

## **Thoughts on ARIZ**

### **Do we need to redesign the ARIZ 2000?**

**Pentti Soderlin**

Management Consultant

Helsinki

Finland

pentti.soderlin@netlife.fi

The basic concepts in TRIZ are the Contradictions, 40 Principles, the Matrix, and the Laws of Evolution, the Substance-Field Analysis Modelling, Ideal Final Solution, Substance Field Resources, Scientific Effects and **ARIZ**.

**For some people it seems to be rather confusing that there are two concepts, TRIZ and ARIZ, so near each other but at the same time quite different things?**

Further it has appeared that some of the “old” TRIZ Masters each have their “own” versions of ARIZ. So, which version to follow? Here is one more!

#### **What is the role of ARIZ?**

All the major TRIZ concepts are included in ARIZ, where the various TRIZ heuristics are presented as a sequence of operations to resolve technical problems. According to Altshuller [1] the letter “T” means theory in TRIZ, and the “A” algorithm in ARIZ, the order of execution. That’s why I would rather call ARIZ as the **Job Plan** of TRIZ **and consequently abandon the name or concept of ARIZ..**

The Job Plan, ARIZ, contains aids for the problem formulation and definition, even the routine to enhance ARIZ itself. It is further claimed [4] that only 1% of the problems requires the use of ARIZ. This leads to a conclusion that only 1% of the problems is really difficult? It is also claimed that ARIZ in itself is a methodology. Surprised? Yes, because I thought that whatever you are doing you should use the Job Plan. It is to the problemsolver to decide which module or part he or she is going to use?

**TRIZ v ARIZ confusion leads to a double methodology, which should be avoided.**

After Altshuller has passed away, who takes the initiative or rather the lead in the development and “authorization” of ARIZ?

#### **Separation of basic concepts**

Various textbooks of TRIZ, namely [1], [2], [3], and [4], present different versions of ARIZ. Maybe the total number already exceeds 10. Whatever the history of various versions is, there still exists a dilemma: **too complicated and verbal Job Plan.**

ARIZ should be simplified and restructured. Instead of a consequent and serial order of execution, although having “go to” advice, there should be separate simultaneous or optional routes emanating from different Problem Statements.

The problem formulation should also allow a lighter version of getting started. If 99% of the cases can be solved without ARIZ, why bother with such an excessive routine? How can we separate the “easy” cases from the more difficult ones?

#### **A simple solution**

In the May 2002 issue of TRIZ-Journal [5] I presented a draft for ARIZ. The main idea was to separate different TRIZ heuristics to different Routes to be followed. If we have a clear Technical Contradiction we should follow the relevant Route that will use the Matrix. If we have e.g. a not properly working system, we will follow the Substance-Field Route. If we are after a function and would like to find some new phenomena, we should refer to Effects Route.

This means further that we should add a specific **Problem Statement Phase**. This is similar to that used e.g. in Kepner Tregoe [10], which starts with Situation Analysis. It is rather confusing to have many different although necessary stages or steps as there is in [4] for problem definition. I mean the

- Stage 0: Information
- Stage 1, Problem Analysis
- Stage 2, Problem Reduction
- Stage 3, Problem Sharpening and
- Stage 4, Resource Applications (which in fact means questioning whether the solution is hidden in the system resources).

which all are in fact numerous calls to investigate, check or determine whether the problem solution could be within these stages. This is in conflict with cognitive rules concerning the capacity of human brain. To separate these stages is a disservice. **Wouldn't it be easier to remember only one Problem Statement followed by different routes of Problem Solution?**

To acquire this we could simply ask:

- do we have a Technical or Physical Contradiction (can we formulate one)?
- do we intend to enhance a working system, or do we have problem in ditto?
- are we after a function, which we don't know the answer?

This will lead to a specific problem modelling or description, with the relevant specific heuristics or tricks to be applied.

All the routes provide to the problem solver some recommendations:

- Technical Contradiction the Principles from the Matrix or the solutions to the Physical Contradiction through the known Separation Principles, Phase Transition or Super v. Sub System transformation.
- Substance-Field Route the 76 Standards.
- Effects the database of scientific phenomena.

