Tasks at the contact points of a system and its supersystem.
2. **Tasks set by hierarchical levels** (this paragraph explains the main feature of the schematization and its significant difference from functional analysis. You can see 5 hierarchical levels on the fig. 3). **Common approach: how to improve the management of object A (located on a higher hierarchical levels) by object B (located on a hierarchical levels below)**?
3. Tasks set inside aggregated elements.
4. Tasks assigned to processes, functions and relationships not investigated in paragraphs from 1 to 3.
5. Tasks set at the junction of a generalized object / content of a generalized object.

A detailed description of system concepts and how to set tasks within the schema see in the author's book [3].

The tasks posed by the results of the analysis of the circuit in fig. 3 (the matrix of tasks according the schema):

Table 4. Tasks according to schema of problem situation (Fig. 3). Table of tasks.

Type of task	**№**	**Task description**
1. Tasks at the contact points of the system and the supersystem.	1.1.	How to make it possible that the client requirements reduce time spent by an experienced employee in the process while maintaining the quality of training new employees?
	1.2.	How to make it possible that a new employee creates a value proposition for a client without the participation of a mentor? *(the mentoring is eliminated from the new employees professional growing process).*
2. Tasks set by hierarchical levels	2.1.	How to make it possible that the mentoring program corrects the activities of a new employee in such a way that an experienced employee would spend little of his time?
	2.2.	How to make it possible that in the process of providing feedback to the experienced employee a new employee affects the activities of the experienced employee so that the experienced employee spends as little time as possible?
	2.3.	How to set up the process of transferring experience from an experienced employee to a new one so that an experienced employee does not waste his time on it?
	2.4.	How to eliminate the suppression of the initiative of a new employee in the process of transferring experience from an experienced employee to a new one?
	2.5.	How to make it possible that the competitor's value proposition manages the client's activities in such a way so that the transferring of experience from an experienced employee to a new one will be faster than what is happening now?
3. Tasks set inside aggregated elements.	3.1.	*Since the task is set in the field of B2B-sales, the client should be considered the most important aggregated element.* How to make it possible that the various client's Decision Centers and their interaction contributes to the transfer of experience

		from an experienced employee to a new employee, while minimizing time spent by an experienced employee?
4. Tasks assigned to processes, functions and relationships not investigated before.	4.1.	How to make it possible that the mentoring program updating is produced itself so that an experienced employee does not waste his time on it?
5. Tasks set at the junction of a generalized object / content of a generalized object	5.1.	How to make it possible that when the experienced employee is conducting mentoring, the personal characteristics of the new employee (strengths and weaknesses) are considered as much as possible so that an experienced employee does not waste his time on it?
	5.2.	How to make it possible that the existing competencies of a new employee minimize the participation of an experienced employee in the process of transferring his experience?

Matrix of solutions:

Table 5. Matrix of solutions due to the table of tasks (Table 4).

Task's number	**Solutions description**
1.1.	1.1.1. You need to know customer requirements in advance. It is achieved by ranking customers by customer's channels and categories (according to ABC-analysis [4]), with a detailed description of customer requirements in accordance with their typology (customer portraits, benefits matrix [4]). 1.1.2. You need to explain the basic knowledge of a meeting with clients to a new employee. This issue can be successfully closed by less experienced employees instead of mentors (experienced employees).
1.2.	To remove a mentor (experienced employee) is an enormous task. It is of a higher level than the rest of the tasks, which are set according to the scheme (Fig. 3), since it directly corresponds to the main goal defined in the initial conditions of the task.
2.1.	2.1.1. Transfer of trainings online. 2.1.2. Detailed explanations of the points of the mentoring program (the program is prepared in Google docs, the points of the program are made in the form of links [4], after which a new employee can receive a detailed comments and explanations); the use of infographics, pictograms (visualization to simplify the perception of this information). 2.1.3. Introduce the principle of "inverted education": the employee studies the proposed materials, thus a usual transfer of the materials from the experienced employees is excluded. Next, the new employee presents his understanding to an experienced employee who draws up a corrective action plan in a pre-prepared template.
2.2.	2.2.1. *It is necessary to somehow provide feedback in a special way, and for this it needs to be set, structured*. Therefore, material should be integrated into the training modules to provide feedback on the completed tasks towards an experienced employee: the form of providing information, content requirements, the procedure for answering questions. Moreover, you need to create a whole "mentor kit". 2.2.2 It is necessary to exclude any duplication of feedback. Therefore, it is recommended that the mentoring process be divided to elementary forms of activity and feedback should only be received per one form of activity at the same time. 2.2.3. *additionally*: if an employee cannot carry out initial form of activity in the course of one iteration, then other new employees should also be involved in the process of

