

# Modelling 40 Innovation Principles with «Moving Little People»

Pavel Livotov, Ph. D.  
TriSolver oHG, Hanover, Germany  
phone +49 511 860 8343; fax +49 511 860 8345  
e-mail: livotov@trisolver.com  
internet: www.trisolver.com

## Abstract



The article describes a recent approach to enhance creativity and output using 40 Innovation Principles, both for technical and non-technical tasks, which is based on the experience of the past 10 years through the introduction, training and integration of TRIZ in more than 100 German and Swiss companies.

The idea of the method is to illustrate the 40 Innovation Principles with the animated «Little People» models. Such models give the users additional creativity impulses and a new motivating «fun-element» to work with TRIZ without the psychological inertia which is typical for the usual illustrations. Combined with the easy-to-use brainstorming and idea-mapping software, the approach seems to cover about 80% of all needs in innovation and creativity support for daily managerial or engineering work.

## Longevity of 40 Principles

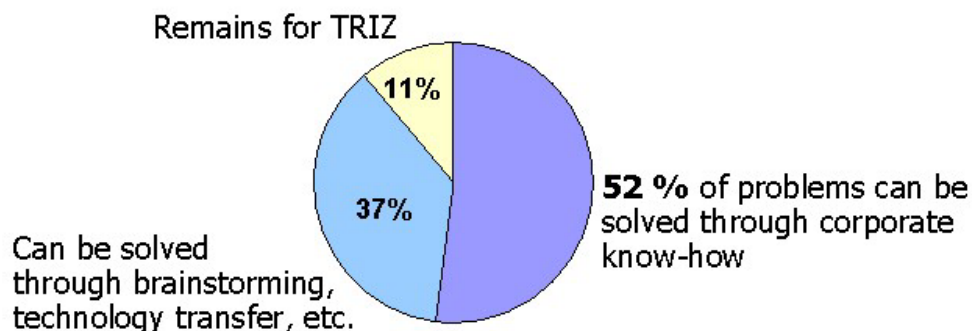
Although formulated about 30 years ago, the 40 Altshuller's Innovation Principles have remained till now the most popular and usable TRIZ tool. How could it happen that the Principles, suitable only for simple to moderately difficult tasks [Altshuller, Creativity as an exact science, 1979] and good for newcomers to TRIZ, are still playing such important role in industrial TRIZ practice? As a seemingly «inevitable» piece of TRIZ classics, one can find them - sometimes slightly modified - almost in every modern TRIZ book or software. A lot of researchers and practitioners since the 1970's till now have been inspired to re-invent, improve or up-date the Altshuller's work, for example:

- to modify principles for management and organisational tasks (already in 1973 by Voronkov)
- to create double «direct-reverse» principles (Flikstein, 1973)
- to add new principles or sub-principles (Polovinkin, 1976)
- to adapt the principles for radio-electronics (Gutkin, 1976)
- to simplify principles or to reduce their number,
- to adapt principles for food, science, architecture, software, advertising etc.

The reason for such «affection» for the principles is obvious: principles are simple to use or modify and can be easily integrated in brainstorming or daily engineer's work. One established part of industrial practice is the composition of the specific groups of principles for solving different kinds of problems, for example:

- statistically most often usable principles for general problems (principles 35, 10, 1, 28... )
  - most suitable principles for solving product design problems
  - principle sets for cost reduction or system evolution
  - customized principle sets
- etc.

We gained some more objective reasons for the longevity and attractiveness of the 40 principles through a scientific analysis of innovation and invention process, performed by TriSolver in about 100 German companies in 2000-2002 [see Proceedings of the ETRIA Conference TRIZ Future 2003, Strasbourg, Nov. 2002]. This investigation confirmed the fact that although the importance of systematic and directed problem-solving and innovation in the industry is high, the level of satisfaction with the existing methods and processes is also relatively high. Hence there is no broad natural impulse to use more effective and comprehensive TRIZ methods in general, at least in daily work.



