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Special Features of the Use of TRIZ for Solving Organisational-Managerial Tasks (OMT): Schematization of an Inventive Situation and Work with Contradictions

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Особенности применения ТРИЗ для решения организационно-управленческих задач: схематизация изобретательской ситуации и работа с противоречиями.

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Contents

Chapter 1

Introduction

This work belongs to the field of Theory of Inventive Problem Solving.

The work consists of 2 sections and appendices.

The first section is devoted to schematization used in the analytical phase of an inventive situation[1] solving OMT. It is shown that most problems in organized social systems are set by the stakeholders in a form that is not enough informative for its processing using TRIZ tools. What is typical in general also for tasks in any other areas, for example: ≪increase productivity of the line by 5%.≫ Such tasks always come with high uncertainty, since resources to achieve the goal in these tasks are drawn from soft systems such as human and their interaction.

The most convenient way of initial presentation of OMT in a form convenient for further processing, according to the author, is schematization used by the followers of G.P. Shchedrovitsky, which was initially developed by the Moscow methodological circle (MMC) specifically for the analysis of such a class of tasks. In the section it is described in detail how TRIZ tools ≪are arranged≫ for a preliminary analysis of the problem using schematization.

The second section is devoted to the choice of the operational zone[2] for OMT and the allocation of resources in the operational zone. This is also addressed by M.S. Rubin in his works: ≪The character of the interaction field in business systems determines the different nature of the space or zone of conflict. This is not a physical space, as it is usually the case in technical systems, but rather a multidimensional space-set, consisting of conflicting elements and relationships between them≫ [44].

In this work the scope of application of this tool is described and explained why this approach is preferable precisely for this class of problems.

In the Appendix the practical application of the described methods is shown.

[1] This is *a situation characterized by the presence of necessity to satisfy the demand of a specific supersystem without a clearly defined set of problems for the further solution or direction of solving the problem* [42].

[2] Part of the physical spaces where the conflict or undesirable effect arizes that generates the inventive situation [42]. It is worth noting that the area in which the conflict in solving OMT is located, is not necessarily defined as a physical point in space – remark by author.

1.1 Relevance of the research topic

Since the 1990th, in the TRIZ environment the application of the methodology to the solution of problems in social systems has been actively discussed ([1], [2], [3], [4], [5], [36], [37] and many others sources). A number of TRIZ specialists successfully applies its tools in projects on business systems and other organized social systems, for example, to the evolution of creative teams [37], to other organized social systems, whose purpose is not to make profit (government structures, military units, police, judicial system, healthcare, etc.). For that time TRIZ specialists have accumulated many successful cases in solving problems in social systems, which indicates the intensive development of TRIZ in this direction (in a number of works, business systems are not classified as social ones [5], but as information systems [1]). Some examples of TRIZ applications to business tasks are also described on the website of the author [6].

As any artificially created (organized) system a social system tends to entropy [23], [38], hence in such systems an obligatory function is control. When implementing a control function in a dynamically changing supersystem, modern managers face many challenges, which the author calls organisational-managerial [11]. The notion ≪organisational-managerial task≫ (OMT) will be unfolded in more detail below.

Most of such problems usually do not cause difficulties to managers and are solved by analogy, since most situations with which a manager is faced in everyday practice, are of known type [10]. However in conditions of modern rapidly changing economic and social reality the manager is faced with many inventive situations [39], which are difficult to resolve in the usual way [11]. It should be noted that the use of TRIZ for solving OMT ist still not structured, up to initial provisions. Take at least an emphasis in the definition of business systems: a number of authors (N.N. Khomenko [37], V.A. Korolev [5], B.V. Shmakov [8], etc.) call such systems social, and, for example, E.A. Sosnin and B.N. Poyzner [1] call them informational). In a number of works such systems belong to some indefinite set – so called ≪non-technical systems≫ (for example, [7]) or business systems that is already somewhat more accurately [2]. Even if, of course, business systems are important, they are still subsystems of a larger class of systems – organized social systems, which include, as mentioned above, not only profit oriented systems. OMT can arise in any of the listed types of organized social systems, as in any of these systems there is a management function, during the implementation of which inventive situation arize.

Many attempts have been made to transfer TRIZ tools designed for solving problems of transforming technical systems to OMT, some of which have taken well, whereas some of them are the product of a direct, but ineffective transfer from one sphere to the other, therefore the use of such tools is doubtful, for example, the ≪direct translation≫ of the matrix of G.S. Altshuller into the language of business systems [8] (it should be noted here that along with attempts to directly but ineffectively transfer the methods of resolution of technical contradictions there are also deeply developed versions for solving problems in the field of business, for example, the matrix of D. Mann, author of *Hands-on Systematic Innovation for Business and Management* [9]), however, these methods can only be applied after formulating a contradiction, which is hardly possible at the beginning of work on OMT.

In general, the problem of studying the inventive situation before applying TRIZ tools is a separate large-scale task. In many aspects the application of TRIZ for solving such problems

is “lame” precisely because of lack of tools for reliable inventive situation analysis.

In addition, there is an assumption that the term ≪business system≫ [2] includes partly (but does not completely cover) both social systems and informational ones. However, this classification does not outline sharp edges of such systems and it is difficult to understand where the social system ends and the informational one begins. Since the systems described by the above concepts are very intertwined and the boundaries between them blurred, the author does not consider it appropriate to separate in business systems social and informational subsystems. It's enough to understand that business systems are part of a larger system: organized social systems. The author believes that it is easier to deal with the concept of **organisational-managerial tasks** (OMT), this concept indicates that **the task is set in any organized social system by a subject which has a goal of producing a certain improvement in the interaction of the elements of the business system bound by informational and social relationships** [40].

Why does the author call this type of task organisational-managerial? It is known that organisational tasks are associated with optimisation of the allocation of resources with the goal of getting the most impact out of them. Below it will be shown that organisational tasks can be posed at the level of both filling and generalized objects in business system (definitions of generalized objects and filling are given below). **Organisational tasks** are connected with the organisation of links between generalized objects in the business system and filling generalized objects of a business system according to its properties. **Managerial tasks** are tasks related to the **improvement of the efficiency of activities** of elements of a business system that are in certain relationships. Since the subject usually needs to increase the effectiveness of a business system or some subsystem of it, it most often initates both organisational changes and managerial influence. In the literature, these types of influences are not often distinguished (for example, [23]), however, these concepts are sharply divorced in the work of G.P. Schedrovitsky [10], therefore, the author uses this classification and talks about OMT if it is required to increase the effectiveness of a organized social system (in particular, a business system) or any of its subsystems. **Below the author uses the term ≪OMT≫ in the context of tasks related to improving the efficiency of organized social system or its subsystems**.

It is worth noting that the author did not meet generally accepted terminology, which is clearly describing similar systems, with the exception of the generally accepted position that an organized social system is designed for the goals of the customer (short, medium or long term). Terms describing the structure of organized social systems, not counting the generally accepted classification describing the hierarchy of the internal structure – organisation, top-management, departments, sections and project teams [26], [28], [32] – are not known to the author.

Thus, the urgent question is the elaboration of an inventive situation for OMT aiming at the possibility of further analysis provided that most solvers get such tasks in insufficient formalized form, therefore, a method of preliminary analysis is required for similar tasks. It should be noted that with the problem of formalization of OMT are faced not only specialists in the field of TRIZ, but also the members of the Moscow Methodological Circle (MMC) under the leadership of G.P. Schedrovitsky [10] were actively engaged in such problems. As a result of their activities, they developed the method of schematization of such tasks [41], which perfectly copes with this problem, but generates another one: this tool perfectly helps

in the initial ≪entry to the task≫, that is, in the initial analysis of the inventive situation, but is practically useless for its further solution, however, for the problem of ≪solving in depth≫ management tasks through the identification of contradictions and their subsequent resolution TRIZ mechanisms are well suited. This thesis is confirmed by work experience of the author together with representatives of the methodological school of G.P. Shchedrovitsky in a number of projects.

In addition, trying to use the IFR operator to resolve inconsistencies in OMT [11], the solver inevitably faces difficulties in determining the operational zone (OZ) and the resources that can be mobilized for the search for the most effective solution, since the boundaries of the OZ are outlined by abstract concepts, rather than by the physical frame of conflict, as in technical tasks. In this paper, an attempt is made to formalize the selection of the OZ when resolving contradictions in managerial tasks. The author shows how in this way it is possible to outline the OZ not as a point in space, as in technical tasks, but in the plane of abstract concepts that are often used in the description of conflicts in organized social systems (motives, incentives, reaction, values, desire, competencies, key performance indicators, etc.), which is the core of a number of OMT [11]. Application of a similar approach, including the use of a shortened version of ARIZ and its elements to solve such problems is given in a number of cases on the author's site [6].

The practical need for preparing OMT for further analysis using TRIZ tools is long overdue. Also obvious is the need to offer a simple and convenient mechanism for determining the operational zone, since the lack of a methodologically developed mechanism for determining OZ restrains the use of ARIZ for this class of problems [11]. The author believes that short ARIZ versions (in 6-7 steps) are an excellent tool for solving OMT, which managed to prove itself in practice as a reliable tool that provides sustainable results.

1.2 Goals and objectives of the research

The objective of this work:

- Propose a way to formalize business tasks using schematization and draw up a roadmap for applying schematization to solution of OMT in order to further successful application of TRIZ tools.
- Develop areas of transition from schematization to TRIZ tools, including the level of the terminological apparatus. This question is relevant also because between TRIZ specialists and SMD methodologists (followers of the school of G.P. Shchedrovitsky) an active exchange of information has been going on during the last several years, however the issue of transition between tools until now no one worked out;
- Develop a method for determining the operational zone in OMT, taking into account the specifics of formulation of conflicting elements in similar tasks.

1.3 Scientific novelty of the research

The scientific novelty of this work is as follows:

- The author has developed a method for applying schematization to training OMT for

the further use of mechanisms TRIZ as an indispensable condition for the analysis of inventive situations in the field OMT.
The author conducted a detailed analysis of the work of G.P. Shchedrovitsky and based on the studied material developed a sequence of schematizations for the analysis of inventive situations simplifying the further use of TRIZ tools in order to solve such problems. The author considers analogues of such approaches used in TRIZ (system operator and functional modeling during the FVA), and concludes: **schematization has a unique mechanism for determining managerial layers, and also concepts of generalized object and filling, which provides new opportunities for statement of partial tasks in solving OMT, with the ability to scale the obtained solutions**. Such opportunities are missing in the existing scope of TRIZ tools, which significantly prevents the use of TRIZ mechanisms to solve OMT.

- **The author proposes a system of problem setting** based on the results of schematization of inventive situations using by means of sequential analysis [11]:
  - the model of a viable system (MVS) at the system-supersystem border;
  - degrees of controllability by layers in the scheme;
  - interconnections (links, functions, processes);
  - generalized objects and their filling.
- A roadmap was compiled:
  - Identify the problem situation.
  - Define the conflict area and identify conflicting pairs (objects and subjects of OMT)
  - Add system elements around the conflicting pair and identify secondary problem situations related to the task.
  - Define the relationship between the elements of the system at the level of generalized objects (≪generalized object≫ is s term, which is explained in detail in the text of the thesis. The term does not replace, but complements the notion of an ≪element of the system≫, is a subsystem of a system element). If necessary identify processes.
  - Identify the nearby elements of the system, including ≪regulators≫.
  - Identify conflicting areas of generalized objects and fillings.
  - Set up a system of tasks by carrying out an analysis:
    - of a model of a viable system (MVS) at the system-supersystem border;
    - of the degree of controllability by layers in the scheme;
    - of the interconnections (links, functions, processes);
    - of the generalized objects and their content.
- A method for determining the operational zone in the OMT was developed that is characterized by a high abstraction of descriptive characteristics, as a result of which it is impossible to outline a part of real space, in which the conflict develops (different to most technical tasks). This method makes it possible to use ARIZ mechanisms to resolve contradictions in OMT at a high degree of abstraction. **The novelty is that using the method, developed by the author, the solver can not only determine the operational zone as a physical contour of space (it is worth noting that this possibility reinforces the use of schematization, where it's very convenient to elaborate such parts), but also to determine the operational zone directly from the formulation of a technical contradiction, and subsequently identify**

resources of the operational zone in the form of factors determining the system state and the properties indicated in the technical contradiction. The ability to allocate resources from abstract concepts is the most important skill in solving OMT, since the physical contour of space can just not to be at the disposal of the solver [11].

- A roadmap is compiled:
  - Formulate a pair of TC (technical contradictions);
  - Choose the main TC;
  - The conflicting pair of the selected TC forms the operational zone, including tool and product;
  - Identify the resources as a group of factors affecting the tool and the product;
  - Further on, we work in the ARIZ logic: assign an IFR rule, substitute product and tool resources in the IFR rule, etc.

It is worth noting that the author came across with the opinion of a number of experts that in relation to OMT, it is incorrect to use the term ≪technical contradiction≫. Some TRIZ experts consider it worth to identify market, organisational, interpersonal and psychological (intrapersonal) contradictions [40]. The author does not agree with this principle of division, since TC is a form of conflict representation, and the listed contradictions do not relate to the form of presentation of information, but to the level of solving the problem (in TRIZ initially considered as macro and micro level, and such a classification applies clearly to the level of problem solving. If the term ≪technical contradiction≫ introduces some embarrassment, on can be use the already the well-established notion of a ≪dialectical contradiction of the first kind≫) [11]. Certainly understanding of typical levels of formation of contradictions when solving OMT is an important information for the solver, simplifying the formulation of contradictions, but terms describing levels in OMT and the concept of ≪technical contradiction≫ are not identical, and therefore interchangeable.

It is worth noting that when solving OMT, the method for quickly resolving technical contradictions is actively used, which is especially important for the solution of OMT characterized by a variety of contradictions. The method was developed in the System Restriction Theory (SRT) for working with a ≪thundercloud≫ (the method is described in detail by Darrell Mann already in 2000 and published in *The TRIZ Journal* [12]), however, since in TRIZ it is used a slightly different form of graphic representation of the contradiction, the author adapted this tool, and as a result, the method of express analysis of contradictions became much simpler and now requires much less time than in the original version [12], which makes this tool extremely practical [11]. However, the author decided not to include a description of the modified contradiction analysis tool in the dissertation, as the author's innovation related to the transfer of SRT approaches for TC resolution in TRIZ do not have sufficient novelty and in one form or another are used by many TRIZ specialists [12], [40]. If desired, more details on the application of this approach by examples of solving practical problems are given in **appendix 3**.

1.4 The practical relevance of the research

1. The proposed methodology of schematization in order to formalize OMT allows you to:

  - Define the system contours without missing important details, and on the other hand, exclude «extra» elements of the system, taking into account the objectives of the task at the expense of system visualization and highlighting the position of the solver. The system operator is in the author's opinion not an alternative to schematization, since this tool has no means to describe the relationship between elements of the system, it describes only its composition;
  - Set a system of tasks to be further solved by TRIZ means, without omitting important aspects of the organisational-managerial task;
  - Several times reduce the time for communication within the team during analysis of the inventive situation.

2. The proposed methodology for identifying resources as factors affecting elements of the operational zone allows:
  - Reduce communication time to identify the operational zone, previously very lengthy considerations had to be made in order to identify the OZ in an organisational-managerial task in the case the solver intended to apply ARIZ to resolve a contradiction;
  - Identify the resources in the operational zone as significant factors affecting tool and product in the operational zone without searching for objects in the business system, thus dramatically increasing the speed of analysis and the quality of inventive solutions.

All this makes the proposed methods suitable for practical use in consulting projects. Detailed application examples in consulting projects prove the instrumental nature of the proposed methods (see appendix, as well as sources [6], [11]).

1.5 Key Points for the Defence

1. **Use of schematization to process invention situations in OMT and the relation between schematization and tools adopted in TRIZ**.
  - The goals of applying schematization in solving business problems.
  - The method of defining business tasks through schematization.
  - Terminological apparatus of schematization.
  - The scope of application of schematization and its application in conjunction with others TRIZ tools.
  - Conclusions on the use of schematization.
2. **Method of identification of the operational zone in OMT from the model of technical contradiction**.
  - The objectives of the identification of the operational zone in business tasks.
  - In what cases is it necessary to resort to the identification of the operational zone in business task.
  - Difficulties with determining the operational zone in business tasks.
  - The method for extracting the operational zone from the model of technical contradiction.
  - Definition of tools and products and identification of resources as factors, affecting the tool and product in the operational zone.

– Conclusions on the application of the method for identifying the operative zone from the model of technical contradiction.

1.6 Personal contribution of the applicant:

1. The use of schematization according to G.P. Schedrovitsky for pretreatment of poorly explained inventive situations in OMT with the purpose of obtaining a system of partial tasks, which are then processed with the TRIZ arsenal. Connection of schematization with TRIZ tools.
2. Application of the categories ≪Generalized Object≫ and ≪Filling≫ in order to obtain scalable solutions when using TRIZ tools in solving OMT. The terms ≪Generalized Object≫ and ≪Filling≫ are explained in detail below. Briefly: ≪Generalized Object≫ and ≪Filling≫ are subsystems of a system element, these concepts clarify the concept of ≪system element≫ and are of great practical importance when analysing OMT from the perspective of scaling solutions;
3. Development and testing of the identification of the operational zone in OMT.