	finalizing this form of activity (working in pre-prepared mini-groups, mutual improving of their activity).
2.3.	2.3.1. it is necessary to clearly separate the process of transferring knowledge from the process of transferring experience. This solution is a part of solutions 2.1.3, 2.2.1, 2.2.2. It is necessary that the new employee have possibility to receive the necessary information (2.1.1, 2.1.3), and then adjust his feedback (2.2.2) according to his experience. 2.3.2. It is necessary to ask epy experienced employees to provide 3-5 typical cases for the most important subjects of sales activity with a detailed analysis of their solutions (e.g. record videos), and then present these cases to new employees. The second stage, when they start working out the office with their clients, they must demonstrate these forms of activity in contact with real customers, plan 2-3 sessions of improving their activity forms. Thus, we create a hierarchically organized system of mentoring, which depends on the degree of level of skills of new employees. It ensures that most of the transferred competencies will not disappear due to inability of a new employee to perceive practical particularities. 2.3.3. It is necessary to delegate mentoring in part of activity forms to less experienced employees, and to transfer part of the simplest activity forms to new employees, while self-learning of those parts where is no difficulty in transferring experience must be done by new employees.
2.4.	Previous solutions lead us to a rather rigid mentoring structure, however, if you need to keep the maximum initiative for a new employee. 2.4.1. To include a block in the mentoring process to explain one's own vision of the process of tasks in the studied forms of behavior by new employees. 2.4.2. To include the obligate work of new employees in the mentoring process to structure their activities, taking into account the comments of an experienced employee on important forms of activity, followed by the presentation of their vision to an experienced employee.
2.5.	It is necessary to know how to collect and systematize information on the value of competitors' proposals for the client, followed by using this information as a means of adjusting the forms of activity of a new employee. To do this: 2.5.1. It is necessary to create a database of competitors' value propositions. 2.5.2. It is necessary to periodically update the hypotheses of customer needs in *the matrix of benefits* depending on the information received by the competitors' value proposition database. 2.5.3. It is necessary to prepare a new employee for a meeting with a client using *the matrix of advantages* and a database of competitors' value propositions. Besides, it is very useful to valuate new employees' activity with a specially developed *training card*, i.e. an experienced employee gives recommendations on the completed card by the new employee.
3.1.	3.1.1. Make preparations for a meeting with a client and the meeting with the decision makers by a separate process controlled by less experienced employees. An experienced employee only controls preparation for the meeting with a client and the meeting itself with the decision makers (the experienced employee helps prepare a business case only).
4.1.	4.1.1. A training manager (or an employee acting as a training manager in a small company) should make changes based on the results of periodic meetings with mentors and new employees who go through the mentoring process.
5.1.	5.1.1. HR is developing an *employee competency profile*. The mentoring program is adjusted depending on the *employee competency profile* - its theoretical and practical parts can be improved. If a profile shows high competencies for self-training, then the mentor sets control points of the mentoring process. The resource of an experienced employee is used at control points only! The rest of the entire process of mentoring the

	employee goes on their own according to the offline program or online training module (online training is preferable).
5.2.	5.2.1. see solution 5.1.1.