Practicable problem solving approaches in the industry - ©TriSolver 2000-2002

We have found that about 52% of all technical problems in the industry are being solved through corporate technical know-how and common sense. The next 37% of problems can be cracked with simple creativity methods such as brainstorming and morphological analysis or with the help of direct feature or technology transfer from other technology fields. For both these segments the engineers' work and creativity can be enhanced effectively by relatively simple TRIZ-methods, i.e. 40 principles. For the mighty TRIZ methodology there remains only 11% of all problems.

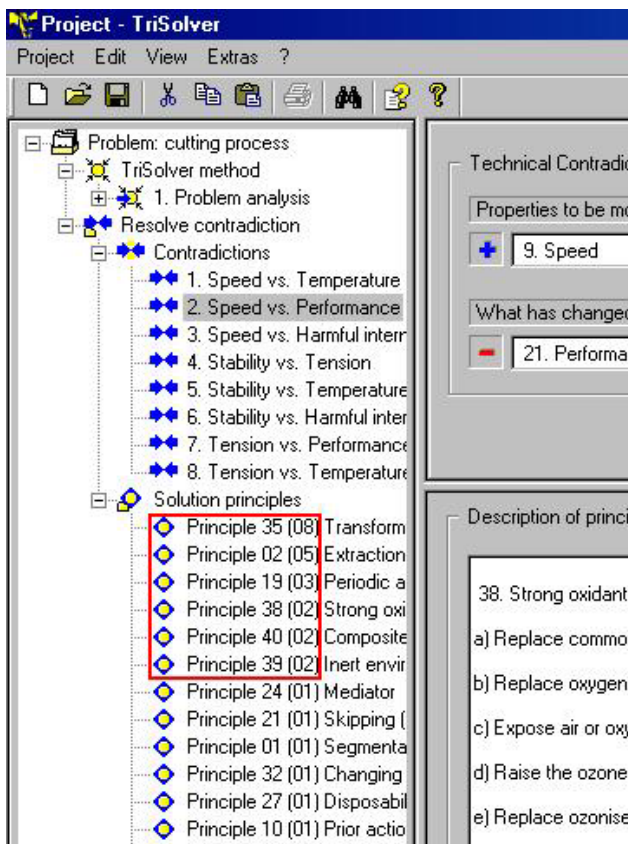
## Magic of Contradiction Matrix

Holding no less power of attraction is the Contradiction Matrix, as a method of using the 40 principles. As known, the Matrix - as a result of about 7 years of investigation work - delivers an approach on how to select the best principles to resolve one specific technical contradiction, in order to reduce the trial-and-error work involved in applying all 40 principles.

In spite of the fact that in TRIZ cradle - Russia even in the 1980's the Matrix was no longer the most recommended of strong TRIZ tools, a lot of attempts to improve this empirical and early TRIZ method are still known nowadays:

- adding/reducing the number of lines or columns,
  - changing the titles of 39 technical parameters,
  - up-dating the matrix cells or filling the «empty» matrix cells,
  - «customising» matrix: the user can re-invent the matrix according their experience,
  - other mathematical experiments, up to random choice of matrix cells
- etc.

Although such attempts are being undertaken with the best intentions, they do not contribute to TRIZ significantly, neither practically nor theoretically. Also, the best and fullest matrix would not guarantee the solution of difficult problem. Not the Matrix but the Principles are crucial for problem solving. They are good to enhance technical creativity but only scratch the surface of the problem in complicated situations.



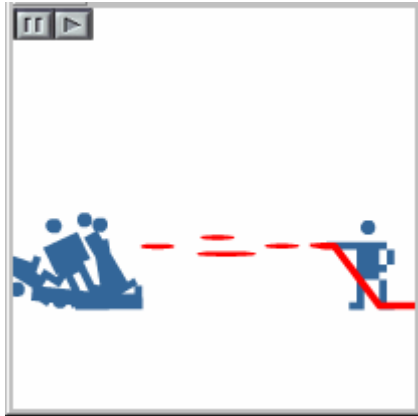
Contradiction Matrix within the TriSolver-Software

In practice one should warn all newcomers to TRIZ about «blind trust» to the Matrix. One can remember the earlier experience of using the matrix in Russia, still in printed form: the pointer often unintentionally hit the false matrix cell, but nevertheless it did work.

