

Exile of the Six-winged Seraph

Len Kaplan
(GB LLC)

Introduction

The development of a new process never happens out of nowhere. Usually, it is an answer to questions, which are unanswered within the scope of the old method. The GB approach was created as an answer to the questions TRIZ was facing:

1. When implementing the TRIZ approach to creative work, how do we make it fit into the management culture of the company? (i.e. how to make the problem solving process controllable, plannable, and aligned with the company's strategic goals.)
2. How to organize the process of solving "unsolvable" problems and finding creative (unexpected, workable, and implementable) solutions in such a way that it would not require creative thinking?
3. What principles should be at the base of this process? What kind of labor division should the process use?

Goal: implementation of an innovation system

Creation of an innovation (creative) system within large organization faces many problems [1]. For example:

- Difficult to introduce "flexible" work conditions
- Difficult to control the process of searching for creative solutions
- Company management tends to reduce the creation of innovative subdivisions to finding the new names for R&D departments

Interestingly enough, all of these difficulties stem from the natural characteristics of creative thinking. As we know, creative thinking occurs and manifests itself most often under certain conditions enabling the creativity. We can narrow it down to three main conditions:

1. *Absence of strict control over the creative process:* it is impossible to "create upon request".
2. *Absence of punishment for mistakes:* mistakes are an unavoidable component of the creative process. Fear of punishment strongly discourages the will to create and take risks.
3. *Freedom of creative search:* a new idea is not necessarily relevant to the current goals of the company, but may bring large profits in the future.

These conditions seem fairly logical. They are supposed to motivate the employees to create, experiment, and invent. A company, which rewards creative activity, becomes more flexible and dynamic. It beats the competition in new product development, and therefore enjoys successes in the market. Then why is management so reluctant to establish creative teams and innovative culture within the company? Why, instead of the classic "Innovate or Die", we often hear the ironic "Innovate and Die"?

Contradictions interfering with implementation of innovation systems

So what is the main cause of management's negative attitude towards the idea of implementing an innovation culture or at least a creative group? Apparently, it is because the conditions of supporting innovations are destructive to the company. At least, that is how it seems to managers who are used to

overseeing everyday work. To them, creativity and innovation seem unmanageable and uncontrollable. It's hard to know who and when will come up with a successful idea; and whether that idea will be the solution to the company needs. It is impossible to control whether "creative employees" are actually working or just wasting time. Furthermore, it is unclear who to hold accountable for mistakes, which can sometimes be quite costly. This is why managers have a tendency to start and finish the entire process of implementing creativity by simply getting a new label.

As we can see, the main problem of implementing an innovation system in a company is the creative characteristics of innovative work. Company management is faced with multiple contradictions:

- *Creative culture should be implemented in the company to help the company survive and succeed in modern market conditions...*
...but this culture should not be implemented, because it is impossible to control.
- *Creative culture should exist in a company to support and motivate creative thinking...*
...but it should not exist in order to maintain controllability of the company.
- *Creative thinking should be used in order to originate creative ideas for new products and processes...*
...but it should not be used, since creative ideas appear uncontrollably and often do not match the needs of the company with their goals and timeframe.

All of these contradictions show that the old paradigm has an irreconcilable problem. The old paradigm can be stated as: *creative solutions can only be obtained through creative thinking*. The old paradigm will inevitably be replaced by a new one – free of problems associated with the particular characteristics and needs of creative thinking.

How would this new paradigm look? If it exists without the problems associated with creative thinking, it must be: *creative results should be obtained without creative thinking*. Sounds counterintuitive, doesn't it? That is because it should! Every time that a new paradigm replaces an old one, it must sound counterintuitive, unexpected, defiant, and wrong. This is the nature of what we call a "paradigm shift". Imagine how cabbies and horse harness manufacturers reacted to the new paradigm of "cart without a horse" in the early 20th century. How about the phone companies of the 80s when they heard the idea of a "phone that is always with you"? [2,3]

So the new paradigm suggests that we should obtain creative results (solutions) without the use of creative thinking. Is that possible? If so, how?

Problem formulation: exile of the six-winged seraph

In 1959, the scientific journal "Inventor and innovator" published an article by Genrih Altshuller and Rafael Shapiro titled "The Exile of the Six-winged Seraph." They later published a book under the same name. This was one of the early articles related to the not-yet-born science of inventions – TRIZ.

"Back then we found another book about inventiveness. In the book, we read: "Like a prophet, an inventor is inspired at the crossroads by a six-winged seraph."

It was a very old book... The book was quietly living out its time on a library shelf. But the six-winged seraph, which descended from its pages, turned out to be quite resilient. He moved from book to book, from publication to publication. He even penetrated solid, scientific portfolios. Although here, he was called other names: "creative intuition", "natural abilities", "technological

understanding of nature”. The faces changed, but the essence of the matter remained: inspired by the six-winged seraph – invention; no visit from seraph – no invention.