1.7 Work approbation

1. Scientific conference ≪TRIZ. The practice of applying methodological tools≫. Moscow, 2016;
2. TRIZ Training in full-time and distance format, trained more 300 specialists. During the training, students solved problems from their practice under the author's guidance and used these tools in their projects;
3. At the time of writing the dissertation, the author has completed more than 50 consulting projects using these tools;
4. The book *TRIZ. Solution of business problems* / A. Kozhemyako. Synergy University, Moscow 2017. – 288 pp., Ill. With answers to questions from readers who applied the recommendations in their projects. In 2019 the 2nd edition, revised and supplemented, was issued.
5. Scientific conference "TRIZ-Summit", Minsk, 2019.

1.8 Publications on the topic of the dissertation

1. A. Kozhemyako. *TRIZ. Solution of business problems.* Synergy University, Moscow 2017. – 288 p., Ill .;
2. A. Kozhemyako. Non-technical TRIZ: experience in solving OMT, limitations and tools. Materials of the VIII anniversary conference *TRIZ. The practice of using methodological tools and their development.*
3. A. Kozhemyako. Ideas for the joint use of TRIZ and SMD for solving business problems. Published on the site `https://www.bmtriz.ru`.
4. A. Kozhemyako. Ideas for the joint application of TRIZ, SMD and TOS for solving business problems. Part 2. Published on the site `https://www.bmtriz.ru`.
5. A. Kozhemyako. Some points about systems thinking of the head of a sales department. We apply system analysis. Sales Management Magazine, 03 (98), 2018.

6. A. Kozhemyako. Schematization of the inventive situation in OMT. Materials of the conference *TRIZ-Summit*.
7. A. Kozhemyako. Specifics of the application of TRIZ in OMT. Materials of the conference *TRIZ-Summit*.
8. Morphological analysis to solve business problems. Published in the journal *Management today*.

1.9 Structure and scope of work

The work consists of an introduction, three main sections, a conclusion section, and six appendices, including examples of practical application of the proposed methods, set out on 83 pages; includes 28 figures, 10 tables, a list of references with 46 titles, including books and publications by the author on the topic of the dissertation.

Chapter 2

Research Results. Schematization of Inventive Situations

2.1 Objectives of the research

A solver using TRIZ to solve OMT is sharply faced with the question of a detailed clarification of the inventive situation. Practice shows that usually the solver receives such tasks from stakeholders in an insufficiently formalized form [11]. Simply put, we have to deal with ≪slogan≫ formulations of the problem [40], albeit accompanied by ≪digitized≫ indicators, as

- It is necessary to reduce the cost of our products by 10% within 3 months;
- Reduce labor expenses by 15% within 6 months;
- Increase the influx of target leads [16] to 300 units per week until the end of 2018; Etc.

It should be noted that not only TRIZ experts are faced with the problem of formalization of OMT. The members of the Moscow Methodological Circle (MMC) under the guidance of G.P. Schedrovitsky were actively dealing with this problem [10], and as a result of their activities, a schematization technique for such problematic situations [41] was developed, which is able to qualitatively cope with this problem, but does not have system tools for further work with OMT, which, in turn, are provided by TRIZ.

Objective of the research: to show the benefits of applying schematization in preliminary analysis of the inventive situation and develop a method to apply schematization in conjunction with TRIZ tools. Consider existing TRIZ approaches to formalisation of inventive situations and show areas of similarity and areas of difference. Show which benefits offers schematization compared to other tools of preliminary analysis of inventive situations. Link schematization with TRIZ tools solving OMT.

2.2 Minimal Viable Business System

Since the dissertation is devoted to tools for working with OMT, which, as indicated, can be set by stakeholders when trying to improve an organized social system, it is necessary better

to understand the functioning of such systems. Consider typical elements of an organized social system on the example of a business system. We begin by defining the concept of the viability of a business system developed by Valeri Souchkov [2]:

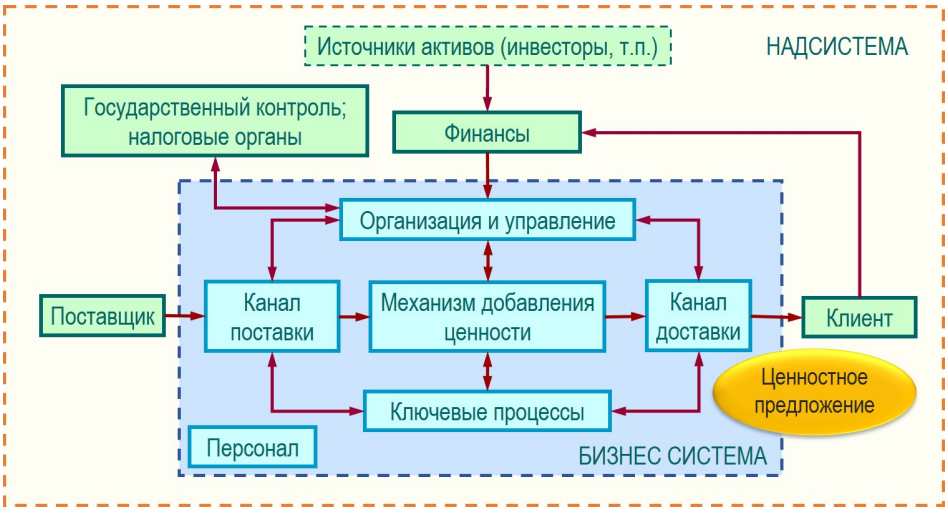

Fig. 1. Minimal viable business system.

As can be seen from the diagram in Fig. 1, for a business system to be minimally viable, it must contain a supply engine, an added value creation engine, and a delivery engine supplying value to the market. In addition, the viability of the system is supported by business processes and management functions (goal setting and control of their implementation), carriers of these functions is the personnel of the company, in particular managers. **In business systems, people are the most significant subsystems and supersystems**. The problem is that a person is a system with a high degree of uncertainty (low probability of predictability of behavior), and therefore, the same parameter of value at the input to the system can give a large spread of output values depending on the specific state of the system element, and it is often possible to observe a result that is very far from forecast.

Since a sustainable development of a business system is a primary goal, the functions of setting tasks and monitoring their implementation requires a clear vision from the manager [13], such that in business systems arise many inventive situations, the resolution of which can clarify the vision of the manager. It's known that with many inventive tasks, a manager is not coping due to the lack of a standard solution. In modern management it is estimated that more than 90% of managerial decisions are standardized [10], [23], but remaining unsolved tasks may reduce the effectiveness of business systems, and may remain unresolved for years, as practice shows. The author faced similar tasks in the field of document management, staff recruitment and training, marketing and sales, in the area of CRM systems ... The situation is aggravated by the fact that it is not always easy to find and adapt decisions from generally accepted practices – OMT often need to be closed pretty quickly.

Until these "white spots" can be overcome and clarity appears about their design in the mind of the manager, the function of setting tasks for execution and controlling them cannot be fully implemented. The business system is in constant movement, therefore such "white spots" in the activities of modern managers arise with enviable frequency, and time to overcome them less and less is spent from year to year. Similar tasks are called in this paper *organisational-*

managerial tasks (OMT). They have good potential for applying TRIZ tools and approaches.

Since the purpose of this work is to study the features of the application of TRIZ to the class of tasks set in business systems there should be given attention to the definition of OMT.

The author believes that in solving this class of problems it is worth to distinguish three forms of activity that form the basis of management [41]:

- organisation;
- leadership;
- management.

Organisation is the process of forming supersystems and / or subsystems of various level in business systems: associations, organisations, departments, workplaces finally. Organisation is the formation of the structure, that is, of the elements and their interconnections.

Leadership (from words to lead, lead by hands) is the setting of tasks to performers and monitoring their implementation.

Management is a change in the activities of performers. That is, when the structure is organized, all tasks are distributed (including tasks for feedback), but we are not satisfied with the efficency of the performers, we are trying to change their activity in the direction of improvement, that is, we begin to manage their activity.

All three of these activities form what can ultimately be called ≪Activities in business systems≫. Therefore, I propose to call such a class of tasks ≪organisational-managerial≫. *Of course, from the standpoint of using TRIZ, we are only interested in inventive situations that arise when solving OMT.* Further, using the term OMT, the presence of an inventive situation will be implied.

However, before using TRIZ tools, an inventive situation should be previously analyzed. Similar analysis in OMT has differences from pre-processing tasks in technical systems, primarily because an element of the system is a human – *a complexly organized element that has its own goals.* Moreover, the processes going on in such systems are often quite confuse, contain a lot of interrelations which are hardly to grasp and dynamically changing and require a special approach to their identification and description.

Below we discuss approaches used in both TRIZ and management consulting that can be (and are) used for describing OMT and compare them with the method proposed by the author of a description of an inventive situation in OMT.

2.3 Application of the SMART method to formalize organisational management tasks

SMART [14] (the extended formula “SMARTER” is also used) is a mnemonic abbreviation for the principle of setting goals. This model is today the basic standard when setting tasks to subordinates, we can say that this is the main international standard in this field. According to SMART, the task should be specific, measurable, attainable, relevant, correlated with a specific period (time-bounded). Perhaps this is the most world-famous way of formalizing OMT. Examples of tasks set in accordance with the SMART model:

1) 10% of the employees are stably late for work for 5-10 minutes, another 3% of the team are late for more than 15 minutes. As ≪stable delay≫ delays more than 5 times a month are considered. It is required to lower maximum stable lateness of employees up to 3, lateness of 15 minutes and above have completely to be excluded.

2) It is required to increase sales of the company's product (biologically active supplements from natural raw materials) by 20% until December 31, 2017. Growth through expansion of territories is unacceptable, an increase should occur in existing territories. Allowed increase in marketing budget – 10%.

This method of formalizing OMT is much better than the absence of any scheme, however, it is easy to notice that such a statement of the problem is good for execution in case the performers have all necessary resources to complete the given task and if the performers know ways to accomplish it (they know how to apply these resources to achieve the given goal). However, such a model is completely insufficient for formalization of the task in order to find the most effective conceptual solutions if there is no standard solution to the problem. Consequently, the SMART model does not open up the possibility of applying TRIZ methods, and therefore, it cannot be considered as a method of preliminary formalization of the inventive situation. In fact, the use of the SMART model does not allow the solver to switch from the inventive situation to a task (more precisely, to a system of tasks) suitable for further processing using TRIZ tools. **In the opinion of the author, what makes the use of TRIZ in the first place difficult for the solution of OMT is the lack of reliable and relatively simple tools, allowing to move from an inventive situation to a system of tasks in the field of business systems**.

The SMART model, though, makes important refinements to the understanding of the inventive situation, but does not solve the problem of preparing an inventive situation in OMT for further processing by TRIZ methods. Currently, the SMART method is a generally accepted method of goal setting all over the world, mastery of the SMART method is considered as one of the most important competencies of a modern manager, as almost indispensable management basics. However, to formalize the inventive situation in OMT, this generally accepted method does not give the required result – it does not help to derive a system of tasks from an inventive situation, which can subsequently be processed with TRIZ tools.

There is also another opinion. For example, a number of TRIZ specialists are convinced that if there are no standard methods or not enough resources to solve the given problem, then any TRIZ specialist will formulate a contradiction using standard formulas. The author strongly disagrees with this argument, since before a contradiction can be formulated according to standard formulas, for a successful solution of the OMT it is required to describe a model of a working business system (MWS) [15] and set up a system of particular tasks to its elements (subsystems and supersystems). Otherwise, we get a contradiction that is of extremely general nature, and therefore, there is a high risk of getting trivial decisions as output. The author recommends to formulate contradictions to each of the particular tasks posed after the analysis of the MWS. Otherwise, the solver risks that the obtained solutions are to ≪narrow≫, and as a result, a situation is possible when the solver will not finally reach the goal [10], [11].

It is worth noting that the tree of contradictions also cannot be used on this stage, since at the stage of formulating the OMT the set of contradictions is not yet visible – see the example at the end of the section (the problem of implementation a new sales system in the company).

Conclusion: the SMART method helps to specify the task to be performed, but

cannot be used as a tool for initial processing of an inventive situation.

2.4 Description of business processes

Description of business processes [34] is another method that is actively used in an consulting environment for preliminary processing of an inventive situation. It is usually resorted to the description of business processes if the solver believes that an organized social system does not function rationally, which means, unlike the previous method of tasks setting, has a narrower scope. As a rule, this tool is used to analyze the inventive situation in order to increase the efficiency of standard, well-established processes in organized social systems.

The technology for describing business processes in the worldwide practice is standardized and described by generally accepted *notations*, e.g. IDEF0, BPMN and others [34]. In TRIZ, a similar method is also actively used in the form of *flow analysis*. And although the descriptions of business processes and the flow analysis are not quite the same thing [11] (flow analysis describes the transfer of matter, energy or information, has sources, consumers and a flow path, whereas the description of a business process focuses on a list of operations performed by the process owner and process members), these methods have a lot in common.

An example of a business process description:

Add picture: Fig. 2. An example of a description of a business process.

In fig. 2 an example of a description of a business process of decision-making by a bank on a client's loan application is shown using BPMN notation. As can be seen from fig. 2, a similar method is well suited for preliminary analytics of only one class of OMT: optimization of regularly recurring operations in various parts of the organized social system. But if the task is connected not only with established processes, what to do in this case? After all, business processes are only one aspect of the development of organized social systems, there are also other levels – making strategic decisions, developing new directions of activities, relationships of process participants and other tasks.

Conclusion: the tool is very useful in solving a particular class of OMT but does not possess the required versatility and is suitable exclusively for optimization of regularly ongoing processes, and therefore, as a single tool for preliminary processing of an inventive situation for solving OMT cannot be recommended.

2.5 System Operator

Let's consider the ≪classic≫ TRIZ tools that is claimed to be used for primary analysis of an inventive situation in OMT.

There are known cases, where TRIZ practitioners use the system operator for this purpose [25]. The author also applies the system operator to solve problems in business systems. One example of the application of the system operator to solve an OMT is shown in Appendix 2. With the help of the system operator it is possible to see the dynamics of development of a system and predict its structure in the future, and also to consider the structure of

the functioning system – to describe supersystems and subsystems of the given system (... sub-subsystems, subsystems, system, supersystems, super-supersystems ...).

Indeed, the system operator has a significant drawback – it is looking at the development of the system through the composition of its elements, but does not take into account the layers of the system and the relations between its elements. This, of course, cardinally limits the capabilities of this tool for a descriptions of organized social systems. In addition, the structure of a working system is taken only element-wise, in contrast to the schematization that looks through the layers, groups, relations, processes and functions. And if the supersystems are on completely different management layers, what to do in this case? How to set specific tasks for effectiveness of management of system elements? The system operator does not reflect management phenomena (fig. 3).

The advantages of the system operator include its versatility and adjustable level of detail of system elements, as well as the ability to trace the evolution of the system, its subsystems and supersystems, what determines the prognostic value of the tool.

The downside is the impossibility of an adjustable decomposition of elements of the supersystem, the impossibility of drawing relationships between elements of the system and the supersystem (the structure is taken as if in isolation, without indicating the connections between the elements of the system), as well as the impossibility of demonstrating in the model the schemes of control, which is a critically nessecary moment when studying the inventive situation with the aim to solve OMT.

Add picture: Fig. 3. The structure of the system operator.

Nevertheless, the author considers the system operator a perfectly applicable tool to solve OMT, but not for the purpose of preliminary analysis of the inventive situation, but **in order to study the system in the context of its evolution** [11], which is important for a number of **strategic** tasks, where situational interactions of elements of the system should not be taken into account.

In contrast to the specific inventive situation posed by the customer in an organized social system, tasks that should be studied using the system operator, are usually general and strategic in nature (see Appendix 2).

2.6 Structural Analysis and Functional Modeling

These types of analysis applied in a FVA [19], most accurately describe the inventive situation when solving OMT, since they show the composition of the system, elements of the supersystem, the relationship between the elements of the system, functions, and modern versions of FVA allow you to extract groups of elements and even to take into account the processes within the system [17]. An example of a functional scheme is shown in fig. 4:

Add picture: Fig. 4. Simplified functional scheme of a construction worker's helmet (in red harmful functions are shown).

It is this approach that makes it possible to conduct a preliminary analysis of the inventive situation with the aim of setting particular tasks, which subsequently can be solved using TRIZ

tools. However, functional modelling has all the same key defects as any method developed for analysis of technical systems: the method does not take into account the management context between elements of the system. Moreover, a part of the elements of a working system are good modifiable objects of the material world, and some are subjects, that is, people, performing defined functions, but with their own goals, dynamically changing emotions, patterns of behavior, etc., that is, objects with behavior which is hard to predict. The description of such objects requires a special language in order to develop solutions that can later be replicated.

When solving OMT, it is impossible to ignore such phenomena, since people in organized social systems are essential (and often the most important) elements of the system.