For the matrix-fans we recommend hence formulating several contradictions for one problem situation, forming a set of recommended principles and as the next step using those principles which were recommended more than once. The correct application of the matrix in this case gives a small number of principles, which were recommended 3...8 times (e.g. principles N.35 - 8 times; N.5 - 5 times, N.19 - 3 times etc.), and a longer «tail» of principles which were recommended only once, as is shown in the screenshot from TriSolver-software. In any case this approach helps to understand and to document the bundle of underlying technical contradictions in the system that may be of high importance for problem analysis.

## Illustrations and psychological Inertia

In order to complete a short overview of 40 Principles one should also mention graphical illustrations and technical examples of the principles. The illustrations of the 40 principles, as they are known from some TRIZ software products, often have a too abstract or specifically technical character. The exception is the brilliant humorous sketches of Uri Fedoseev to the Altshuller's book «40 Principles: TRIZ Keys to Technical Innovation». In many cases the illustrations create additional psychological inertia by fixing the attention of inventors on one or another graphical image.

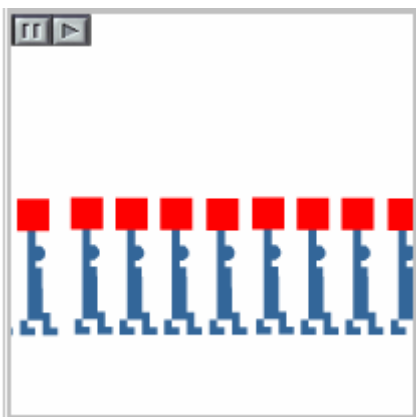


It would be easy to believe that a quantity of good illustrated principles, practical examples or effects is a great support to overcome the lack of creativity. The engineers hope that they can quickly compare examples to their specific situation and solve a problem. Our experience does not support this theory. On the contrary, such an approach often motivates the users to the trial-and-error work that is in fact opposite to the basic idea of

TRIZ. We could often see how people spent a lot of time in vain trying to find an exact solution for their specific problem in the «endless» libraries of examples or pictures.

## Moving Little People

As is well known, the method of modelling systems with the aid of the «Little People» helps to overcome psychological inertia and thus the typical drawbacks of illustrations or specific examples. Also, 40 Principles can easily be «translated» with its assistance into graphical images, which are easy to understand for people of different educational and professional background.



After creating a lot of variants for the interpretation of principles with the Little People models, selected 40 animated pictures were integrated into a new, compact and easy to-use software tool for creativity and idea-mapping. (Optional functionality gives the user the opportunity to create individual Little People models). The first test demonstrated a high acceptance of such a «fun-element» in problem solving, reducing psychological barriers by applying TRIZ in daily work or in workshops.

In the TriSolver investigation, mentioned above, it was found that the majority of industrial companies trained in TRIZ use it seldom in their daily practice later. Conducting

numerous interviews with R&D leaders, innovation managers and engineers of different companies, we identified more than 60 functional benefits of systematic innovation and problem-solving with TRIZ. One of them was: make the problem-solving process with TRIZ more enjoyable and exciting. Perhaps the «moving little people» will help us to meet this user request.

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## Author

Pavel Livotov, Ph. D., author of more than 70 patented inventions, began his work with TRIZ in the 1980's in St. Petersburg, Russia. As CEO of TriSolver Group Europe, he is sharing his experience of the past 10 years through the introduction, training and integration of TRIZ in more than 100 German and Swiss companies. He is one of the creators of the TriSolver-software «Idea Generator & Manager», which is the most usable TRIZ based program for professionals in Germany.