...we did not believe the six-winged seraph. We were convinced that technology develops following a set of rules. This leads to a logical conclusion: these rules can be studied and used for conscious inventive work – without any accidental inspirations or epiphanies.”[4]

Classical TRIZ significantly pushed the “six-winged seraph” from some strategic positions. However, he was indeed “exceptionally resilient”. Now, it is time to finally remove him from the process of creating innovative solutions to complex problems.

Before starting an offensive on the well-established positions of the “six-winged seraph”, we must first find their weaknesses.

Creative solution

When considering creativity, people often combine two different concepts:

- **Creative thinking:** search for new ideas, when none of the known solutions work, and
- **Creative result:** a functional solution, “unexpected” to the experts of a given field.

The combination of these concepts leads to the “logical” conclusion that creative solutions inevitably require creative thinking. In order to avoid such “logic”, it is imperative to separate these concepts. What is more relevant: thinking or results? Naturally, the results.

A creative result can be represented as a **system**.

The purpose of this system is solving a specific problem. If a problem can be solved without going outside the scope of professional and common knowledge, the solution does not need to be creative.

The need for a creative solution occurs when professional and common knowledge is not enough. Experts are unable to find a working solution that is not accompanied by significant shortcomings, though they are using all of their knowledge and experience. Let us call these problems “unsolvable”. Nevertheless, “unsolvable” problems still need to be resolved, so we need a “creative” solution. This solution goes beyond the scope of knowledge and experience of the experts; and it must possess three qualities:

1. Completely eliminate the problem.
2. Be implementable – otherwise it has no purpose.
3. Be unexpected to the experts, since they could not find it earlier.

As a system, the creative solution consists of elements and their relationships. A creative solution is a way to change the problem situation. It must consist of multiple, inter-related changes within this situation.

This tends to lead to a few common questions:

1. Why multiple changes? Could one change resolve the problem? It could, but if one change was enough, the experts would be able to find it without TRIZ. If they could not find it, it is probably because the solution requires multiple changes.
2. Why should the changes be inter-related? They need to work together. Therefore, the changes must be organized in a certain way.

3. What kind of changes are we talking about? In order to change the situation, “something” within it must be changed. In TRIZ, this “something” is called *resources*. Furthermore, it is important to change only the resources that are directly involved in the situation and its activity. [5]

This gives us a definition for a creative solution: a system, consisting of inter-related changes to resources directly involved in the problem situation.

In classical TRIZ, *system change I-C* recommends: put together a system, containing property P, using elements, which contain the opposite property, anti-P. Using this suggestion, we are looking for a method to obtain a creative solution, without the use of creative thinking. The elements of a creative solution are changes to the relevant resources. Therefore, these resource changes must fulfil the following requirements:

1. Each change must be known and familiar to the experts. (“Familiarity” here is used as anti-“unexpectedness”.)
2. None of these changes should be able to completely resolve the problem on its own, while the *creative solution* as a system should.

How can a creative solution be made from such un-creative elements? This happens due to new relationships between the elements. So then, why could the experts not find this solution? They, for various reasons, did not consider this particular combination and this particular arrangement of these particular changes to the relevant resources.

Is this resolution of the given contradiction realistic? Quite! A world renowned economist and sociologist, Joseph Schumpeter, stated that all innovative development happens as a result of a casual recombination of already existing ideas, objects, and forces. [6]

TRIZ method – new paradigm

What should a practical TRIZ method be in order to realize the new paradigm for obtaining creative solutions? Let us try and “calculate” its structure.

Creating the solution

We will start “from the end” – the process of creating a solution. A creative solution must be obtained through the process of “combining” many simple, singular changes to resources directly involved in the problem situation. The “combination” process is not unlike the process of using known elements to construct another mechanism, another electronic structure, another chemical process, another financial model, or another election campaign. This kind of process is well-known to the experts and is often done without any creativity.

In fact, using the same set of elements, it is possible to create several different conceptual solutions. Which one should be implemented? The one that will be the most optimal for the “here and now.” Or, to use TRIZ terminology – a “locally ideal” solution. This decision should be made using a predefined set of criteria of evaluation.

Compiling such a solution can be a fairly simple process, if the experts are aware of all the elements that may be included. Prior to combining the solution, it is important to have a comprehensive list of “elements”. This is possible by extracting relevant knowledge from the experts.

The solution does not require just any knowledge, but only that which changes the situation in the necessary direction. When experts are extracting the possible changes to relevant resources, they must only select those that match the current goal.

Suggestions [7,8] activate and organize the process of extracting this knowledge. A well-formulated goal helps direct the process towards the necessary changes.

Extracting the necessary knowledge to achieve a set goal is a very familiar and habitual activity for the experts. Performing this task does not require any special, creative efforts.

The process of extracting knowledge from the experts' memory is well-known as "idea generation". Although it seems overly enthusiastic to refer to simple, well-known to the experts changes in resources as "ideas".