Conclusion: The author believes that functional analysis has great potential for solving OMT – in the author's book [11] an example of a solution of a similar problem is explained in detail –, but this tool is more likely applicable to a certain class of OMT related to the optimization of organized social systems and their subsystems [39] and is not very convenient for preliminary analysis of inventive situations arising in such systems, since it does not take into account the specifics of a description of people as subsystems of a social system, nor does it take into account the dynamically changing driving influence of the elements of the system to each other in the context of the inventive situation under consideraton (i.e., it does not take into account the peculiarities of ≪soft≫ systems).

2.7 Schematization developed at the Moscow Methodological a circle (MMK) under the leadership of G.P. Shchedrovitsky and its application for preliminary inventive analysis of inventive situations

This method was formed in the Moscow Methodological Circle under the leadership of G.P. Schedrovitsky [10] in order to organize the thought activity (мыследеятельность) of a group of professionals who discuss problematic situations in the field of organisation and management. The meaning of this tool was to gradually put on the ≪Map≫ the elements of the system that are significant for the task being solved and relations between them, that is, get a tool for the manager, similar to the main tools of military strategists – a map, the details of which are appearing gradually, in the course of the thought activity of the officers planning the military operation. The author considers such workout to be an excellent alternative to the methods described above from the point of view of formalizing the inventive situation, but getting a synthesis of schematization and TRIZ in its purest form was not so easy.

Essentially, schematization is a visualization of an inventive situation worked out in accordance with the **system categories** and understanding the functionality of the system [10]. It is this tool that the author considers optimal for a primary analysis of an inventive situation when solving OMT. It should be noted that the author had to restore the following categories of schematization on his own, based on a detailed study of the works of G.P. Shchedrovitsky, as currently schematization is greatly simplified and many SMD methodologists are building schemes without taking into account the categories of systems described below. Some of them even generally simplified schematization to scribing [35].

Therefore, the author had to restore the principles of schematization from the work of G.P. Schedrovitsky, and then develop on his own methods for setting tasks based on the results of a schematization of the inventive situation in OMT.

Based on the analysis of the works of G.P. Schedrovitsky the following categories of schematization can be distinguished:

1. MWS (model of a working system – frame);
2. Layers;
3. Groups;
4. Relations;
5. Functions;
6. Processes;
7. Generalized Objects;
8. Fillings.

A caveat is required: the category ≪**system frame**≫ in the terminological apparatus of G.P. Shchedrovitsky can be replaced by the category ≪**model of a working system**≫ developed by Nikolai Shpakovsky [15].

Since the author spent a significant part of his work in departments of marketing and sales of international corporations and is the author of a three-volume book ≪The era of smart sales ...≫, where he summarized the experience gained and described his methodological basics in this area, and currently leads a significant part of projects in the field of marketing and sales in the B2B market [27], many examples of OMT the author takes from these areas. Of course, this does not mean that OMT are restricted to the field of marketing and sales. The converse is true: problems from marketing and sales are a special kind of OMT.

2.7.1 The model of a working system (MWS) is determined in two stages:

1. Isolation of the kernel.

The inventive situation presented by the stakeholder indicates that there is resistance of managers who do not accept the new sales system, implemented at the enterprise. It's known that before that, managers didn't work chaotic, their work was determined by a different sales technology supported at the enterprise, to which they adopted. After conducting these simple arguments, we identified the structural core, which can be represented as part of a scheme (Fig. 5):

Add picture: Fig. 5. The core of the problem, presented in the form of a scheme.

In fig. 5 we see the main stakeholder in the task – the ≪resisting≫ managers themselves, to what they resist – the complex sales system being implemented – and the existing sales system, to which they adopted during time. The two sales systems conflict with each other (this is a logical conflict), in this case – differ in content and requirements, as shown by a dashed arrow, in addition, managers also conflict with the newly introduced sales system, as it requires them to restructure their work, which causes dissatisfaction with the salespeople. The new system is promoted by the head of the sales department, so between the head of

the sales department and the managers, we also observe a conflict of interest. Further on the diagram we show also this connection. **The core of the scheme always represents the minimal scheme of conflict given by the inventive situation.**

2. Definition of connections from the core of the task to the supersystem and the final definition of the MWS (frame).

To whom the managers express their dissatisfaction, who perceives their resistance? In the course of communication with the client, it turns out that first of all – to the head of the sales department (in the diagram in fig. 6 he is designated as ROP). And maybe also to customers, which is inacceptable to the company. In any case, customers should be introduced in the scheme, since they are ultimately affected by the internal changes in the sales department.

Why was the sales system created? To increase conversion rates, efficiency of work with the client, and as a result – to sign more transactions on large amounts without hiring additional sales staff. What else ≪hurts≫ the sales system? The CRM system (Customer Relationship Management [16]) implemented in the company. The new sales system requires major changes to the work with the main software in the sales department – the CRM system. Therefore, the scheme depicts a conflict of the new sales system with the existing CRM system, to which specialists of the sales department adopted. The problem is not that the installed system does not have certain options, this is a secondary problem, a smaller one than the one we trying to formalize. The problem is that the ≪relationship≫ of the sales staff changed with the new requirements of the CRM system.

In addition, the work of the sales department relates to activities of other company services – production, warehouse, logistics, accounting ... This is important, but at the stage of setting the task it is too early to engage in a deeper detailing of these processes; therefore, we denote these ≪touch points≫ of the sales department with other company services as ≪cross-business processes≫, which can also be transformed under the influence of the new sales model. So we got a formed **model of a working system** consisting of: sales staff, head of sales, the existing sales system, the new sales system that is replacing it, the target client groups, CRM systems and cross-business processes:

> Add picture: Fig. 6. A model of a working system, presented in the form of a diagram. Abbr.: ROP – Head of Sales Department.

2.7.2 The concept of a layer in a scheme.

A layer in a scheme symbolizes that an element of the system element or a group of elements, placed on a higher layer controls an element or group of elements, located on the lower layers in the context of the task (i.e. a layer is a graphical representation of the fact of controlling the activities of one element in relation to another). And although the system is in most cases defined as a set of interconnected elements, it is obvious that the elements can have different hierarchical positions in the system to be studied, that is, there is a hierarchy of control between the elements from the viewpoint of a *defined action* considered in the context of the problem to be solved. The concept of a layer allows to consider the elements of the system, taking into account their dynamically changing hierarchy, where the hierarchy is determined on the basis of understanding which element is governing, and which element carries out the

≪orders≫ of the more ≪senior≫ elements of the system, and not in general, but only in the context of this specific activity related to the considered OMT.

It is worth noting that the concept of a layer does not replace the concepts of a sub-subsystem, subsystem, system, supersystem, etc., so layers are not at all the same as what we depict in the system operator. *If subsystems, supersystems, etc. are fairly rigidly fixed, the layers are constantly changing in the context of the activities of the elements depicted in the scheme.*

That is, as an important concept for the analysis of business systems, the author suggests to use schematization with the allocation of ≪layers≫, explaining this with the basic properties of organisational-managerial systems built on a *dynamically changing hierarchy of governance in the context of the studied activity of elements of the system.*

It is important to note that subsystems are subsets of the system, the system itself is a subset of the supersystem. As you know, subsets have the property of similarity to the sets of which they are a part. In other words, a subsystem is a set of elements that make up the system, broken down by some criteria into subsets [45].

For example, a subset of the decision center [16] in an organisation is a seller of the company – a potential supplier of the product, since the seller is a subset from a decision-making perspective (he makes a decision based on information transmitted to the seller, but not only. In the process of decision the decision center is influenced also by other subsets). But which element rules which activities of other elements? This is a big question. The answer can be given only in the context of the task. Suppose, in the process of implementing his functions, the manager conducts research on customer needs, on the basis of which he subsequently prepares a commercial proposal. Which element of activity controls which? *Of course, the client controls the further actions of the seller based on the information provided about his needs.* Moreover, if we consider a different situation, where the needs of the customer is a product, then the layers will change again, that is, the seller through questions will manage the activities of the decision center. At the same time, the subsystem and supersystem remained at their places, only layers change! Another example. The seller forms a picture of the world of the customer, creating value in his offer. Which element is now driving the activity of which? Now the seller drives the activities of the client from a position of acceptance of the solutions. The subsystem governs activities of the supersystem in this context. Please note: subsystem and supersystem did not change places, but layers – changed!

This is the most important understanding from the point of view of finding a solution to a problem in an organisational-managerial context, therefore, the concept of a layer is not a substitute for the concepts of supersystem and subsystem.

Rule for representing layers in a diagram: If any elements of the system are depicted in the diagram higher than the others, then the solver ranks them in the upper layer, i.e. in the context of this inventive situation considers them as controlling elements. The main thing is to always remember the rule: layers may vary depending on the contemplated inventive situation.

In fig. 6 layers are clearly visible in the context of the task: Cross-cutting business processes have largely determined the configuration of an existing CRM system. The CRM system, which was configured based on the requirements of the existing sales system, at the moment is a deterrent to the implementation of the new sales system, as it is reliably connected with

end-to-end business processes in the company, which implies the use of its reports by a number of related units. It does not support the functions required for the new sales system, but the transition to another CRM system, although it will provide the necessary functions for the introduction of the new sales system, is highly likely to give rise to similar conflicts at the border of the sales department with other divisions of the company. From here it's easy to conclude that the sales staff are on the next layer – they are ≪controlled≫ by the existing business processes in the company and the ≪adapted≫ to them CRM system that supports the current sales system, which, in its turn, does not suit the head of the sales department and the best employees, since it does not support effective work with clients in recent conditions on a highly competitive market.

It is not hard to notice that the schematic representation of the MWS taking into account the layers makes a lot of important refinements in understanding the inventive situation. The analysis of the schemes shows that there are at least several contradictions hidden in the problem (*of course, such a representation of an inventive situation requires the solver to develop schematization skills, so in the process of constructing a scheme a bidirectional thought process is going on: the scheme is built in the process of analyzing the layers, but on the other hand, layers ≪appear≫ in the process of constructing the scheme. Therefore, in practice, the scheme of the MWS is usually redrawn several times, until full clarity is established in the description of the inventive situation between the problem owner and the solver*).

To this point, the author received the remark that since a scheme is rarely created in one passage, this approach strongly resembles the method of trial and error. The author does not consider the method of trial and error and iterative approach as identical concepts, as during several iterations the scheme is refined, and is not newly created in a random manner. The solver also clarifies the definitions when formulating a technical contradition or an IFR. It is far from always possible to get the final wording in the first attempt. The same happens when applying schematization.

2.7.3 Groups of elements of the MWS (groups)

A group is a combination of elements of a system to fulfill a specific function. If the group is taken as a separate system, then we can talk about the MUF (main useful function) of the group. *The author believes that instead of the term ≪group≫, introduced by G.P. Shchedrovitsky, it is completely appropriate to use the TRIZ terms – system, subsystem, sub-subsystem ....* Usually, if solving a problem requires a more general consideration of the elements of the system, or a more detailed one (in the course of work on the task such transitions are assumed and become apparent in the communication process between the solver and the problem provider), it is convenient to give on the scheme the required detailing of the elements and their relationships for deeper analysis, but in the moment when more superficial analysis is required, combine such elements (sub-subsystems) into groups (subsystems) and emphasize the general function of the group. In practical applications of schematization for the analysis of an inventive situation, such a division may be very important, for example, for the task of increasing the efficiency of a department (in this case, the sales department) the following scheme was developed for the analysis of an inventive situation:

> Add picture: Fig. 7. Scheme of the sales department with the allocation of layers and groups. Abbr .: KAM – key account manager, lead – potential client who in

one way or another responded to marketing communication.

The groups in the diagram are:

- marketing department;
- sales department;
- customers.

For example, why did the company create a marketing department? To prepare and conduct marketing promotions? To study the market? For advertising campaigns? For marketing analytics? To carry out public relations (PR)? Marketing should carry out all these functions, but they are not the main ones. They are auxiliary ones. All these functions are needed in order to promote your product on the market. So the MUF of the group of marketing (department) is the promotion of the company's product on the market by influencing target client groups (again groups, only now they are combined by functional features of consumption). The MUF of the group (department) sales is the same, but with some differences – promoting a company's product on the market by personal impact on the client. The difference between them is essential in the way how they impact on the target audience.

Groups can be not only departments and divisions. It can be project groups or, for example, groups of employees united by some social characteristic or, say, the time of work in the company. It all depends on the condition of the task. Only one very important rule should be remembered. Any group has its own MUF that is significant for the problem to be solved. An arbitrary division of elements into groups within the frame of a working system is unacceptable, as this complicates the task, burdens it with unnecessary information. The question arises: is it worth to introduce this concept or to stick to the notion of a subsystem, traditionally used in TRIZ? Is it possible to use the concept of ≪aggregation of elements≫ instead of ≪groups≫ also known in TRIZ? At this stage the author proposes to leave this debatable question open.

Functions. Functional language is perfectly developed in TRIZ and, perhaps, is the main language used in the analysis and description of a system: first of all, with the use of FVA. Therefore in this work, a detailed description of the concept of a ≪function≫ is not required.

Processes and communications. These are the most important categories of schematization.

A *process* is the development of a phenomenon in time. In this definition the key word is ≪phenomenon≫.

Relationships are a designation on the scheme showing that in the context of the task it is important for us that element A affects element B, but what processes are going on is not important for us.

Since the scheme in fig. 7 is functional, processes are not indicated on it, but functions are shown as arrows. But when creating a functional scheme it is not managed to get a working model, that is, when analyzing the scheme, disruptions and promising trajectories of the problem solution became not visible, then you should embark into processes.

Interestingly, in TRIZ this problem of the process level has already been discussed, for example, in relation to *advanced functional analysis* developed by Naum and Oleg Feigenson [17] when, as a result of the FVA not one, but several functional models are built, each for a specific state of the system due to the processes occurring in the system.

Here we can clearly see the fact that in most problems the solver may remain at the functional level (then on the scheme only functions and relations are present), but there are situations when the system has to be considered in various states depending on the processes occurring in it. Similarly, when conducting schematization of an inventive situation, there are situations when the scheme requires to indicate also the processes going on between the elements of the system. Understanding the difference between processes and relationships is very important for a qualitative schematization of the inventive situation when solving OMT.

You can see an example of such a scheme in the diagram below:

> Add picture: Fig. 8. The scheme of analysis of the inventive situation of the problem of increasing the effectiveness of the mentoring process.

In the diagram shown in fig. 8, the modelling of the mentoring process is visible, that is organized in the sales department. The processes indicated by arrows are considered in detail that go on when planning a strategy for concluding a deal, the student's work in ≪field conditions≫ and the processes that occur during the organisation of feedback from the student to the mentor. In addition, the task involves in-depth study of the processes taking place in the period of supervision by the mentor of the development of the student's skill in using the tool, which the latter should develop on the instructions of the mentor.

Up today, the author does not have data on the existence of a methodology to clearly determine during schematization whether a transition to a process level is required, or it is sufficient to remain on the level of a scheme containing only the necessary elements, their functions and relationships. The practical recommendation is as follows: first we build a scheme describing the inventive situation at the level of relationships and functions, and then, if the data is clearly not enough for further processing by TRIZ tools, we begin to delve into the consideration of processes between system elements, for which flow analysis or analysis of business processes using standardized notations is applied [34].

Introducing processes in the scheme leads to inevitable complications of the scheme, describing the inventive situation, therefore, when conducting schematization one should be guided by the principle of appropriateness and introduce processes only if there is a need for their detailed study (see the case of the introduction of a new sales systems below, appendix 5).

Generalized objects and filling. Let's move on to the concept of ≪generalized object≫ and ≪filling≫. In the opinion of the author, from the categories developed by G.P. Shchedrovitsky, these concepts are one of the keys in terms of applying system analysis to inventive situations arising in the field of organisation and management. These categories applied to schematization are responsible for scaling the received solution. **Scaling is the most important characteristics of the obtained solution in the organisational-managerial sphere.**

When conducting schematization from the position of the categories ≪generalized object≫ and ≪filling≫, not only the likelihood of a scalable solution sharply increases, but also its stability, that is, the ability to withstand environmental disturbances. In fact, at the stage of schematizing the inventive situation, the foundation is laid of the quality of the future solution.

A *generalized object* is a vacant unit, a kind of ≪shell≫ of an element, which specifies the requirements for that element.

Generalized objects have *properties that pose requirements on their filling.* For example, generalized object ≪head≫, generalised object ≪teacher≫, etc.

Generalized objects are linked to other generalized objects in the structure, but in order for the system to function, the generalized objects must be filled. Someone must be a miller, a supervisor, a driver – e.g., a computer program or a person (see Figure 1 – it is indicated that a person is a subsystem or a supersystem of an organised social system (using the business as an example), although if we look at it in more detail, the subsystem or supersystem would not be a person as such, but a generalized object, which should have the appropriate filling). A **filling** is the system that fills the generalized object according to the requirements of that entity, e.g. a person with relevant competences or, for example, a computer program with certain characteristics corresponding to the requirements of the generalized entity.