Conclusion:

As for author's opinion, the use of schematization made it possible to get a little more interesting solutions than functional analysis due to the *ability of schematization to study the* hierarchical levels *of investigated business system*, and also consider a person in a business system *from two perspectives*: from the standpoint of its business function and from the standpoint of its personal capabilities.

Conclusiones

Important note: *Decisions found as a result of FA application and schematization application are not final. Further, it is supposed to form a system of contradictions and their subsequent solution, which will significantly improve the preliminary solutions found. As the author's experience shows, this approach usually allows you to find solutions that satisfy the owner of the problem. The system of contradictions is not given in this article, since only the tools for preliminary analysis of the problem are considered.*

Such tools as Function Analysis and Schematization provide the most in-depth analysis of the organizational and managerial problems and help to identify enough high-quality preliminary management solutions. Such solutions should be considered preliminary because many of them will need to be further improved by resolving contradictions.

In addition, due to the consideration of some features of organized business systems, the schematization allows one to find a larger number of preliminary useful solutions, as it allows one to consider the interaction of system elements from some important points of view, that are not visible after carrying out functional analysis, especially for **hierarchical levels of control and not only generalized objects and content into ones, but also their relationships**.

During analyzing hierarchical levels using Schematization, 12 solutions were found (2.1.1 – 2.5.3). When considering the generalized objects / content into generalized objects relationships, the most valuable and previously unobvious solution in this project was found (5.5.1).

As a conclusion, we can consider Schematization as a promising tool for a comprehensive analysis of organizational and managerial tasks. While Schematization looks as a tool very similar as Functional Analysis, it is not the same tool due to identification of hierarchical levels of control in the schema. This feature significantly changes the general appearance of the graphic model and affects approaches to its subsequent analysis.

6. Method Comparison Chart

№	Measure	RCA+	FA	Schematization
1	Coverage surface (the tool allows you to cover the entire investigated system or part of it)	+	++	+++
2	Depth of the problem analyzing	+++	++	+
3	The number of identified tasks from the original problem	+	+++	+++
4	How much the identified tasks correspond to the models adopted in TRIZ	+++	++	++
5	How much time was spent analyzing (*more signs «+» corresponds to less time*)	+++	+	+

6	Identification of hierarchical relationships between system elements (important for business tasks)	-	-	+
7	Dual consideration of a person: as an element of a business system and as a separate system with its own properties	-	-	+

References

1. Altshuller G., Zlotin B. and other authors. “Search For New Ideas: From Insight to Technology”. Chisinau, Cartya Moldavanske, 1989. (in Russian)
2. Kozhemyako A. “About systemic thinking of the head of the sales department. Apply system analysis” *Sales Management. 2018,* №3. pp. 162-182. (in Russian)
3. Kozhemyako A. “TRIZ. Solving Business Problems”. Moscow, Synergy University, 2019. (in Russian)
4. Kozhemyako A. “Smart sales era in the B2B market. How to conduct an audit of a commercial service on your own and break away from competitors”. — bit.ly/2SSNcht.
5. Souchkov V. "Extension of Function Modeling to Non-Technical Systems". In *Proceedings of the 15th International Conference TRIZfest 2019*. The International TRIZ Association - MATRIZ. September 11-14, Heilbronn, Germany. 2019. pp 130-137.
6. Litvin, S., Feygenson, N., & Feygenson, O. Advanced Function Approach. In *Procedia Engineering*, 9, 2011. Pp 92–102.
7. Schedrovitsky G.P, “Organizational Management Thinking: Ideology, Methodology, Technology (lecture course)”. Moscow, Publishing house of the studio Artemy Lebedev, 2015.
8. P. Checkland. Soft Systems Methodology: A Thirty Year Retrospective. Systems Research and Behavioral Science. Syst. Res. 17, S11–S58 (2000)