Application of TRIZ to solving a management problem: a case study

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This paper demonstrates how M-TRIZ (which stands for *Management-TRIZ*, an extension of TRIZ), can be used to solve business and management problems. The case presented in the paper is based on a real situation, which took place several years ago in the telecommunication industry. The presentation is limited to describing a general process of working with several M-TRIZ techniques and a selected number of produced recommendations. The paper assumes that the reader is familiar with the basic TRIZ concepts.

A problem.

Two large professional groups were going to enter a long-term joint project. The goal of the project was to develop a range of hi-tech products and bring them to the market. The project involved many teams and several sub-projects for each specific product.

The first group (Engineers) were corporate engineers, who used to work under strict project requirements and deliver results at the requested time with the proper degree of quality. The second group (Researchers) were research scientists of the state-owned research institute, who were not used to work under such requirements. Both groups consisted of at least, one hundred persons each. Both groups were located remotely from each other: the distance between the offices of each group was more than 500 km.

A problem addressed to the risk management area. The risk was that the group of Researchers could be late with its deliverables for several foreseen reasons: unexpected delays, misunderstandings between the two groups and etc. The Project Board was trying to find a solution to reduce the risk. The board considered a possibility of relocating the personnel of both groups to a single place but found it too expensive and, what was more important, it would be very uncomfortable to the families of the project personnel.

A third-party consulting company was hired to assist the project board. The consultants came up with the following problem formulation: it was necessary to bring the cultures of the both groups closer. To achieve this, the company suggested a plan of joint gatherings, at least twice a month, were the project staff would be able to meet and communicate in open and friendly environment.

However, the Project Board did not like this solution since it was unclear how this solution would directly influence the project within a short term and guarantee the required results. Therefore the decision was made to study if M-TRIZ can help with producing more effective recommendations. The M-TRIZ management consulting project lasted three days.

Problem-Solving Approach.

The approach used to solve this particular problem was based on the convergent model of structured creative thinking (Fig. 1). For navigating within the search space of possible solutions, the M-TRIZ techniques were used: analysis of the problem situation to identify and formulate core problems and systematic techniques for generating solution concepts.
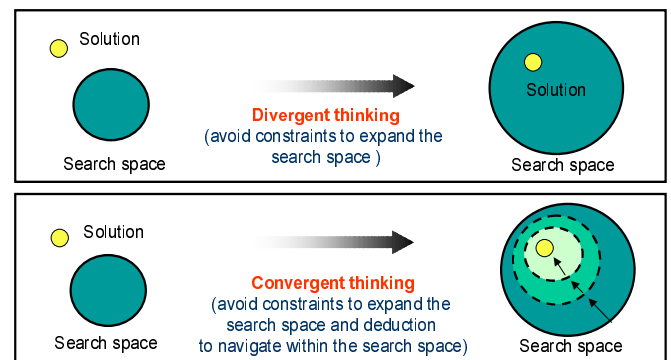

Figure 1. Convergent vs. Divergent Thinking

Problem Analysis.

According to M-TRIZ, two types of problem models could be defined depending on a particular situation:

a) based on potentially conflicting requirements and
b) based on system analysis if there are no visible conflicts.

Analysis and refinement of the problem defined by the Project Board led us to the conclusion that the problem defined by the consulting company (bringing cultures closer) was too general, and, therefore, more difficult to solve than other more specific problems.

Our study of the situation resulted in the decomposition of a general situation to two core problems:

1. **Problem A:** Researchers might be slow with submitting the required results due to the nature of research work and the research environment and
2. **Problem B:** The delays in the project might arise due to miscommunication and misunderstanding because both groups have different backgrounds and different ways of representing results of their work.

Although both problems seem to be interrelated, we tried to solve every problem independently to avoid incompleteness of a final solution.

Problem A: Conflict model.

The conflict is formulated in a way similar to formulating a macro-level physical contradiction in TRIZ: two opposite requirements put on values of the same parameter should be indicated and conditions corresponding to each value should be mentioned.

Conflict: The researchers have to work faster than usually to be in accord with the defined project schedule and milestones; and they should not work faster than usually because they will experience stress.

Problem B: System/Interaction model:

The analysis of a system where a problem arises is being done in a way similar to conducting Function Analysis, a supplementary TRIZ tool for product/process analysis and problem formulation. Principal ideas of the TRIZ-based Function Analysis were found well adaptable to the analysis of business and management systems and processes.

Since it is unclear what results to expect and what system changes will be required, the full analysis is recommended. The goal of the analysis is to reveal and locate the undesired effect and formulate a problem in M-TRIZ terms.