In the technology of G.P. Shchedrovitsky's the requirements of generalized objects are called *properties-functions*, and the properties of filling *attributive properties.* (In G. P. Shchedrovitsky's texts generalized objects are named ≪places≫, but the author believes that such a name is more likely to cause confusion). So in OMT there arises a special class of tasks – tasks that *coordinate* requirements of generalized objects (properties-functions) and filling properties (attributive properties).

When solving OMT, the solver must understand on which layer should he solve the task. If the task is solved in the space of the organisation or its units (department, department, site), it is important to try to find a solution on the level of generalized objects, which will determine the further scaling of the obtained solution. If the task is set at the level of a specific filling, then the solver should warn the customer that the solution is likely to be special for this case and scaling of the obtained solution will be difficult (if at all possible).

Generalized objects can be represented as subjects (this is a generalized object that takes people as filling), and objects (taking a computer program, any document, robot, etc. as filling, see fig. 9).

Some notation used in the diagrams :

> Add picture: Fig. 9. Some designations used in the scheme of the inventive situation.

2.8 Setting objectives based on the results of schematization

Two versions for further analysis after schematization have to be distinguished:

Option 1. Work with existing disruptions. We find *disruptions*, i.e. discrepancies between ≪how it should be≫ and what is currently depicted on the scheme. Particular tasks can be set from disruptions (**see appendix 1**).

Next, we highlight a list of harmful effects (HE). Working with harmful effects is well developed in TRIZ, most often for this purpose cause-effect analysis is applied. Therefore, according to the results of schematization of an inventive situation, we can advance in a variety of ways:

We get a list of HE and conduct a cause-effect analysis. This approach can be applied if all NE in the diagram are obvious;

We identify the disruptions in the diagram and set the task to eliminate them. To the received tasks, you can apply the primary processing mechanisms of a task, long and successfully used in TRIZ – flow analysis, functional analysis, cause-effect analysis, benchmarking ... [18]. There are many variations, we move depending on the context. No one forbids applying schematization to clarify in detail the structure of the disruption, if the obtained task is a new inventive situation with many unknowns [11];

Highlight technical contradictions and continue to work with them (*technical contradiction: a situation that arises when trying to solve an inventive task by improving a specific feature (parameter) of the system, which leads to unacceptable degradation of another feature (parameter) of the same system* [42]). In that case decisive TRIZ mechanisms come into operation.

Option 2. Choosing a promising roadmap and setting private tasks. This was the path we took, solving the problem of a multiple increase in sales of construction equipment in the channel ≪road construction≫ (fig. 10). The problem was that over the past three years, the company's product margin has been halved, and sales were steadily falling. Marginality is known to add up from costs structure and market value. We decided to start from the second and analyzed the structure of the construction equipment market (fig. 10 gives an example of a raw analysis of the situation, but in order to understand that the current business strategy of the company has been chosen incorrectly, schematization without finegraned detail turned out to be sufficient):

> Add picture: Fig. 10. Preliminary ≪raw≫ scheme of the design of the construction equipment market in the Southern Ural.

To come to the choice of a promising road map, we plotted budget allocation for road construction and sorted out the hierarchy of this distribution – so the layers in this diagram were grouped by regions (groups). Further, understanding the price segmentation of construction equipment, it turned out to be easy to compare these two parameters with the practice at the client side, and then highlight two points on the scheme – *layers* that the company is working with now and the layer as much as possible close to the consumer, capable of acquiring the technics of this segment based on the data plotted on the scheme and its typical needs. *So a promising roadmap was decided, which was significantly different from the existing company's market strategy.* To implement the resulting roadmap it was required to pose a number of tasks and resolve the contradictions that arose.

At first glance, it may seem that this scenario is similar to the construction of a functional model during FVA, as both the scheme and the functional model describe the structure of the system. However, the **scheme refines also the layers, showing the dynamical hierarchy of control, additionally allowing to model the depth of interaction between**

system elements, by introducing a chain of concepts of relation-function-process, and reveals the composition of the subsystems, if this is necessary from the position of the task being solved (groups or aggregation of elements). This includes the ability to select groups passing through layers ≪diagonally≫, for example, if by the condition of the task there is a need to analyze the work of project teams taking into account employees in two or more roles (for example, a member of the project team is a financial officer). **When conducting schematization, the solver has the ability to distinguish between the filling property and the requirements of generalized objects, which is critical important from the point of view of scalability of the resulting solution** (another example of an inventive situation is depicted in the diagram in fig. 11).

> Add picture: Fig. 11. The scheme of selection of employees according to the competency model.

Fig. 11 shows a scheme compiled by the author to describe an inventive situation that arose during the selection of employees for certain positions taking into account changes in the requirements of generalized objects during the evolution of the organisation according to the model of I. Adizes (fig. 11 shows the so-called PAEI code (P – production of results, A – administration, E – entrepreneurial function and I – integration. PAE is more about generalized objects, I is more about filling). The PAEI code is shown in fig. 11 as a function of the requirements of generalized objects and properties of their filling. In the scheme also significant roles of process participants are visible which are located on three layers and elements of the recruitment systems related to generalized objects (competency model) and filling (competency assessment, personality type and ability assessment).

Therefore, despite a certain similarity with the functional model, the scheme is a slightly different tool. Its **main purpose is to isolate the system of tasks from the primary inventive situation**. The author suggests using schematization to formalize the inventive situation when solving OMT. Schematization should be applied immediately after clarification of the core of the problem and the goals of the solver before using the usual TRIZ tools.

2.9 The fundamental difference between schematization and functional modelling

Layer Selection. The functional model used in the FVA does not imply building a hierarchical scheme with the allocation of layers, where the subject of management is in a higher layer in comparison with the controlled object. A similar hierarchy of elements in the scheme is very important for the analysis of an inventive situation in OMT (the very concept of organisational-*managerial* tasks requires a representations of system elements depending on the control hierarchy in terms of allocated task).

Representation of a system element as a Generalized Object and Filling, clear realization whether we are solving the problem at the level of a *generalized object* or at the level of the *filling*. The author pointed out above that business systems are soft systems, as they include human as the main subsystems.

The author emphasizes once again that a simple tool transfer from technical to business systems is not possible. To handle an inventive situation in business systems requires specific tools that prepare a task to use ≪standard≫ TRIZ tools.

2.10 The algorithm for working with a scheme

The algorithm for working with a scheme goes as follows:

- Based on the situational analysis that we carry out on the scheme, the most acceptable way of conducting further transformations is chosen, which is defined on a priority basis (road map of future moves).
- As soon as the roadmap is selected, we immediately attaching it to the existing system see the secondary tasks in the form of directions or HE, which will appear in the system when implementing the selected roadmap.
- If necessary, we analyze the selected tasks with tools of primary task processing adopted in TRIZ.
- If necessary, we form technical contradictions. Next for the solution of the selected contradictions we apply the known TRIZ tools.

2.11 An example of the use of schematization for setting objectives for organisational and managerial task (the case is described in detail in Appendix 5):

Given is a system consisting of: sales department of an industrial enterprise, manufacturing tooling from heat-resistant steel, presented by the head of sales, sales staff and the current sales system sales (fig. 12).

The essence of the problem: the head of sales (ROP) implements a new sales system, having advantages over the previous one in terms of depth of study of customers and, as a result, allowing to increase the average amount of contracts and conversion, however, managers resist and are in no hurry to leave the ≪retrackted tracks≫.

Required: to make managers use only the tools of the new sales system in their activities (the task in the original formulation, that in the process of analyzing the scheme turned out to be not quite the correct goal setting – see the table).

Below, we compose a MWS, presented in the form of a scheme. The process of constructing a scheme for this task is described above (see explanations for fig. 6):

> Add picture: Fig. 12. The scheme of the inventive situation in the problem of changing the sales system.

The tasks set according to the scheme (fig. 12) using the categories of schematization[1]:

1. Interaction of the system (dotted line) with the elements of the supersystems

[1]In the original text displayed as table with 3 columns.

1.1. *The CRM system.* The conflict arose largely due to the fact that the existing CRM system is not adapted to the requirements of the new sales system, which creates significant inconvenience → **Make the CRM system meet the requirements of the new sales system and supported it.**

1.2. *Cross-business processes.* The new sales system changes the cross-business processes, this has especially an impact on the collaboration with the design department and the production → **Configure cross-business processes in such a way that the requirements of the new sales systems are provided.**

1.3. *Customers.* The new sales system increases the time for a contact with the customer → **Increase the depth of the work with the customers without increasing the time expenses of the managers?**

2. **Layers**

2.1. The implemented sales system influences the actions of the managers, imposing on them specific requirements → **How to make the sales system requirements performed, but the managers have to spend as little effort as possible?**

2.2. Managers are faced with the fact that for a number of clients the requirements of the new system are redundant, which does not increase, but rather reduces efficiency (*from this point of view managers ≪control≫ the reaction of customers, hence the given distribution of the layers on the scheme*) → **Differentiate customers and introduce the new sales system only in relation to such client groups in which conversion increase and average weight of the transaction is expected when applying this system.**

3. Communications. *Partially analyzed in paragraphs 1 and 2, additionally:*

3.1. A logical conflict between two systems, for example, the approach to identification of needs, the stages of the transaction are radically different. → **Compare the requirements of the existing and new systems, identify areas of similarities and cardinal discrepancies, disassemble into elementary steps of the area of cardinal differences, thereby simplifying the implementation** (such an approach to the problem allows the solver to rely on existing resources).

3.2. Communication defects in the line head of sales – managers → **Define metrics and reference points in the new sales system, which should provide feedback from the manager to the head. Simplify the data retrieval for the managers on reference points.**

3.3. Establish a relationship CRM system – head of sales → Having solved the tasks 3.2, **bring the CRM system in accordance with the received solutions, incorporate accordingly changes in the schedules of the meetings, strengthen communication on reference points and reduce communication on less essential items.**

4. Processes and functions

4.1. *The task appeared after setting the task 1.2:* **Conduct a detailed analysis of business processes between the sales department and the design department, as well as between the sales department and the production department** (compiling in advace a map of processes in BPMN notation). **Highlight the bottlenecks and set tasks to overcome them.**

4.2. *After solving task 1.1*, **set the task to simplify the input of the required data into the CRM system implementing patterns and rules.**

5. Groups

5.1. Negative phenomena within the group of managers – the effect of the adoption of new technology by the model of J. Moore → **how to use innovators and early adopters as a resource for introducing the new sales system? How to identify and neutralize the influence of ≪brakemen≫?**

5.2. Customer groups, what follows from the analysis of the task 2.2. **Divide customers into categories A, B and C. Define customer categories and target customer groups, for which the new sales system is redundant. Set a task to synchronize the work of the department, which should apply both sales systems, if the hypothesis is confirmed that the existing sales system would be appropriate to be maintained for certain customer groups amid the introduction of the new one.**

6. **Generalized Objects and fillings**

6.1. **Conduct training of ≪good average≫ in the new sales system after solving problems from points 1-5 and determine whether they reach the level of the ≪stars≫ after a given time. If not, conduct a comparative analysis of the work of both and conduct additional training of the ≪good average≫ according to the performance model** (the performance model explains what specific competencies make stars to stars by comparing their competencies with competencies of the ≪good average≫ in the team and identifies discrepancies).

According to the results of the application of schematization and analysis of the scheme, taking into account the categories of schematization, 13 tasks were formulated which describe the success of introducing the new sales system in the practice of the sales department of this production company. **The author pays special attention to the tasks set in points 2 and 6 of the table. If categories of layers and of generalized objects and filling were not introduced, these tasks could be not set**. And, as explained above, the tasks of meeting the requirements of generalized objects and filling properties are most important for the solution of OMT arizing in organized social systems! Some tasks from the table do not require the use of TRIZ tools – they can be put to execution using the method SMART [14]. Some tasks require the use of ≪primary processing≫ tools: flow analysis, cause-effect analysis, comparative analysis. An attempt to solve some problems will lead to the formulation of technical contradictions [11].

Thus schematization allows a primary analysis of inventive situations when solving OMT and to obtain a set of partial tasks, **in particular taking into account layers and the compliance of filling properties with the requirements of generalized objects** which can best be solved with TRIZ standard tools.

The second option is to extract harmful effects from the resulting scheme and subsequently work with them – **see appendix 1**.

2.12 The algorithm for solving OMT and subsequent use of TRIZ tools:

The algorithm for solving OMT using schematization and TRIZ methods according as the result of project implementations can be presented as follows:

Add picture: Fig. 13. The algorithm of work with OMT. Scheme.

Chapter 3

Method for Identifying the Operative Zone in OMT from a Pair of TCs

3.1 Goals and objectives of the study

It's known that the operational zone is the space where the conflict is located, which is specified in the task model [47]. The author emphasizes that solving OMT there are most often several operational zones, that is, usually we are not talking about a single conflict, being the cause of the inventive situation, but about their severity. And it's not at all a fact that, having performed a cause-effect analysis, the solver is guaranteed to find one single cause for their appearance, unless, of course, he is moving along the causal chain ≪from inside out≫.

The definition of the operational zone is required, first of all, for the localization of the place of choosing a resource, since solutions obtained using resources taken from areas of conflict are closest to be ideal [22].

In technical tasks, the operational zone is much easier to determine, there it is always localized in space, and its localization is defined by the boundary of the task. For example, if during a drilling operation, the cutting edge of the drill blunts, then the operational zone is in the zone of cutting the metal of the workpiece, before the transition to the micro level, of course. When moving to the micro level, the operational zone will be in the layers of the material of the cutting edge drill, possibly will go to the level of the grain boundaries of the metal, etc. For specialists in material science the operational zone is quite obvious.

When solving OMT, such certainty is not observed. For example, if we assume that you are a scientist and spent a long analysis of the problem of employee motivation using tools for pre-processing tasks, as a result of which you were able to reach the level neurobiology and localize the biochemical processes of the brain in the operative zone, then in this case, the operational zone will be determined by the same principles as in technical tasks, that is, it will be a piece of space in which there is a conflict located leading to an inventive situation. What blocks the release of dopamine in sufficient quantity [29]? Why positive reinforcement does not happen for which serotonin is responsible together with other neurotransmitters

[29]? The task becomes material, belonging to physical objects ...

However, the vast majority of managers are not neurophysiological scientists. Even psychologists primarily operate with abstract concepts and prefer not to touch the physical levels [23], [29]. Therefore, when solving OMT the physical layer usually not available to the solver. And this is not an exception, but the rule. For example, what is that – motivation? By and large, *motivation is the person's inner ability to overcome the resistance to rest and achieve the posed goal [29]. Motivation always concerns the inner world of humans, in contrast to stimulation (external impact).* Analyzing the phenomenon of motivation, we are forced to analyze such categories like human abilities, resistance to rest, goal, human values etc. – even a cursory analysis of these categories gives an understanding that the physical level of solving such problems is usually not available to the solver. At least at present. Let's continue: components of motivation are goal, power of will, self control. Goals are set by the context, the environment and the human's system of values [24]. It's very difficult for a solver to ≪grab≫ ≪hard≫ resources, that is, resources at the physical level. Talking about motivation, we can say a lot about conflicts, without mentioning any single point in space.

Therefore, if the operational zone is the location of the conflict, where a tool is present (an object that performs a negative impact), a product (an object that perceives this effect) and the environment surrounding this conflicting pair [3], and often the operational zone in OMT can not be described at the physical level, then the operational zone in such a class of tasks is nothing more than a conflicting pair isolated from a pair of TC (TC1 or TC2).

Why is it useful in solving an OMT first to highlight the contradictions, and only then move on to identify the operational zone? This is due to the fact that in such problems the contradictions are primary, usually they manifest themselves either in the conflict of interest of key stakeholders (*the author repeatedly used the following move in his projects: after schematization of the inventive situation and highlighting key stakeholders MPV analysis was carried out [43], which allows to identify requirements of the stakeholder participating in the contradictions, in fact – a conflict of interests. These contradictions are analyzed and fixed in the form of a pair of TC*).

Or contradictions appear when you try to make some changes in the system, for example, after highlighting tasks after schematization the solver comes to the conclusion that certain changes are necessary, but with mental projection of these changes on his system he sees a secondary harmful effect, giving rise to a contradiction. At the junction, it is easy to formulate a new pair of TCs, which is usually done. For example, in a Sberbank a similar thought experiment with recently entrenched as an organisational and managerial norm (from conversation of the author with participant of a TRIZ corporate training for employees of the ≪Sberbank TT Group≫).

Understanding that **in OMT the operational zone is determined by the conflicting pair in the working TC with the addition of a description of the environment of the negative interaction between the tool and the product** (note: the tool is the subject of the negative ≪processing≫ of the object, that is, the product), **gives the key to the resources closest to the source of the conflict in such tasks and allows full application of ARIZ mechanisms to OMT** (the tool will be the system state in the previously identified working TC, and the product – the deteriorating consumer property of the system). The author has already indicated that to solve OMT it makes sense to use only shortened, ≪combat≫ forms of ARIZ in several steps.