Prior to extracting this knowledge from the experts, it is essential to:

1. Formulate the objective, which will focus the process towards the relevant knowledge.
2. Identify the relevant resources, which need changing.

Formulating the objective

There is a directly-proportional relationship between the objective and the number of resources relevant to its achievement. A bigger, more "global" objective means lots of relevant, changeable resources; the more "focused" or localized the objective – the less resources that require changing.

Let us assume that we know which function needs to be changed in order to obtain the necessary result from a problem situation. This function is called the "key function". Depending on the complexity of the situation, it may contain one or many key functions.

There are three ways to change a key function in order to eliminate a problem:

1. Improve or magnify ("useful" functions);
2. Eliminate or weaken ("harmful" functions);
3. Modify or replace (in case of contradictions).

The process of formulating the objective includes several stages of gradual concentration: from a vague "problem needs to be solved" or "task should be completed" to a detailed understanding of how a single function needs to be changed.

This concentration can be done through various analytical procedures [9,10,11,12]. It is irrelevant which of them to use. What is relevant, is that the analysis should lead to the required result: the identification of a key function and the direction in which it needs to be changed.

Resource Analysis

The following hierarchy is convenient for the identification of the key function resources:

1. Function components:
 - a. Objects involved in performing the function
 - b. Actions performed during the function's execution
 - c. Conditions, which ensure the function's activity, and the environment, which creates these conditions.
2. Entities:

- a. Elements of objects, actions, and the environment, which are directly involved in the performance of the function.
- b. Energy, i.e. the moving force of the actions.
- c. Information required in the performance of the function.
3. Entity characteristics:
 - a. Time-related characteristics: time segments, sequences, frequency, speed, periodicity, etc.
 - b. Space-related characteristics: location, mutual placement, shape, size, distance, etc.
 - c. Structure: organization, relationships. Structure can also be viewed as combining the components of the function; inner structure of entities; structure of actions in the function; etc.
 - d. Conditions (inner state) of entities, involved in the function.

This hierarchy helps the experts extract knowledge regarding objective-oriented changes to resources.

Problem solving – the process of the new generation

The new process for solving an “unsolvable” problem can be described through these steps:

1. **Problem situation analysis:** Transition from a vague, poorly-defined problem statement to a specific direction for modifying a key function.
2. **Resource analysis:** Identify the resources directly involved in the activity of the key function.
3. **Idea generation:** Identify the knowledge pertaining to goal-oriented changes to the resources of the key function.
4. **Solution development:** Create conceptual solutions by combining individual changes to resources and creating new relationships between these resources.
5. **Implementable solution selection:** Select a locally ideal solution using predefined criteria and create an implementation plan.

An implementable solution consists of goal-oriented changes to the resources of the key function, which must be known or familiar to the client’s team of experts. This way they will have a full understanding of how to implement all of the changes, what can and should be used for these changes, and the consequences of every change.

A non-creative creative process

A clear labor division between a TRIZ specialist and the client’s experts eliminates the need for creative thinking. The TRIZ specialist does what they do best: analyzes the problem situation and directs (facilitates) the problem-solving process. Experts use the full extent of their knowledge of the problem situation, its resources, and their possible changes. This form of cooperation allows us to obtain creative – unexpected and realistic – solutions.

So how do we organize such a labor division? The TRIZ specialist facilitates a multifunctional group of the client’s experts – those that will be implementing the eventual solution. Meanwhile, the experts will find the solution themselves, which will increase their motivation in its implementation. [13]

The maximal access to the professional knowledge, skills, and experience of both sides of the team: significantly facilitates the work of the project; accelerates goal achievement; and creates favorable conditions for the implementation of the solution. This is the greatest advantage of the new paradigm of solving “unsolvable” problems.

Using this new generation process in a large company requires the creation of a comparatively small team of professional facilitators. As a result, all “creative processes” in the company become controlled, planned, and, most importantly, clearly aligned with the company’s strategic objectives. All these advantages are achieved by refusing the use of “creative” thinking in the process of solving “unsolvable” problems.

We cannot conclusively state that we managed to exile the “six-winged seraph” from this process, but we pushed him off to the side a significant amount. We must not forget: he is incredibly resilient...

Final question: is it possible, using these recommendations, to create a workable process founded on the basic concepts of TRIZ? The answer is: yes! In fact, it is already created and is working quite successfully. This process is the GB Method. [14]

Conclusions

We succeeded in finding and proving the following:

1. It is possible to organize a process for solving “unsolvable” problems and finding creative (unexpected, workable, and implementable) solutions in such a way that it does not require the use of creative thinking.
2. This process is based on facilitating the client’s team of experts with a labor division, in which each side performs their own professional work.
3. Implementation of this approach to creative work allows it to fit into the prevailing management culture of the company, since the process becomes controllable, plannable, and concurrent with the strategic objectives of the company.

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