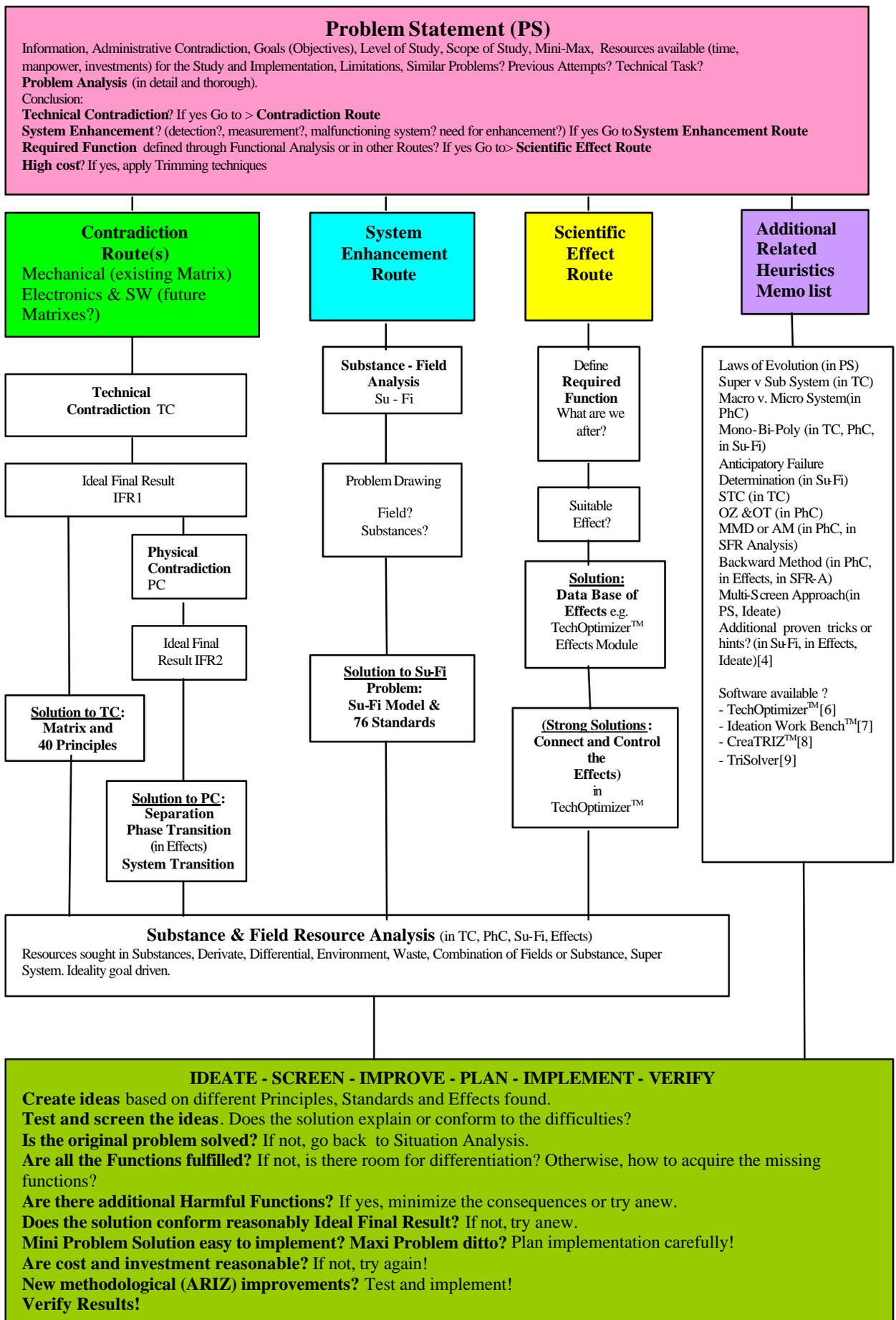
Of course there is always the possibility to jump to another route, if found necessary or applicable.

But these Routes result not more than ideas how, where or what to search for the actual solutions. The real Creative Phase starts through the Resource Field Analysis, which should be executed first in this phase, when we know what we are after. If this is done earlier without real hints what to search, there is a possibility that the analysis is done mechanically and certain important elements forgotten. The memory will be overloaded because the space of analysis can be enormous. There is again a more rational and cognitive way [12] of handling information, because "nobody knows *a priori* what information will be needed for a solution and what is excessive for a problem"[4].

### **Related Things**

TRIZ contains also other useful topics to be considered. Some of these might be or simply are useful also in ARIZ. But in which stage of the ARIZ they belong? Amongst such are The Patterns of Evolution of Technological Systems [2]. These could be useful during the Problem Statement Phase. Maybe by questioning one after the other, we can state the phase of development of our product or process and find potential projects and solutions.

Further in previous versions of ARIZ the clear location of some concepts is not defined. To avoid this these have been located in the Additional Related Heuristics Memo list. The list is not a complete one.



## Discussion

1. My first concern was the announcement that only 1% of the cases requires the use of ARIZ. My intention is to show that in all cases one should, if not actually implement in full details, think the problem definition and solution as an ARIZ procedure. The actual difficulty of the task will reflect the possible attentive use of the all details in ARIZ.
2. In the previous versions of ARIZ there are no identifications where the problem statement and refinement ends, and where the actual problem solving or idea creation phase starts. In the figure later, I have tried to extract the phases from each other, and locate them anew to a few numbers of major elements. This is in line with cognitive principle [12] & [13] and **makes again things easier to learn and remember. A picture is always more perspicuous than a long list of consequent phases with no apparent weight on any of its components.**
3. Nothing “new” is presented, although the Substance Field Resource Analysis is in the new location. Also the various ado with Problem Definition are united under one heading “Problem Analysis”. All the details can be found from e.g. the Savransky book [4]. My presentation is also a reflection from TechOptimizer™ [6] version 3.5., where similar problem solving tool grouping is given. It is great software for TRIZniks, especially because it’s great database of scientific Effects.
4. One minor remark: it is not only the Primary Function which we are after [11]. There might as well be problems with Secondary Functions in the system. These should be treated from the problem point of view equally important, as any Value Engineer knows.
5. In applying Trimming techniques one should be aware not to trim parts or components the function of which you do not understand. Further you should always be careful trimming those features which have something to do with Esteem Value. Probably after the trimming the product is no more the same as the original one if one or several functions are missing, but a complete new one.
6. In this presentation there is the ARIZ 2000? scheme. I call anybody to contribute.
7. Next: some thoughts about the concept of Value and Ideality?

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