The main distinctive feature of the way to describe the OZ in management systems, used by the author is a new factor approach in the description of the OZ. This method is well suited to describe the OZ in complex social systems with objects having parameters which are distributed over time, in space and other characteristics. For example, if in the procurement department of a company changes have occured in significant areas of the business process then such changes will entail both positive actions and undesirable effects in other departments, that is, there do immediately arise many OZ! This raises the question: how to track them, especially in large companies? And whether you need to track them, isn't it easier to switch to another method of description – a factor approach? Moreover, decisions can have a delaying effect, and in different areas of the business they have to be solved in different time. Therefore, in solving OMT, it's much more efficient to consider which factors influence the state of the system and the parameters indicated in the identified contradictions, and use them already as resources [11].

That is, we are dealing with a situation where the system contains many elements, each of which is described by a many factors.

It's also very difficult to describe relations between elements in a business system, especially since the connections between the elements are constantly rebuild depending on the influence of external and internal to the system factors. That is, to select elements in OZ, and even more to catch relations between them can be extremely difficult, therefore, to identify OZ associated with the studied undesirable effect is almost impossible.

However, if we are dealing with contradictions arising in business systems (Fig. 14, Appendix 5), *in practice it is much easier to identify which factors determine states and properties in a contradiction* than to look for conflicting pairs in the business system associated with the investigated contradiction, and describe their OZ, and later to explore the parameters of these elements. As was noted above, it is much simpler to detect the *essential factors* of the X-elements in the business system, that define the states of a system and its properties connected with a contradiction, than the elements themselves. In addition, the detected parameters are easy to be used as resources to solve the problem. That is why in working with the OZ a factor approach should be considered as promising when solving OMT.

The author believes that this conclusion, which was obtained and confirmed in the course of participation in more than 50 projects allows to universalise the ARIZ approaches and apply them equally successfully both to technical and OMT tasks.

The analysis of a task using ARIZ remains the same for both OMT and technical tasks, with the only difference that the OZ of a technical task is a physical area of space, and in the OMT the operational zone is formed by a conflicting pair «state of the system – consumer demand» along a negative branch, it is in fact a conflicting pair expressed in abstract terms (and not as a physical area of space).

For the rest the procedure for applying ARIZ to any artificial systems remains the same, which allows to use well-established ARIZ tools for solving OMT.

3.2 An example of the allocation of the OZ in an OMT

We apply our principle to the resolution of the contradiction depicted in fig. 14. Recall the essence of the problem (in the form of a pair of TC), which will be the starting point in our

further considerations:

> *If the number of transactions simultaneously worked out by a sales department employee is 15, then the managers go to the targets faster, however, to fulfil the sales plans with existing conversion rates the number of managers in the sales department has to be increased, which is unacceptable (TC 1).*
>
> *On the other hand, if the number of transactions simultaneously worked out by a sales department employee is 25, then to fulfill sales plans with existing conversion rates fewer employees are required in the sales department, however, sales staff slowly reaches the planned targets, which is unacceptable (TC 2).*

Further, according to the ARIZ logic, from the pair of contradictions it is required to extract the working technical contradiction, for which we carry out the following reasoning:

The sales department is created for personalized work with customers to generate a high subjective value of the proposal, going beyond the value of payment. Personalized work is the core of the definition. If it is possible to create the same value by immediately influencing a group of consumers, the sales department is no more required, it should be curtailed as an extra link in the business [16]. If the sales team is present in the company and is not a consequence of psychological inertia of the management (sellers should be, because they have always been there), then **the personalization of customer impact** is the only way for the company to convey the high value of its proposal.

Of course, in this regard, *sellers should serve the greatest number of deals at the same time without loss of conversion and without reducing the average weight of a transaction within a specific client category.* From here it is clear that one manager should not have 15 deals in simultaneous processing but 25. Therefore, the working TC looks as follows (Fig. 14):

> Add picture: Fig. 14. The choice of working TC from a pair of TC

We have to increase the workload of managers, so we select TC 2: *if a manager is working on 25 projects at the same time, the number of managers in the sales department will decrease, but the manager will reach the planned targets later, which is unacceptable.*

Then the conflicting pair will be as follows:

> 25 projects are given at the same time to worked out by one manager and 6 months of reaching the planned sales figures.

There is clearly a conflict here: 25 projects are being worked out at the same time by one manager (tool), negatively affects the time to achieve the planned sales figures (product):

> Add picture: Fig. 15. The OZ, including the tool, product and their environment of interactions. 25 projects – a tool, planned indicators – a product.

Next, the factors have to be identified which essentially influence the tool and product within the OZ (Fig. 15). The identified factors can subsequently be used as resources, substituting them in the rule for the ideal final result IFR.

We give an example of such a identification of factors [11]:

Element of the OZ	**The role of the element**	**Resource as a subsystem of each element**
25 projects at the same time at one manager	Tool	• Decision making scheme in a category A project • Decision making scheme in category B project • Stage of the transaction (sales funnel) • Sales channels • Project related work • Errors in recruiting a customer base
Going to targets 6 months	Product	• The number of leads (responses to marketing activity) • Lead quality • Sales funnel conversion • The average frequency of a transaction per year • Employee Competencies • Client base recruitment regulations • Collaboration with colleagues

As a result, we received an impressive list of resources for solving tasks. Some can be further decomposed, for example: sales channels, related work of the manager in the project, etc.

If there are many resources received, they can be subjected to the procedure prioritization, for example, according to the following logic (priority falls on the left to the right) [25]:

1. The element of the operational zone: Product → Environment → Tool
2. Quantity: Unlimited → Sufficient → Limited
3. Quality: Harmful → Neutral → Useful
4. Value: Free → Penny → Dear

Prioritization of resources: the higher the final score, the higher the priority [11]:

Add picture: Table to be completed

Resources in the Operational Zone (OZ)	P	E	T	U	S	B	H	N	U	0	L	E	Sum
Decision making scheme in a category A project			1	3					1			1	6
Decision making scheme in category B project			1	3					1			1	6
Stage of the transaction (sales funnel)			1	3				2				1	7
Sales channels			1		2			2			2		7
Project related work			1	3				2			2		8
Manager errors when recruiting a customer base			1		2		3			3			9
Number of leads			1			1			1			1	4
Lead quality	3					1			1			1	6
Sales funnel conversion	3					1			1			1	6
The average frequency of transactions per year	3				2				1		2		8
Employee Competencies	3					1		2				1	7
Set-up regulations		2		3					1			1	7
Collaboration with colleagues		2			2				1			1	6

In our example, three resources allocated in table in gray. Therefore, they should be used first.

For this problem, more than 10 solutions were obtained using dedicated resources, and this is for one pair of TP! For example, I would like to show how it worked harmful resource – manager errors that get the maximum score.

In the ARIZ logic, the ideal final result (IFR) rule is assigned and then instead of the X-element, the selected resources are substituted. (IFR – decision inventive task, allowing to obtain the desired result with zero compensation factors. As follows from the laws of physics, such a solution can never be reached and therefore the concept of perfect the final result serves to reduce the degree of psychological inertia in the process of solving the problem by orienting the problem solver to search solutions with the highest degree of ideality [42]).

We demonstrate these steps:

1. Rule of IFR: ≪X-element≫ itself provides access to planned indicators manager for 3 months (condition of the task manager), provided performance index of 25 projects at the same time exploring (with increasing the load on managers to achieve planned targets in companies occurred on average for 6 months).
2. Manager mistakes when recruiting a database of projects themselves provide access to manager's planned targets for 3 months, subject to fulfillment indicator of 25 projects at the same time.
3. Since it was not possible to directly obtain a solution from IFR, we proceed to the formation of physical contradiction (FP) around the selected resource (FP – a situation that occurs when a certain attribute the object of interest to us must have two different meanings at the same time to ensure the desired result [42]): errors in recruitment of the base should lead to the correction of technology sales manager, in order to reach the

target indicators for 3 months, and errors in the selection of the base are not lead to the correction of the manager's sales technology, since the manager doesn't has sufficient skills to reflect errors that occur during recruitment customer base.

Since the company that set this task has implemented an adaptation system sales staff, it was easy to take control of the mentor process recruitment of the base of projects to newly arrived managers and to carry out its reflection first, 2 times a week, then – 1 time per week, then 1 time in 2 weeks, thereby making his mistakes a resource for correcting further work. Similar reflection is carried out according to performance models developed for mentors [16].

After the formation of the FP, the solution involving this resource turned out to be the obvious is managing the employee's reflection process in the process initial set of customer base.

3.3 Roadmap for working with the operational zone in organisational-managerial tasks

- Formulate a pair of TP;
- Determine the operating TP (TP1 or TP2);
- Select the conflicting pair in the working TP;
- Highlight the operational area, additionally defining the interaction environment tools and products (the operational area consists of a "tool", carrying out harmful effects and "products" perceiving harmful effects [3]);
- Allocate resources to the operational area and determine their priority, if resources lot.
- Formulate a IFR rule.
- Substitute resources in the IFR rule instead of the X-element. If the decision is not obtained at this stage, then form around the selected resource physical contradiction (we act in the logic of ARIZ).

Chapter 4

Conclusion: Conclusions and Recommendations

4.1 The effectiveness of the proposed methods

The effectiveness of the proposed methods is practically confirmed:

1. Schematization – the tool is used in more than 20 projects;
2. Formulation of the operational area in management tasks – in more than 30 projects.

These tools are included in the training program implemented by the author in full-time format and format of the online workshop. 200 online training programs trained people, according to the full-time program – about 150 people. During the training, students (students are company specialists) carry out projects in the field of their activities and protect projects based on learning outcomes. By citing the numbers above, the author had in mind only the most high-quality projects of the training participants.

4.2 Scope and limitations of the proposed methods

The author assumes the use of these techniques to solve organisational management tasks set in any organized social systems. These tools can only be used provided that the solver owns the subject of research, or works closely with specialists, possessing the required substantive competencies in the field of strategic and regular management, marketing, sales, financial planning, psychology etc. [2], [13], [23].

The author's practice shows that the greatest efficiency in application tools can be achieved in team mode, if the work teams are effectively supported by flexible project management tools, First of all, Scrum technology [26].

The author's recommendation for use in organisational and managerial tasks:

1. Always apply schematization to the full clarification of inventive situations subject to the use of TRIZ in organisational and managerial tasks;

2. Apply the method of formulating the operational area and working with resources of the operational zone proposed by the author only if formulating a TP pair, the solution is not obvious and the solver expressed a desire continue to move in the logic of ARIZ.

4.3 The possibility of further development of techniques

The author believes that TRIZ specialists should take a closer look at G.P. Shchedrovitsky [10], [41] and study the application of categories of systems, proposed by the author, for a more accurate and quick description of inventive situation.

A special methodological study requires the category of "layer", as well as "Generalized Object" and "material", practical recommendations for a more conscious the use of these concepts in solving organisational and managerial problems.

The author believes that research in this direction should be continued. The author believes that the proposed description of the operational area is not final. The author believes that it is necessary to develop a special methodological language for the description of the tool, product and, in particular, their environment interactions. As a result of this description, the allocation of operational resources zones can be much more accurate, therefore, will give even more interesting practical results.

The development of criteria according to with which the solver can make a detailed analysis of the resources of the operational zone.

The use of TRIZ for organisational and managerial tasks today a day far from established discipline, there is a significant research work.

Appendix A

A.1 An example of using schematization for analyzing inventive situations in conjunction with S-curve analysis.

Objective: to increase staff productivity and reduce time costs the first person of the company through a change in the employee motivation system. Note: in This example does not show the final solution to the problem, it is demonstrated exclusively an analysis of the inventive situation.

Tasks: pyrotechnic company "Fast and the Furious", St. Petersburg.

From fig. 13 shows that during the existence of the company, the author changed three motivational models with which he inspired his close-knit team. As the MPV (main parameter of value) adopted "employee productivity", expressed in the number of operations per shift with the required level quality. Since the concept of "operation" is predetermined, and the operations themselves reflected in the technological maps that are compiled for each event, perform a performance calculation and determine the level of quality of performance work is easy.

Add picture: Fig. 16. Change of various motivation systems in the company.

We describe the motivation system shown in Fig. 16:

Curve No. 1 – at the beginning of the existence of the company, in the late 90s – for the promotion It was considered to be arranged in an organisation where there is a normal social package, stable salary and healthy relationships in the team. At the beginning of this approach perfectly stimulated employees to work, compared with others not quite "White" companies. But over time, the "white package" began to be accepted as the norm, and stability was no longer a motivating factor, but perceived as due. Performance employees

Curve No. 2 – the company introduced a system of cash bonuses. She gave tangible growth performance and responsibility but then performance declined. Previous bonuses were no longer available for motivation to work. Numerous studies have been conducted on the effect of money on motivation, of which it is known that the award is perceived by the employee as a motivator approximately three months, after which he begins to take it for granted. According to the findings S. Covey [30], money for business is like air, without them the company cannot work can, and the employees quit. However, for life, a person needs not only breathe. Therefore, such a system has very limited resources for its application.

Curve No. 3 – a decision was made to develop an intangible system encouragement, which would be based on their own moral and ethical values employees who must match the values of the founder of the company, given requirements of the pyramid of needs A. Maslow [31]. Today the system is in the beginning of this curve, and according to the director's forecasts, it will give a smoother, but steady and continuous growth of labor productivity and personal responsibility of employees, will spread its influence both on the selection of employees, and on their retention. Naturally, the value motivation system is by no means It does not cancel the system of monetary incentives, it supplements it. Observations give reason to believe that a value approach combined with a powerful system training can give about a twofold increase in selected MPV.

From fig. 16 shows that the studied system in this company is located in the very beginning of the third S-curve, and therefore, all the main efforts of the leader must be spent on tuning the system – you need to create such conditions that the system began to work steadily. There are no other priorities at this stage. Now you need to set tasks, for which it is proposed to parse the system in the form in which it exists now, and then determine the desired parameters system, its future configuration (Fig. 16 shows that the transition to the third the curve in the company has just occurred while substantial value shift in the minds of employees takes time and does not occur instantly).

To describe the current inventive situation, we apply schematization:

> Add picture: Fig. 17. The use of schematization for the analysis of an inventive situation.

Since we resorted to schematization after applying the analysis on S- curve, we got some new knowledge. From fig. 16 we see that introduced the bonus system (curve 2) was implemented quite successfully, which resulted in MPV growth, although the system reached its saturation quite quickly. Naturally, in the diagram (Fig. 17) we fixed the structure of this system in a section "It was".

Then there was a transition to curve 3 (Fig. 16) as a more promising naturally, with the preservation of the bonus, that is, between the two curves occurred continuity. If the company didn't do this, then the transition occurred there would be a significant "drawdown" of MPV (Fig. 16). Yes and no cash reward Motivation systems have no prospects, any normal leader knows this.

In addition, the company determined the position of the new motivation system at S-curve – this is stage I (Fig. 16). In accordance with the objectives of the first stage, we say not as much about efficiency, how much about the potential of the system and its minimum health. Therefore, in the diagram in Fig. 17 we depict the structure based on assigned tasks: to ensure the minimum performance of the new system motivation, but taking into account its configuration (at the heart of the system proposed task manager, the pyramid of needs A. Maslow). The author does not consider the pyramid A. Maslow is an exceptionally correct model, but to describe the current situation, she perfect – over the years of work in this company, employees have "grown" from the point view of values and the pyramid of A. Maslow it simply and reliably demonstrates.

Carrying out the analysis of the circuit in Fig. 17, we found unwanted effects (NE) and recorded them in the table:

No. / Condition of elements existing system, “It was“ / Item Status the new system, “It has become” / Tasks / No. NJJ / Description

1. Prize distributed directively the director

Premium distributed collective according contribution

SJS 1 Grievances and their hidden conflicts

SJS 2 Manipulation of employees in relation to colleagues

2. Staging detailed strictly defined SMART tasks

Outlining frames statement of general tasks and setting constraints employees themselves

SJS 3 Recently arrived employees cannot work in this mode, since they don't lack of knowledge

SJS 4 Distracting experienced staff for control tasks less experienced

Transition to a single environment planning for example to flexible design system management for small teams – SCRUM

SJS 5 Regular weekly planning takes extra time, usually 2. . . 3 hours a week.

SJS 6 Irritation from repetitive operations planning, team briefings, etc. → decreased attention, attitude to the system planning as an unnecessary load

4. Employee values at level 1-2 in A. Maslow

Mature employees having values 3-4 A. Maslow level

SJS 7 Often, such employees want to open their business, so they leave the company

SJS 8 Such employees have their own opinion on working matters with them need to agree. Manage such people – it's the same as grazing cats.

SJ 9 Need to maintain interest in all areas of motivation – money, emotions, intelligence, meaning and contribution to a society that requires significant efforts from the director / owner

SJS 10 Such an employee has versatile interests, not the fact that manufacturing tasks will be paramount for him

5 Primary control carried out by the director

Director carries out general control indicators, control quality operations do it yourself employees

SJS 11 With the loss of workgeneralized object value for employee risk of deterioration quality of operations, which may go unnoticed

SJS 12 Even when an employee sincerely tries, he is subject to the factor eyes, that is, simply does not see own flaws that are easy see from the side. However external detailed control abolished.

The selection of NE in the analysis of the circuit in Fig. 17.