In the presented situation, the system analysis is fairly simple due to a low number of components involved:

- **Component Analysis**: A system consists of two components: the group of Researchers and the group of Engineers. A management board can be considered as an additional component. Although other components can be included as well (e.g. components of a supersystem or technical means), we omit their presentation in the paper.
- **Function Analysis**: The function of Researchers: *to provide Engineers with the results of the research work in time.* The Function of Engineers with the respect to Researchers: *to provide timely feedback and detailed specifications for the research before and after each project's phase.*
- **Interaction Analysis**: Interaction between Researchers and Engineers is provided via Information Exchange. General characteristic of the interaction in M-TRIZ terms: *Insufficient*.

Specific Problem Diagram resulted from the analysis (defined in a way similar to the TRIZ substance and field analysis):

Researchers   Engineers

Interaction: insufficient
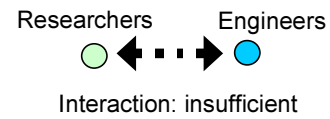
Problem Solving.

The problem A was solved by using a set of principles which are similar to the TRIZ set of principles for solving physical contradictions. Only those principles, which led to valuable recommendations, are presented:

a) Elimination of conflicts by separating conflicting requirements in space:

1. **Relocate the resources by partial mixing**: move a part of Researchers (those who are eager to move, according to the project tasks) to the location of Engineers and vice versa.

b) Elimination of conflicts by separating conflicting requirements in time:

1. **Segmentation**: Break the scheduled project time intervals into smaller, better controllable parts, as small as possible.
2. **Cushion in Advance**: Start each new phase of the project earlier than required (by corresponding allocation of resources) and concurrently with finalizing the current phase. A part of a team working on a specific task thus starts preparations and work for another phase in advance.
3. **Partial or Excessive Action**: Define the goal for each research phase of the project as *more than required*, but to be achieved within the same time interval.
4. **Feedback**: introduce a positive feedback that would additionally motivate the Researchers, for instance:
   - Organize meetings of the Researchers with a "happy" customer.
   - Researchers are paid bonuses if the results are provided on time (or royalties coming from the product sales).

c) Elimination of conflicts by inter-system transitions.

1. **Transition to supersystem**: Introduce a supersystem component that would motivate researchers to produce results on time (work faster) but indirectly related to the project:
   - Finding a renowned academic publisher who would agree to publish a series of books on the project research results. A deadline for submitting a publication should correspond to

the project milestone. A possibility to have a solid publication will additionally motivate researchers.

- ❑ Financial support of trips of Researchers to the conferences organized by industrial corporations, R&D associations or other parties with corporate culture involvement and not necessarily related to the core of the Project.

### d) Elimination of conflicts by mobilization of resources.

1. Analyze the existing human resources. Who of the existing Researchers are eager to work in a corporate environment? Assign to them certain management tasks necessary to provide timely results.
2. Analyze the existing time resources: break each defined time interval unit into sub-intervals: the task interval and the evaluation/ communication/ feedback interval. Develop a strategy to search for time intervals that might create gaps in the research during the project and an approach to effectively use them.

Problem B: Solution Models:

Since the problem B belongs to the category of problems that involve undesired/insufficient interaction, to solve the problem we will use a subset of rules for a system modification derived from the TRIZ collection of Inventive Standards. The goal of problem solving is to transform the insufficient interaction to sufficient.


Interaction: insufficient   Interaction: sufficient

Possible solutions based on the *generic patterns of improving interaction*:
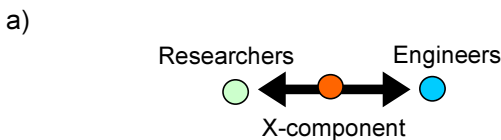
a)

X-component can be: A) human component or B) non-human component.

- ❑ Case A: specially trained personnell is assigned to improve communication and information exchange;
- ❑ Case B: software tools can be used that help to provide communication: intranet-based general and specific forums, tools for asking questions to a wide audience without physically gathering, etc. Develop a generic format of communication and assign management of the communication.
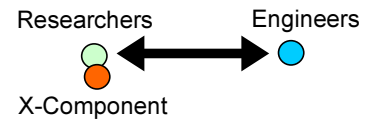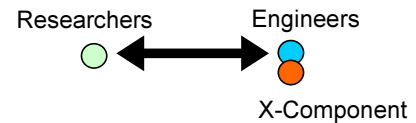
b)

X-component can be: A) human component or B) non-human component.

- ❑ Case A: specially trained personnel is assigned to Researchers to improve communication and information exchange;
- ❑ Case B: software tools can be used that help to improve communication: intranet-based forums targeted at specific tasks, tools for asking questions to a wide audience without physically gathering, etc.

c)

X-component can be: A) human component or B) non-human component.