Thus, 12 tasks were set, the solution of which can provide working capacity selected the system motivation staff. Analysis inventive situation allowed to quickly identify and formulate 12 specific tasks, which would be difficult without using a system approach, given the fact that the selected system is at stage I of development according to S- figurative curve and did not pass approbation.

It was decided to introduce a motivation system taking into account the implementation of the found solutions to the tasks given in the table.

Appendix B

The task was set by the director of one company as follows: how register business processes independently, without complicated terminology and unnecessary paperwork? It was required to give a minimal template that would allow perform work on the description of the company's business processes so as not to produce unnecessary information. It would not happen that the developed business processes would slow down the company, deprived of its required dynamics. At the same time, work on the intuition, as before, is no longer possible, the young company was faced with the first growth disease. The company faced a serious controversy.

A lot of literature is available on how to prescribe business processes. But almost it is not indicated anywhere how recommendations for describing business processes in depending on what stage the company is at. And even if such There are recommendations; they are quite heavy and bulky. We set the task to give capacious and accurate recommendations, differentiated for different stages of development business, which will answer exactly the question: what model Need to prescribe business processes for this particular company?

We apply the system operator in order to better understand the system by Description of the company's business processes. The structure of the system operator is shown in fig. 3 in the main part of the dissertation.

System Operator:

1) PRESENT.

1.1. The investigated system: business processes.

The system of business processes, special attention to cross-cutting business processes (affecting work of 2 or more departments or groups). Process flexibility.

Quote: "Most companies are organized according to a functional principle, but they should work in conditions of interfunctional interaction. ... processes break the hierarchical structure. "

1.2. Supersystem

Strategic management, balanced scorecard. Horizontal employee interaction. Quality management system – as a methodology. Market, competitors. The dynamics of the environment. Changes to the law.

Quote: "From the point of view of the process approach, the organisation appears as a set processes. The management of such an organisation is based on process management. Each process has its own goal, which is its criterion. effectiveness. The goals of all processes are lower level goals, through the implementation of which top-level goals are achieved – the goals

of the company. ”

1.3. Subsystems:

Business process system (model), responsibility management, management personnel, process regulation, personnel reporting, process automation, process performance management.

2) PAST 30s 20th century.

1.1. System:

A person in the workgeneralized object, instructions of managers (namely “instructions”).

A.K. Gastev focused on the human factor. He believed that the main thing the role in the work of the enterprise is played by man. Quote: “organisational effectiveness begins with the personal effectiveness of each person in the workgeneralized object, in particular with the efficient use of time” (development of a description technique production processes at this time is primarily associated with the name of this wonderful person).

The most important problem, according to A.K. Gastev, there was an inability of a working man obey, work in a team and strictly follow the instructions of the leaders.

1.2. Supersystem

The survivals of the agricultural system, industrialization, leadership, production pace. Rigid hierarchical structure in the enterprise.

A.K. Gastev noted that “workers do not know how to keep a single production pace and work as well as their European counterparts do. Way of life peasant Russia without rich European working traditions. ”

1.3. Subsystems:

Workgeneralized object; Personal qualities: a sense of time, personal efficiency at work generalized object, the ability to obey.

A.K. Gastev emphasized that “Russian workers lack a sense of time. Russia, in which the workers are former serfs who went to the free bread, this way of life did not initially contribute to the acquisition of the European “installation on time“.

3) THE PAST 70-80s. 20th century.

3.1. System:

SADT standard (Structured Analysis and Design Technique), functional methodology Simulation IDEF0 (Integration Definition For Function Modeling).

One of the best-known methodologies for describing organisations as organisational-technical systems, has become the methodology of structural analysis and design SADT systems (Structured Analysis and Design Technique). It was developed American Douglas Ross (D. Ross) in 1973. Particularly widespread use received one of the SADT subsets – functional modeling methodology IDEF0 (Integration Definition For Function Modeling). The initiator of its development and further standardization was the US Department of Defense. Methodology IDEF0 was successfully used in military, commercial organisations to solve a wide range of tasks (from software development for defense systems prior to the development of logistics and management systems finance). Availability and experience of using IDEF0 in various subject areas areas, along with growing computer support, made it even more affordable in use. This, in turn, also led to the widespread use of IDEF0 as a methodology for describing the business processes of organisations. In many ways, the popularity functional modeling

methodology IDEF0 due to the ease of notation, the main elements of which are the function block and arrow.

Also in the USSR at the beginning of the 70s, an Integrated Management System was introduced in the USSR product quality (CC UKP). Management was based on the logic of mass production, economies of scale, centralized control, and also resulting low rate of change and a rapid loss of relevance. The control system inherited from the USSR is based on the concept of mass production, which dominated the entire national economy. The main purpose of this systems – get the economic effect of the growth of production. Than the larger the volume of production, the lower the cost per unit of output. At it's easier to standardize and unify processes, and also easier carry out centralized control. Such a system allowed to produce a huge amount of TRU (goods, works, services), but in order to change something had to spend a huge amount of resources due to lack of flexibility in management and processes. As a result, it turned out that in the international arena, our enterprises were uncompetitive due to lack of flexibility and the inability to quickly adapt to the needs of the market.

3.2 Supersystem:

Strategic management, balanced scorecard. System quality management. Competitors, market ... Relative stability, gradual, smooth change of scenery (a significant difference from the NS "Real"). Acting legislation.

3.3 Subsystems:

IDEF0 Principles, Process Diagrams, Process Performance Management, System business processes (model), responsibility management, personnel management, process regulation, staff reporting.

4) FUTURE.

1.1. System:

Flexible business process cards integrated into CRM systems and more high level (ERP).

1.2. Supersystem

Self-developing business (company), further development of LEAN, CRM system, ERP systems with integration of machine learning algorithms, BigData, distributed registries.

1.3. Subsystem:

Instant access to self-updating information. Flexible business process system (model), responsibility management, personnel management, regulation processes, automatic reporting by indicators, flexible management process efficiency. Automation, robotization, competency development system, knowledge management.

From the analysis of the system using the system operator, we can distinguish following:

1. Subsystems: Quick access to information. Business Process System (model), responsibility management, personnel management, process regulation, personnel reporting, process automation, performance management processes. We see that business processes must be able to quickly be extracted from the information environment, have high flexibility, have reference points that show what will change in the supersystem when changing business process at the level of a specific position.
2. Strategic management, balanced scorecard. Lean production, system management quality. Market, competition... Relative stability, gradual, smooth change of scenery (sig-

nificant difference from the NS "Real"). Current legal regulations.
When designing business processes, a system should be developed indicators: KPI (key performance indicators) and managerial indicators by which we track the effectiveness of achieving KPI. The future shows us that business processes should be included with knowledge management system, that is, a system should be developed indicators tied to a competency model. Provide here no gap! Automatic collection of statistics on indicators special attention should be paid, to develop a culture of working with numbers, gradually preparing the control system for the application of methods machine learning in the future.

3. The human factor significantly affects performance and efficiency processes. Therefore, when the responsibility matrix is prescribed, the functional defined, it is necessary to select people in a team with psychological and competency portrait suitable for the position. Otherwise, no one guarantees that the processes will work correctly and be fully implemented volume.
   It follows that business processes should not only be tied to knowledge management system, but also with the profile of the position, which, in general, is logical.
4. Take into account that the sense of time in humans has evolved since A.K. Gastev, but still far from ideal, so business processes should be Automated in a CRM system with automatic notification, but in in any case, before preparing the ToR for CRM, which ultimately will get BP description, a paper document is created.
   It's important to consider that trying to regulate everything in a row is silly, but in small companies, such attention to administration is fraught with loss business. Therefore, before the regulation of processes should be determined company position on the S-curve (most conveniently according to I. Adizes) and based on this set the "scale" of regulation, that is, determine the extent detailing the process. It is also important to determine the degree of freedom of acceptance. employee decisions in changing business processes in order to increase them effectiveness. As stated above, allow for operational process change, but with setting markers, which of Related processes will be involuntarily affected. Should provide differentiation of access rights to change processes.
5. Studying the success of IDEF0 shows us that for presenting business processes you should try to get as far away as possible from text instructions in favor of charts – infographics, drawings with short explanations. If more is needed detailed explanation, it can be given as a note to corresponding paragraph of the infographic. Such instructions are perceived and memorized much better, but there are pitfalls. Good infographics – the best option in terms of perception of instructions by the user, but she has a huge minus in that drawing circuits is very expensive and long in time. Not all employees can do this.
   Today, this problem is resolved. In 2016 – 2017, the present boom in integrating graphical display of business processes in CRM systems according to IDEF0 recommendations. Hence it's clear that it's worth pay attention to CRM systems that have just such opportunities and use them. It is important to consider monitoring for indicators indicated above, differentiation of access rights, signaling by reference points when making changes.
6. An integrated product quality management system (CS UKP) of the USSR may be interesting only in the case of large-scale reengineering of business processes in large corporations. In other cases, you should not contact her.
   You should pay attention to the company's standard for designations and corpus of

concepts. The corpus of concepts should be the same for everyone in the company and as much as possible unified with the practice accepted in the world. "Translations" of terms inside the company is too expensive. Therefore, together with the development business processes should deal with the standard adopted by the company. It's better to immediately lay down standardized concepts and notation than later spend a lot of time and effort to fix it.

7. When choosing a CRM system and a method for preparing a description of business processes should take into account the rapid change in the environment, the system should be able to make changes quickly, better – without the involvement of IT-specialists. Otherwise case, the dynamics can be lost, and the PSU will turn into empty trash and will stop working.
   You should not engage in self-written programs, but use ready-made ones expandable systems to provide the above functions.
8. When describing the BP should take into account the interaction between units. Exactly at the junction of departments there is the greatest defect in communications, distortion information and various kinds of failures.
   Recommendations – see above. Optional: when determining a personality profile the generalized object should not be considered in isolation, but viewed in conjunction with units and process owners with whom business processes are intertwined most closely. The problem is solved at the level of generalized objects, do not go into the properties of the material (see recommendations for schematization)!
9. In the future, the impact of IT technology will increase, so the final product will be CRM-system with embedded PSU, giving hints in real time. In the form of a list of documents BP will exist only at the time of implementation, in quality of project documentation. Next is only the electronic format.
   Pay attention to software manufacturers focusing on issue of tips and statistics increased attention.

As a result of the analysis of data concentrated in the system operator, a matrix for the implementation of a system for describing business processes depending on the stage of development of the company, the author has not met analogues of this matrix in any specialized literature, nor in their practical activities (stages development are given in lines according to I. Adizes [13]). The columns are informational blocks required in the description of business processes for each stage: Designations and abbreviations:

Add picture: Add table

\+ ... +++ – the degree of detail of the documentation;

Business Processes (BP)

Organisational Structure (Organ.)

Job Description (CI)

Reporting (Report)

Regulations (P)

Standards Management (Ex. Art.)

Compliance Monitoring Standards (CIS)

Performers in the description of business processes:

Add picture: Add table

Designations and abbreviations:

"-" missing;

C – himself;

K – team;

Co – consultant (expert).

Case shows that using the system operator provides interesting results in solving organisational and management problems, but more suitable to find strategic decisions.

When solving situational organisational and managerial tasks, application schematization makes it possible to more accurately analyze inventive the situation and set particular tasks including, applying the categories of layers and generalized objects-material.

It seems that this state of affairs outlines the scope system operator and schematization to solve this class of problems.

Appendix C

Task: A modern, fast-growing Chelyabinsk IT company developing platform solutions for working with digital content using artificial intelligence (number of staff: approx. 200 people), repeatedly changed their structure, trying to find a balance between the structure, which are based departments (marketing, finance and accounting, several development departments, broken competencies) and the structure based on project teams, including a variety of specialists, depending on the objectives of the project.

The company faced several inconsistencies, one of which consisted of the following:

> Add picture: Fig. 18. A pair of TAs related to the organisational structure of an IT company.

Contradiction analysis:

TP1. In order to optimize the loading of specialists, the basis of the structure companies should have departments (unit units), as the head unit determines how much time one employee needs to one or another project and, since he owns information about all projects, he can optimize the work of the employees of his department. That is, loading unit specialists are optimized as there is a centralized work planning by an experienced specialist (department head), who sets tasks to department specialists and monitors their implementation.

TP2. In order for specialists to better understand the nuances of the project, they must be completely involved in it, that is, belong to one or another project team, since discussions of all the nuances of the project take generalized object in the presence of the project teams, and at all stages of the project – from the inception and appearance of MVP (minimum viable product – the minimum viable product) [32] to obtain a full-fledged market product, that is, they take part in the discussion of all the nuances project in all its stages.

Combining new entities with opposing states of the system on fig. 18:

1. Is it possible to make the project team at the heart of the structure? the company had a single coordinating center for competencies, which would put tasks for subject specialists belonging to different teams, and would control the execution of tasks?

Here came the idea of applying flexible principles of project management at the level of the whole company, that is, with a built-in system for recording time and project indicators. Agencies supporting flexible planning principles exist (Agile and SCRUM [26]), while allowing you to shoot high-quality analytics (such as Asana [33], eg). At the same time, the top management of the company gets a special, a guiding and inspiring role; much attention

needs to be paid continuous training of staff, especially project managers, to which special requirements.

Conclusion: a flexible planning system with integrated performance monitoring accept, but completely reorient the company to "confederation" project teams – a risky strategy.

2. Is it possible to make departments remain at the core of the structure, but their experts would take part in the discussion of projects not occasionally, but constantly, at all stages of the project with a wide range of specialists involved?

Here came the idea of creating a "managerial club" within the company, members which meets at least 1 time per week and discusses projects in development in the company. In addition, "design circles" have been created that are not found less than 1 time per week, in which all specialists involved in this particular project.

Management Club and Project Clubs are supported by flexible methods planning and related tools.

This solution is partially implemented; full implementation in the company's practice planned for 2018.

Transformations in the company for 2018:

- We create a unified system for assessing the success and contribution of the project and resource allocation.
- We introduce a flexible methodology in which company employees participate in project level.
- The previously adopted structure of the company, based on which unit- units from which resources are drawn into projects.
- A set of measures is being developed, according to which, employees will involved in the product life cycle.
- Developing practices of the "Management Club".
- "Project circles" are being created.

Appendix D

Task.

Find a market way to get the company out of the crisis (company “X” takes about 10% of the Russian market, while being the second producer in the Russian Federation by market share). The crisis is generated by the actions of a more powerful competitor, occupying a leading position in the Russian market and owning a share of more than 50% of the market.

The main objective of the project (after conducting a preliminary analysis): how increase the number of branches and managers without resorting to attracting a significant amount of credit?

The main results.

Found an organisational solution that will allow the company to successfully compete with a more powerful target competitor without borrowing cash, as well as without changing the main product line, that is exclusively in a market way, which was the main requirement of the customer.

Introduction

Company “X“ is a manufacturer of concrete additives, takes 2nd generalized object in market share of the Russian Federation, occupying a little more than 10% of the Russian market. Main competitor company X occupies more than 50% of the Russian market share, and its share continues to grow, and the market share of company “X”, on the contrary, shows a steady decline.

Market analysis of concrete products and ready-mixed concrete in Russia, as well as volume analysis cement production in the Russian Federation (indirect indicator) shows that sales decline company “X“ in the last two years can not be caused by the fall of the target market customers – manufacturers of ready-mixed concrete and reinforced concrete products (see market analysis). As source data of the analysis used data obtained by the analytical department company “X“ (see. Fig. 19).

An analysis of the products of company “X” and its main competitor revealed a complete similarities in the composition and quality of products of these two firms, and the survey data target customer groups show even slight excess product quality of the company “X“ in comparison with the product of the main competitor. It should be noted that there is a promising direction in the market of concrete additives - polycarboxylates. These are more advanced supplements that allow for much lower concentration give more stable properties of concrete. Manufacturers such additives are foreign companies. But neither company “X“ nor its main competitor does not produce such additives, moreover, their market is still small,

despite undoubted perspective.

Product comparison data provided by the analytical department company “X“, a survey of target customer groups conducted by us.

Product cost analysis also showed full compliance with the proposal. company “X“ and its main competitor.

Thus, by exclusion, we can conclude that the main the difference is in customer service, which means we are dealing not with technical, but with organisational and management task.

Since we are talking about the B2B market, then studying market promotion, first the turn should be paid to sales managers [27]. Study in the form of a customer survey showed that the average qualifications of managers of both companies are at the same level. At the same time, customer focus managers “X” marked by customers as much higher compared to the main competitor, while the share of company “X” continues to fall amid growth market share of a key competitor.

In quantitative terms, there is a huge difference – the number managers in company X is about 6 times lower than the number of managers in company “Y“. The situation is similar with the number of branches – the number of branches Company X is 5 times lower than its main competitor. Needless to say that the management of company “X“ is well aware of this quantitative dissonance, however, only after this comparative analysis became it is clear that the size of the company, and therefore a multiple difference in financial opportunities – the only reason for the stable loss of the market by the company “X“ on the background of the growing market at the time of solving this problem.

Maintain a larger staff of managers and branches does not seem possible – not enough money. Financial Opportunities for X and Its main competitor is almost an order of magnitude different.

Hence the main objective of the project: how to increase the number of branches and managers, without resorting to attract a significant amount loan funds?

Subtask: it is desirable to make sure that the competitor could not copy this decision.

Immersion in the task. Market analysis 2007 – 2012.

Charts are based on data provided by analysts of company “X.“

> Add picture: Fig. 19. Analysis of the Russian market of cement and ready-mixed concrete.

As can be seen from the above diagrams, the market for ready-mixed concrete and cement after overcoming the crisis of 2008 – 2009 growing steadily.

Analysis of the sales of company “X” and its most dangerous competitor 2007 – 2012.

According to the end of 2012, in the Russian market of additives for production ready-mixed concrete the following situation has developed: the main market share is the main competitor of the company “X” (it owns more than 50% of this market), the second generalized object is occupied by company “X” (about 10%) of the market, followed by other players.

The diagrams are removed from the example for obvious reasons. The diagrams show that Y sales are growing amid a growing market for precast concrete and ready-mixed concrete. Sales of the company “X” are falling against the backdrop of a growing market for precast concrete

and ready-mixed concrete, and also amid growing sales of the main competitor. Gradually picture develops. But while there is no clarity – is it the sales or the product itself?

Analysis of the product offer of company "X"

A comparative analysis of the product is not given here in view of its significant volume.

Comparative analysis performed by specialists of the company "X" and a survey customers, showed full compliance with the products of the company "X" and its main competitor, and the survey revealed that the quality of the product of company "X" is negligible superior to the quality of the product of its main competitor in the parameter "dosage" – that is, a number of products of the company "X" makes it possible to obtain the desired effect at lower dosages.

The analysis shows that:

product quality indicators of both companies are on the same level (the conclusion was made on the basis of a study by specialists of the company "X" and a survey customers).

the range of products is completely identical, moreover promising additives – polycarboxylates – none of the studied companies.

Key market indicators – production of concrete products, ready-mixed concrete and cement As of the end of 2012, they are showing steady growth.

The market share of the main competitor of the company is growing steadily.

The market share of company "X" is steadily declining.

As stated above, the only significant difference is market activity of companies: the number of managers and branches of company "X" less than 6 times than its main competitor.

The problem is that you need to align the number of branches and managers between competitors, for which you need to increase staff and number affiliates about 5 times. However, this is impossible due to lack of funds, and gap in financial capabilities of company "X" and its main competitor constantly growing.

A key contradiction arises between the need to increase the number of branches and managers and the inability to do this due to lack of funds:

Add picture: Fig. 20. A pair of TP in this task.

Working TP isolated from fig. 18: affiliates and managers should be much to provide the required consumer coverage, but it will require the company investing a significant amount of cash, which is unacceptable.

Comment: The branch in this task is not just representation company. The peculiarity of this business is that most consumers prefers to receive the supplement in liquid form, however, the properties liquid additives are quickly lost, so each branch is a small production site with an additive dilution unit. One such the node is able to reliably supply consumers in a radius of about 250 km, not more. Of course, one node is not enough – you need to have staff managers and technologists involved in the sale and subsequent implementation additives at the enterprise of customers. Therefore, each branch should be endowed functions of production and product promotion. It turns out to work with consumers, we need branches with production functions and managers, carrying out the function of sale. But to keep up with a competitor, you need significant cash.

Operational Zone (OZ). The conflict area in this task is between a large number of branches and managers of the company "X" and a small number branches and managers of the company "Y".

In fact, a conflict arises between great financial opportunities company "Y" and small opportunities of company "X", processing the market (of the same consumers).

Add picture: Fig. 21. The operational area (OZ).

OZ Resources :

Tool: market supply of companies (preliminary analysis revealed the identity of the proposals of both companies)

Product: final consumers (precast concrete plants and manufacturers of commodity concrete), traders (resellers).

Let's try to transfer the branch function to other elements of the system, first the queue – to the health resources.

IFR-1 to OZ resources: The final consumer carries the functions branch.

The customer has already tried this strategy – but enterprises with a competitor's branch, they are not going to bear the costs for the performance of this function – Largely due to this market strategy, business X collapses, although products Company Y Company X Final Consumers Traders identical and even somewhat superior in stability to the properties of a competitor, about which said above. This is a dead end.

IFR-1: The trader himself carries the functions of a branch. The customer objects to of this formulation of IFRs: a trader is only a reseller, a reseller. He doesn't care what to make money on. Nevertheless, we recorded that a trader is a possible source of funding, however, like the plant. But there is a difference between them – the trader needs to do business in the region with numerous customers, and the plant – have the most convenient supplier.

IFR-2: Traders, working on large logistics sites throughout Territories of the Russian Federation themselves ensure the impossibility of further development of a competitor company "X".

Then the problem arose in a new formulation: how to make it so that more Y will open branches and the more hiring managers, the company X will be better? – that is, at this stage the acceptance of TP authorization "surfaced" No. 22 – to turn harm in favor.

In general, such a statement of the problem removes the fear that the competitor will repeat the decision of the company "X". After all, the more it repeats, the more it will "stoke" by myself.

From the course of strategic marketing it is known that such a task is interpreted by the expression "you need to find a competitor's weakness in his strength", i.e. what need to do something that Y can't repeat? (in other words, cannot abandon his own strategy and therefore will "drown" himself).

And here the IFR "works": the trader himself carries the functions of a branch .

Solution Idea:

You need to turn the trader (reseller) into a full-fledged distributor, for whom technological customer support is part of his business, and creation of a logistics platform – an object of

investment of a partner of company “X” with predicted payback period.

To implement this solution, company X will need to guarantee exclusive to one or two partners in the specified territory for the billing period time (the question now comes down to calculating the payback period plus – the time when distributor makes a profit; this period is, after all, a subject negotiations of the parties);

Provide training to distributor technologists, transfer to distributor technology to work with end customers, to provide an opportunity to represent interests enterprises in a given territory (franchise).

Verification of the solution found.

Is the original contradiction allowed? Yes. Even a superficial analysis shows that funds are required several times less than for opening own branches, while the number of managers at the traders is enough for elaboration of category B and part C clients. Category A clients may worked out by the company “X“ with the subsequent transfer to the trader.

Verification of the decision on the impossibility of repetition by the main competitor:

The competitor has already opened more than 30 branches – in all significant regions. For repeating the strategy he will either have to close the branches in which they are invested funds, or compete with your own distributors in regions! Distributors will not accept such conditions. Therefore, the implementation of this a strategy for a competitor of company “X“ will be difficult – this is the weakness competitor, concluded in his strength. The decision was received completely on organisational-managerial level, as required by the customer at the stage of setting the task.

(!) It is interesting that before solving the problem using TRIZ company periodically raised the task of developing traders in order to increase sales. However, the company’s specialists have not previously seen a tool in traders resolving this contradiction and did not try to develop a strategy development of a full distribution network. Just earlier management the company did not set a task like that.

Appendix E

Cross-cutting case demonstrating joint use schematization and work with contradictions as proposed by the author schemes.

A system consisting of: sales department of an industrial enterprise, manufacturing tooling from heat-resistant steels, presented head of sales, sales staff and the current system sales (Fig. 12).

The essence of the problem: the head of sales (ROP) implements a new sales system, having advantages over the previous one in terms of depth of study customers and, as a result, allowing to increase the average amount of the contract and conversion, however, managers resist and are in no hurry to leave the "beaten rails".

Required: to make managers use only the tools of the new system sales in their activities (as the task sounded in the original formulation, that in the process of analyzing the circuit turned out to be not quite the correct goal setting – see table).

Below, we compose a model of a functioning system, presented in the form of a diagram. The process of constructing a circuit for this task is described above (see explanations for Fig. 6):

> Add picture: Fig. 12 (repetition). Scheme of an inventive situation in the problem of changing the system sales.

The tasks set according to the scheme (Fig. 12) using the categories of schematization:

No. / Object of analysis in IFS / Tasks / No. / Task

1 interaction the system (dotted line) with elements supersystems

1.1. CRM system. The conflict arose largely due to the fact that the existing CRM system not adapted to the requirements of the new sales system, which creates significant inconvenience → how to make the CRM system meet the requirements new sales system and supported it?

1.2 end-to-end business processes. The new sales system is changing end-to-end business processes, this is especially true in collaboration with the design department and production → you need to configure end-to-end processes so that The requirements of the new sales system were provided .

1.3. customers. The new sales system increases the time to contact by the customer → how to make the depth of the customers' work increase without increase time managers?

2 Layers

2.1 The implemented sales system manages the actions of managers, imposing on them specific

requirements → How to make sales system requirements performed, but did the managers spend as little effort as possible?

2.2 Managers are faced with the fact that for a number of clients the requirements of the new system redundant, which does not increase, but rather reduces efficiency (from this point of view managers "manage" the reaction of customers, hence the distribution of layers on scheme) → Differentiate customers and introduce a new sales system only in relation to such client groups in which increase is expected conversion and average transaction weight when using this system.

3 Communications, Partially analyzed in paragraphs 1 and 2, additionally:

3.1 Logical conflict between two systems, for example, the approach is completely changing to identify needs, the stages of the transaction are radically different → Compare the requirements of the existing and new systems, identify areas similarities and cardinal discrepancies, disassemble into elementary steps of the area cardinal differences, thereby simplifying the implementation (such a statement of the problem allows the solver to rely on existing resources).

3.2 Communication defects ROP managers → Define metrics and reference points in the new sales system, which should be feedback from manager to leader. Simplify data retrieval by managers reference points.

3.3 Establish a relationship CRM-system – ROP → Having solved the tasks 3.2, bring the CRM-system in in accordance with the decisions received, make appropriate changes to order of meetings, strengthening communication on reference points and reducing communication on irrelevant moments.

4 Processes and functions

4.1 The task appeared after setting the task 1.2: to conduct a detailed analysis of business processes between the sales department and the design department, as well as between sales department and production department (pre-mapping processes using BPMN notation). Highlight bottlenecks and set targets for to overcome them.

4.2. After solving task 1.1, set the task to simplify the introduction of the required data into the CRM system by entering patterns and rules.

5 Groups

5.1 Negative phenomena within a group of managers – the effect of the adoption of new technologies according to the model of J. Moore → how to use innovators and early followers as a resource to introduce a new sales system? how to identify and neutralize the influence of "farther"?

5.2. Customer groups, which follows from the analysis of the task 2.2. Carry out customer separation on categories A, B and C. Define customer categories and target customer groups, for which the new sales system is redundant. Set a task for synchronization the work of the department, which should apply both sales systems, if a hypothesis will be confirmed and the existing sales system will be advisable to maintain for certain groups of customers amid the introduction of a new one.

6 Generalized Objects and material

6.1. Provide training for the "good middle peasants" of the new sales system after the decision tasks from pp 1-5 and determine whether they have reached the level of "stars" after a given

time. If not, conduct a comparative analysis of the work of those and others and conduct further training “Good middle peasants” according to the performance model (performance model explains exactly what competencies make stars stars by comparing them competencies with the competencies of “good average“ in the team and identifying discrepancies).

Next, we divide the subtasks into elementary actions that are necessary implement on the project. If necessary, we indicate the tools that should be used in further process this task. Also create unwanted effects and contradictions, if any, arise during the course of the project.

No. / task conditions / No. / Task for execution, further analysis / Secondary NE / TP (draft)

1.1 How to make the CRM system matched new system requirements sales and supported her?

1.1.1 Carry out ABC analysis and describe portraits customers by category in each channel

1.1.2. Organize a multi-funnel in CRM (process and resultant) in money and quantities

NE: Manager mistakes during funnel selection

1.1.3 Provide the ability to assign to one deal several counterparties indicating status and affiliation of the transaction in the card customer

1.1.4 Provide the ability to assign categories to deal and counterparty

1.1.5 Customize process and result reports funnel according to TK

1.2 End-to-end configuration required processes so that new system requirements sales were secured

1.2.1 Describe existing business processes between designated departments in BPMN notations and highlight points inconsistencies of the current process with requirements of the new sales system (after solutions to problem 1.2.3)*

1.3 How to make depth customer research increased without increasing time-consuming managers?

1.3.1 Develop standard decision making schemes for priority sales channels indicating customer entry points and tactics categories A and B

NE: With 5 priority channels – this is at least 10 circuits that still need identify correctly.

1.3.2 Develop channel matrices

TP: many hypotheses needs – more chance create UTP but difficult keep in mind (need to reproduce quickly in the conversation)

1.3.3 Develop rules for providing bonuses to customers

TP: many bonuses – large probability of getting into need but choose complicated.

1.3.4 Develop a base of typical questions at work at different stages of the funnel

TP: a lot of questions – more chance to create UTP but quickly we will tire the client

2.1 How to make sales system requirements performed but managers spent as little as possible effort?

2.1.1 Provide CRM system with tips

2.1.2 CRM system itself pulls data from customer portraits by average

2.1.3 Provide a description of the business process manager for each stage process and result funnel, highlight areas of greatest time loss and set tasks to eliminate them.

2.2 Differentiate customers and introduce a new sales system only relation to such client groups expected increase conversion and average deal weight at application of this system

2.2.1 Retain existing sales system for category C customers. Introduce a new system sales only for customers of categories A and B.

TP: a contradiction in the choice sales department work schemes – both systems are implemented all employees, or differentiation is carried out?

3.1 Compare requirements existing and new systems, identify areas of similarity and cardinal discrepancy, disassemble on elementary area steps cardinal differences simplifying implementation.

Partially solved in solving problems 1.3.2 - 1.3.4

3.1.1 The difference in actions at the stage of evaluating options: create a list of typical selection criteria in channels for target centers decision-making (supplement the scheme with solving problem 1.3.1)

NE: Managers forget perform actions at the stage evaluation options let gravity process

3.1.2 Difference of actions: a new item was added – economic justification. Give examples (cases) payback calculations that manager can use in preparation commercial offers.

3.1.3 Stage work with objections regeneralized objectd by stage “Resolution of doubt“, which causes difficulties. Describe the background doubt, manifestation doubt, train to work with doubt.

NE: Managers often miss occurrence doubt centers acceptance decisions even if have been trained.

3.2 Define metrics and reference points in the new sales system by which reverse should be carried out communication from manager to to the leader. Simplify receiving data reference managers points.

3.2.1 Develop quantitative indicators in funnel in the process and resultant funnels

3.2.2 Develop quality indicators in sales funnel

NE: Difficulty of control quality indicators in sales funnel

3.2.3. Suggest application control options data to the CRM system by managers daily (e-commerce facilities in no company)

3.2.4 To provide for the formation in the CRM system Lead from email manager and site companies provide automatic accounting leads.

NE: The risk of appearing in the database data of the same client under different names

3.3 Make appropriate changes in order meetings reinforcing reference communication points and reducing communication on irrelevant moments

3.3.1 Create report in CRM-system “movement in funnel for 1 week “for each manager

4.1 Conduct a detailed analysis business processes between sales department and design department, and also between sales and production department

Included in task 1.2.1

4.2 Set a task to simplify entering the required data into CRM system by entering patterns and regulations

Tasks 1.1.1 – 1.1.5 and a number of other tasks

4.2.1 After completing tasks 1.1.1; 1.3.1-1.3.4 integrate these documents with CRM system

5.1 How to use innovators and early followers in as a resource for implementation new sales system? how identify and neutralize influence "Bumpier"?

5.1.1 Create a report in the CRM system for use its capabilities (which entities are actively are used).

5.1.2 Provide a correlation report Entity Use – Conversion – average transaction weight – gross margin per month (use data when conducting meetings)

5.2 Set a task for department work synchronization, which should apply both sales systems if hypothesis confirmed and existing the sales system will be advisable to save for specific customer groups amid the introduction of a new

Task 2.2.1

6.1 Provide training for "good middle peasants" new system sales after solving problems from pp 1-5 and determine if achieved whether they are the level of "stars" through set time. If not, conduct a comparative analysis the work of both and spend retraining "good middle peasants" according to the model performance

6.1.1 Create a performance model indicating weighting factors on positive deal outcome

TP: When using no theoretical data takes into account the specifics enterprises but accounted for new system requirements sales, and if you take the data by the enterprise then they match the specifics, but accumulated by the requirements of the previous sales systems

6.1.2 Observe the work of the "stars" and refine the performance model

TP: If you watch for a long time, then get an adequate model performance but learn by it will not work right away. BUT need to be taught immediately, otherwise the system will not work.

6.1.3 Create a training program / mentoring using data obtained in the course of solving tasks 6.1.1 – 6.1.2

TP: mentoring program must implement best practice staff but at the same time they come off from core business

* in bold the table indicates tasks that require further analytical work.

And there are 28 tasks for execution, of which 26 can be put to execution, if you remove the selected unwanted effects (6) and resolve the contradictions, formed at this stage in draft form (7), after which you can finally formulate SMART execution tasks [14] and implement planning, for example, using SCRUM technology [26]. That is, proceed to "Managerial" part of the project.

2 more tasks require further analysis, for example, using notations descriptions of business processes [34].

We highlight the contradictions in graphical form that we encountered (8 contradictions arose at the stage of formulating tasks for execution, another 7 are secondary unwanted effects that occur when trying to fulfill the set tasks (transferring the remedy to the system). Execution

tasks not containing contradictions, are not included in the table, they will be fixed on the task board [26] and go to work.