- ❑ Case A: specially trained personnel is assigned to Engineers to improve and provide communication and information exchange;
- ❑ Case B: software tools can be used that help to improve communication: intranet-based forums targeted at specific tasks, tools for asking questions to a wide audience without physically gathering, etc.

d)
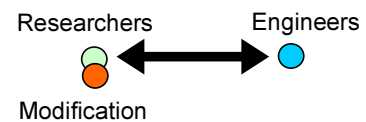
Modification of the component: Find among Researchers a person with good communication skills and eager to work closer with Engineer's areas, and who is familiar with a corporate environment. Make him be responsible for the communication between both groups.

f)
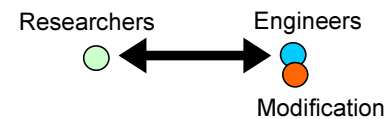
Modification of the component: Find among Engineers a person with good communication skills and eager to work in the research area, and make him responsible for the communication between both groups.

g)
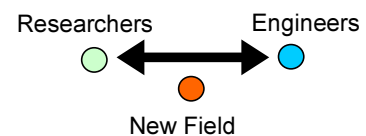
New Field: Additional management of communication between both groups (assigning communication management), finding additional motivation, extra payment, bonuses, royalties, intranet-based workgroup communication tools, newsletters, etc.

In general, the function of a "component" or a "filed" that has to be introduced is to provide errorless, effortless and effective communication between the two groups.

Solutions

As seen, none of the produced recommendations can be regarded as a specific solution exactly indicating how a recommendation should be implemented. On the other hand, the recommendations are specific enough to build detailed solutions on their basis.

Evaluation of proposed recommendations is performed by comparing the degree of ideality of each proposed recommendation. Another important factor is the degree of guaranteeing results. Correlation between two comparative studies will help to rank the proposed concepts and select those that have the highest rank.

However, as follows from our experience, the best way to solve business and management problems is to use a combination of several recommendations produced. One of the alternatives was to use the following combination of solutions: a) to agree with a publisher to launch a series of publications; b) to introduce additional feedback in form of meetings with customers and payments of bonuses; c) to create an interdisciplinary "communication group" consisting of representatives of Engineers and Resarchers whose interests reside in both areas: science and engineering.

The professionals of the Project working with us found the results quite interesting and satisfying. Many of the recommendations presented above were found new, they had never been discussed by the Project Board or proposed by third-party management consultants before M-TRIZ assistance took place.

Conclusions

In general, a number of innovative business and management solutions might appear to be smaller than a number of technical solutions, because there is no such a variety and diversity of physical components and situations which are available in technological areas. Many of the solutions are well documented. For instance, after it became clear that the key problem was how to improve communication, many known solutions could be used, which are not difficult to find in literature. Nevertheless, such problem formulation still remains very general, therefore applying M-TRIZ principles and generic solution patterns can help with generating more specific recommendations with respect to a particular problem situation.

A challenging direction of TRIZ research is to study how to use the TRIZ-based approach for solving business and management problems, which scope is not limited to technological areas only. This direction should not necessarily be restricted to specific areas, such as financial management or PR management, for instance. Actually, the basic TRIZ concepts can be applied to any situation where attempts to use known specific solutions failed to help.

Classical TRIZ and its modern extensions are well developed for technological areas, so the question is, whether the same approach which is used to solve inventive problems can be used for virtually any area of human activities where innovation is required.

TRIZ consists of two layers of knowledge: deep and specific. Deep knowledge defines a general strategy of problem solving (for instance, formulation and elimination of contradictions) while specific knowledge comprises the collections of domain-dependent generic patterns of previous solutions or effects enabling systematic search for solutions (e.g. TRIZ guide to physical effects).

We believe that strategic knowledge is general for any area, whereas specific knowledge can be different for each particular area (such as technology, financial management, information technology, etc).

Summary

Summarizing, M-TRIZ helps with:

- implementing a model of convergent thinking: first, expanding a search space for solutions by neglecting constraints and second, providing tools and techniques for effective navigation within the search space;
- solving specific problems by producing recommendations with respect to a specific situation;
- quick generation of recommendations which are out of the box and invisible by applying common sense or previous experience of an organization only;
- saving time by avoiding generation of many useless ideas, which is a feature of random psychological methods of boosting creativity;
- saving time usually spent for browsing literature to search for available solutions;
- viewing and analyzing every problem in its relations with a system and a super-system where a problem arose.

About the Author

Valeri Souchkov, development manager and innovation expert of InBITween bv, has over 14 years of practical experience with TRIZ, knowledge-based innovation and information technology. He is a TRIZ consultant and trainer certified by G. Altshuller. In 1989 was a co-founder of Invention Machine Corporation. He can be reached at valeri@inbitween.nl