If the resolution of the contradiction is obvious, write it to the right in the table. If not, then We expose the selected TPs to further analysis.

Tasks 1.2.1 and 2.1.3 will be further analyzed, as indicated above, after which TRIZ tools can also be applied to them.

No. / TP in graphical form Authorization / Next Steps

1.1.2

- one +

When setting the trade category marker “C” in the CRM system it is automatically offered process funnel if marker is installed “A” and “B” are the result.

Requirements taken into account two systems of sales

Funnel in CRM

Errors in choosing funnels

+ 2 -

1.3.1

- universal +

It is solved when performing task 2.1.2, so how typical schemes are provided manager in the form of a hint CRM system when setting a deal marker and channel sales. Solution: make the channel marker sales “active field.

Accuracy of description the situation

Decision making schemes

Complexity identification scheme

+ Broken by channels and categories -

1.3.2

+ Lot -

Break down hypotheses by sales channels and decision centers. In preparation to the meeting use only the target matrix, pre-selecting 5 key hypotheses (empirical figure). The target matrix is output by analogy with solved problem 1.3.1

Brighter and reasoned USP (unique trade sentence)

Hypotheses of needs customer

Play from memory during dialogue with by customer

- Few +

1.3.3

+ Many options -

Bonus classification matrix: row by row - classification by groups (financial, logistics, consulting ...), by columns – classification by authority: Manager, Head of Sales CEO.

Probability to get in need

Bonuses to customers

Complexity of choice

- Few options +

1.3.4

+ Lot -

The contradiction is resolved by mentoring – you need not to remember questions, but to learn design them quickly with using typical hypotheses needs and criteria.

Brighter and reasoned USP (unique trade sentence)

Customer questions

Play from memory during dialogue with by customer

- Few +

2.2.1

+ Differentiated by sales patterns -

We try to solve through analysis TOC contradictions [12]

Optimal using qualifications

Department staff of sales

amount supported by standards

- All employees apply both schemes +

3.1.1

- Single stage of work with needs +

Set marker in CRM system, indicating the duration of stay on each stage of the funnel depending on correlation of the stage with the category of the transaction. At exceeding the limit of being at the stage “Need recognition“ marker signals manager about high the probability of a change in stages.

Localization work with issues and criteria of choice

Sales funnel

Ease identification stages

+ Work with needs beaten in 2 stages -

3.1.3

+ Stage “permissions doubt “ -

Let’s try to solve using IFR and resources [11] (previously acted on a hunch, need to find reliable and easy decision to identify doubts Decision Centers)

Conformity project realities of sales

Sales funnel

Complexity identification

- Stage “work with objections +

3.2.2

- Only quantitative +

Bring quality indicators to clear digital form (result – identified at least 3 needs leading to benefits not highlighted less than 3 criteria leading to benefits, etc.). Provide for CRM-system markers, allowing to conduct counting such indicators and display them in special field in the transaction passport.

Adjustment transaction movements → conversion

Funnel indicators of sales

Complexity extract of information

+ Quantitative and quality -

3.2.4

- Manually +

Leads approves in the CRM system only marketing assistant. Also assistant distributes leads for further elaboration → required to enter in a CRM system, a marker for the appearance of a lead, notifying employee to whom attached lead assistant department marketing.

Lead Preservation (guarantee that lead not lost)

Leading in CRM-system

Opportunity appearance in the database defective records

+ Using automatic services -

6.1.1

+ Prepared from using experience -

We try to solve through analysis TOC contradictions [12]

Using available data on application the system

Model performance

Conformity programs learning requirements new system

- Prepared from scratch +

6.1.2

+ Based on current understanding -

We try to solve through analysis TOC contradictions [12]

Preparation time models (launch in work)

Model performance

Efficiency learning (impact strictly to the point growth)

- Based on form matching the behavior of the middle peasants with the stars +

6.1.3

+ “Serednyachki“ with experience from 1 year -

We try to solve through analysis TOC contradictions [12]

Time of the best employees on performance main the activities

Who is conducting training / mentoring

“Concentrate“ practical skills

- Best practics +

So, straight away we managed to find solutions to 8 contradictions out of 13. The remaining 5 contradictions. We will allow by other means.

Resolution of the contradiction 2.2.1 (solved through analysis of TOC):

Add picture: Fig. 22. Analysis of a pair of TP 2.2.1

There is no transition of qualified employees to less skilled work and vice versa

Differentiated by sales patterns

Optimal use employee qualifications

Department staff of sales

Number of supported standards

Both schemes are applied (no differentiation)

Required to have only one training scheme for new employees

The branch “how to make employees differentiated by sales technology, but at the same time we had only one scheme of employee training ”can be seen as promising.

Solution : for the duration of the internship, the employee must be trained according to the program of work with category C customers, and then, upon detection of potential, it can be transferred to work with category A and B clients after retraining. In doing so, we we get a single training system for sales staff, but differentiation by sales patterns saved.

Super effect : gradual manifestation of employee potential, additional motivation by complicating tasks with increasing income, reducing the number of unsuccessful personnel decisions.

Resolution 3.1.3 (use resources and IFRs):

Add picture: Fig. 23. The choice of working TP from a pair of TP 3.1.3.

Includes Stage “Resolution of doubt”

Compliance with realities of project sales

Sales funnel

Identification difficulty “Subject of processing” (doubts are hard to detect)

Includes the “work with objections“

Resources:

Stage of “resolving doubts” (tool)	The process of identifying an “item” processing (doubt) “- product
Approach to the contract	Personal communication with the adoption center solutions
New large customer	Information from other stakeholders
Characteristics of the personality of the adoption center solutions	Experience in similar transactions
Top Management Attention	Behavior Center Analysis solutions

IFR rule:

The X-element itself provides an unmistakable identification of customer doubts (item processing), significantly affecting the outcome of the transaction.

As a result of the substitution of resources in the IFR formula, we obtain the following:

1. When approaching the conclusion of a contract in the case of work with large transactions the head of sales (ROP) takes the transaction under personal control;
2. If the client has not worked with us before, a major transaction is planned, we enter information about the personal qualities of the counterparty in the contact passport – type individuals by DISC topology (or use the enneatype model by topology Adizes-Madanes), interests, features of behavior. For briefing managers detailed cases, examples are shown.
3. If the transaction is large, then at the stage of recognition of needs we study in detail requirements of decision makers on this transaction. Special attention we turn to this point if the transaction is significantly larger than those that were made with this client earlier or the client switched from a competitor. Further, when promoting the transaction, we fix deviations from the above requirements identified deviations and will be reliable indicators of doubt.
4. If personal communication with the decision center is interrupted for a while for objective reasons (the transaction goes to the stage where work carried out with other decision centers (DPC), periodically conduct personal communication with the CPR under various pretexts. Periodicity contacts – at least 1 time per month.
5. Maintain information with persons influencing the decision and record deviations from the current trajectory. In case of detection significant deviations come in contact with the DPC.
6. Use the experience of similar transactions – on an extended monthly basis. retrospective analysis of sales to study the issue of identifying doubts arising in the most material transactions.

Resolution of the contradiction 6.1.1.

A cursory analysis of the contradiction led to the understanding that express analysis by TOC is unlikely will give a quality result. Therefore, we will resolve this contradiction with allocation of resources of the operational area and the application of IFR.

Add picture: Fig. 24. The choice of working TP from a pair of TP 6.1.1

Prepared using the experience gained

Using accumulated statistics

Performance Model

Compliance of trainings program and the requirements of the new system

Prepared “from a clean sheet“

Resources:

Performance Model Preparation “From scratch” – tool	Using accumulated statistics – product
Specification of behaviors overlapping with existing sales system	Accumulated Cases
Unique Form Specification conduct	Cross-channel conversion data of sales
	Manager Reports
	Documented Results meetings

IFR rule:

X-element itself ensures the use of accumulated statistics in the model performance designed for the new sales system.

As a result of the substitution of resources in the IFR formula, we obtain the following:

1. Describe behaviors in the performance model in relation to the new sales system and highlight those forms of behavior that are similar to the previous system. Use existing cases and accumulated experience when working out “Intersecting” forms of behavior;
2. Analyze in channels where the conversion was above the average for transactions categories A and B. Use the experience in these transactions as a reference to verify the adequacy of the performance model created for the new sales systems.
3. To analyze in channels where the conversion was below the average for category transactions A and B. Put a thought experiment in the application of the performance model for a new sales system for such transactions. Mark those forms Behaviors experienced by experienced staff could correct the situation. When training employees, pay special attention to the highlighted forms behavior.
4. To check the adequacy of the conclusions in paragraphs 2 and 3, use the reports of managers and meeting minutes created during the development of analyzed transactions.
5. Use data from manager reports and meeting minutes to case studies when teaching selected forms of behavior (if the form new behavior, then as a case, you can bring a situation where the presence this form of behavior could have a qualitative impact on successful transaction outcome).

Resolution of the contradiction 6.1.2.

Add picture: Fig. 25. Analysis of TP 6.1.2 pair and application of IFRs.

IFR

Do not spend time on comparative analysis of the work of the “average“ and “stars“ by behaviors

Based on current understanding

Model preparation time

Performance Model

Effectiveness of the training (acting strictly on growth points)

Based on job comparisons of “average“ and “stars“

Do not wasting efforts on development of behaviors forms that average employees already reproduce in good way

The application of IFR suggests itself:

IFR 6.1.2-1: the X-element itself ensures the selection of forms that are “not enough” by the middle peasants behavior without a comparative analysis of the work of the “average“ and “stars“.

Solution : analysis of the situation by the “stars“ themselves: if the “stars“ hold a series of meetings together with the “middle peasants“, having on hand a common list of forms of behavior, then spending subsequent reflection with the “stars“ is easy to catch the difference. This operation is not will require more than 1 week.

Resolution of the contradiction 6.1.3.

Add picture: Fig. 26. Analysis of TP pair 6.1.3.

Top employees excluded from the mentoring process

Average employees with experience of 1 year and more

Spend time of best employees on the basic tasks

Who is conducting training

Concentrate on practical skills

Employees with experience from 5 years and more having high results

We already removed all which does not give stable results

Both branches are recognized as dead ends, no solution found.

We try through resources and IFR:

Add picture: Fig. 27. The choice of working TP from a pair of TP 6.1.3

Average employees with experience from 1 year

Spend time of best employees on the basic tasks

Who is conducting training

Concentrate on practical skills

Employees with experience from 5 years and more having high results

Resources:

Experienced staff → mentors – tool	Time experienced employees on basic tasks – product
Project Sales Experience	Meeting Planning Time
Company product knowledge	Time to analyze transaction information
Accumulated customer base	Time to contact customer
Fame in the professional environment, reputation	Time to prepare reports in CRM-system
Expertise in the client’s business	Time for lunch, rest during working hours of the day
	Psychological competence

IFR rule:

The X-element itself provides an exception to the time spent by the best employees on training / mentoring.

As a result of substituting resources into the IFR formula, we obtain the following (we see that with the IFR data better manages the resource of the product):

1. Adaptation of a new employee is divided into 2 parts: introductory course new employee passes with the employee who conducts the initial introduction to the course of affairs and answers some of the beginner's questions. The introductory course is conducted by an employee who has 1 year work experience and stable sales results. After passing Introductory course, the new employee falls into the second stage of adaptation.
2. The second stage of adaptation is the "shadow". That's what technology is called when new the employee is trying to copy the actions of the wizard, in the course of playing it action he is faced with a lot of obscure moments that should fix in the form of questions. Then prepared questions new the employee asks the mentor. The same technology can be used during contacting an experienced employee with a client.
3. This is where the practice entrenched in a number of companies comes from – a progress diary new employee. That is, the new employee does not record anywhere, but in paper or electronic workbook with pre-prepared fields. So information is better structured and amenable to subsequent analysis.
4. After successfully completing the second part of the adaptation, an experienced employee allocates time in his schedule for "polishing" the skills of a new employee in the process of monitoring its preparation for responsible meetings and contacts with by the customer.

Those to completely remove experienced employees from the mentoring process is irrational, but it is possible to reduce their time in the process of mentoring by 2-3 times without reducing process efficiency. The contradiction is partially resolved.

Based on the obtained solutions, the task manager developed an implementation program new sales system, including a step-by-step action plan drawn up in the environment `www.trello.com` using SCRUM technology [26]. Currently going the process of implementing this program of activities.

Appendix F

F.1 General algorithm of work with organisational-managerial tasks indicating the most commonly used tools.

When solving organisational and managerial tasks, we applied the most various tools from the TRIZ arsenal [11]. Some tools from the arsenal TRIZ are used in organisational and management tasks without any methodological completion, and some had to be converted to requirements "Soft" systems, primarily, for the requirements of business systems [2, 11].

In fig. 28 presents a simplified scheme of using TRIZ for solving business tasks used by the author [46]. To describe the groups of tools, we introduce two important concepts: product and result [10]. These terms are widely used in modern management. A product is something that can be transferred to the next stage of work with a task, that is, the "exit" of the instrument. The result is a refined understanding of the system or process (analysis result).

Most often, such a scheme is used not so much to solve situational problems, how much when performing projects in business systems:

> Add picture: Fig. 28. General scheme for the use of TRIZ tools in the implementation of projects in organisational systems.

So, the work on the task consists of five blocks (Fig. 28):

- Formulation and formalization of the task;
- Initial processing of the task;
- Highlighting a list of key contradictions;
- Decisive mechanisms;
- Verification of the decisions received.

We will reveal these mechanisms in more detail.

1. Formulation and formalization of the problem (steps 1–5, Fig. 28).

Process: communication in a team of professionals looking for a solution, designed to understand the conditions of the problem.

The result: an understanding of the system's design — what are the key elements the composition of the system and how the most significant relationships between them are organized, as well as what paths (step 5) should further transform the system.

Product: A set of unwanted effects that make up the problem situation. (step 4) and the trajectories of further work with the task (step 5).

2. Initial processing of the task (steps 6–10, Fig. 28).

In fig. 1 not all the tools that we use in TRIZ are presented, but only the most commonly used.

Process: we analyze the cause-effect relationships, parameters and structure system, determine the principles of its work.

Result: a deeper understanding of the connections in the system, a description is made elements and their key parameters.

Product: key unwanted effects, secondary tasks, solution ideas. Some ideas might appear at the previous stage, but when using there are much more tools from this block.

3. Highlighting a list of key contradictions (step 11, Fig. 28).

Process: we determine the parameters that conflict with each other. Highlight secondary adverse effects associated with counteraction system. We are building contradictions.

Result: sharpening the task to the limit, which allows you to see the nodal points tasks, to cut off all unnecessary – "white noise", which is always in large quantities accompanies organisational and managerial tasks.

Product: list of contradictions.

4. Decisive mechanisms (steps 12–13, Fig. 28).

There are several such mechanisms, most often we use two of them. (steps 12 and 13).

Note that the process of selecting an operational zone and determining resources within

> Here is text missing in the translation.

The operational area is part of step 12.

Process: using conflict resolution algorithms, we find ideas for solutions to the problem. The result and the product here coincide: ideas for solving the problem and tasks of the third order. Such problems arise if the solutions found require further analysis (then back to steps 3, 7-10) or come across a significant system resistance (then go to step 11 and allow new contradictions).

5. Verification of the obtained solutions (step 15, Fig. 28).

Process: we analyze the received decisions, we compare them with the goals of customers and key stakeholders. We pass a verdict: are solutions suitable for introductions? If the answer is yes, then we proceed to the verification by the ratio benefits to costs. If the benefits are incomparably greater than the cost of solving this tasks (which happens, of course, not always), then proceed to planning implementation, if not – go back to the beginning of the algorithm and select additional tasks.

Result: understanding the next steps: we move on to planning implementation or set new tasks.

Product: solutions and secondary tasks.

Now a little about the "parking" (step 14). "Parking" we call the generalized object where "Stored" ideas found in the process of working on a task (of course, parking – this is not

our invention, G.S. Altshuller proposed solutions labeled as "GI" is a brilliant idea). Ideas can come up on a variety of stages of processing the task, starting from step 3 to step 15 inclusive. Their important "park" on time and divide into categories so as not to lose and subsequently translate them into an action plan for the implementation of ideas received during implementation project.

In fig. 28 shows a general scheme for using TRIZ tools in projects, implemented in organisational systems. Of course, in practice it's not necessary All tools depicted in this diagram apply. Instruments used selectively. So, in the example from Appendix 5, primary tools task processing was not used at all, but decomposition was applied secondary tasks obtained by analyzing the circuit in Fig. 12. The decision process tasks remains largely a creative process and, unfortunately, still insufficiently formalized and largely depends on experience, competencies and psychological features of the solver.

Appendix G

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G.1 Abbreviations:

- FVA – function-value analysis (FSA in Russian)
- HE – harmful (unwanted) effect
- IFR – ideal final result
- MUF – main useful function
- MWS – model of a working (functioning) business system
- OMT – organisational-managerial task(s)
- ROP – head of sales department
- SMD – Systems Thinking Methodology (Системо-мыследеятельностная методология)
- TC – technical contradiction