TRIZ- A PROBLEM-SOLVING METHODOLOGY

Be forewarned: Most of my friends nod off when I speak of TRIZ. It is a problem-solving methodology that has a rather hefty learning curve, but worth the effort in my estimation. Here is just a little bit. You can learn more by researching it yourself and ordering some books on the topic.

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A lot could be gained even with the tiniest piece of application of this methodology: *Imagine the ideal state. Then work backwards by asking again and again what it would take to get there.*

Genrich S. Altshuller, born in the former Soviet Union in 1926, was the father of TRIZ. Serving in the Soviet Navy as a patent expert in the 1940s, his job was to help inventors apply for patents. He found, however, that often he was asked to assist in solving problems as well. His curiosity about problem solving led him to search for standard methods.

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TRIZ (pronounced "TREEZ" (the Russian acronym for the Theory of Inventive Problem Solving) is an established science (of almost 60 years), methodology, tools and knowledge- and model-based technology for stimulating and generating innovative ideas and solutions for problem solving. It is short for Teoriya Resheniya Izobreatatelskikh Zadatch.

TRIZ is an extensive system of knowledge, principles, and tools that you can use to analyze and solve inventive problems.

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TRIZ is based on the idea that there are universal principles of invention that are the basis for creative innovations that advance technology. Once these principles can be identified and codified, they can be used to make the process of invention more predictable. TRIZ is widely used today to improve products, services, and systems. It greatly reduces the time to produce breakthrough ideas and inventions.

The following description, written by Dr Toru Nakagawa of Osaka, Japan provides a concise description of the essence of TRIZ. More than a problem solving methodology, TRIZ is a way of structuring thinking.

Essence of TRIZ:

The essence of TRIZ is the recognition that technical systems evolve towards the increase of ideality by overcoming contradictions mostly with minimal introduction of resources.

Thus, for creative problem solving, TRIZ provides a dialectic way of thinking, i.e., to understand the problem as a system, **to image the ideal solution first, and to solve contradictions.**

Following is an excerpt from a course that I created for teaching TRIZ years ago:

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Ideality

Ideality is the state in which performing a desired function or effect occurs without the need for the system.

Evolution increases ideality

Ideality is the ultimate goal that is at the heart of TRIZ. As systems evolve, they increase their degree of ideality. The sum of useful effects trend upward and the sum of harmful effects trend downward. Systems become more efficient and effective, but they rarely reach perfection—although some do, so never lose faith in that possibility. From this concept of ideality, Altshuller, the developer of TRIZ, introduced the concept of the *Ideal Final Result* (IFR). The useful effects are great and the harmful effects are reduced to zero.

Ideal Final Result (IFR)

When IFR is achieved, the system falls away and is not needed to perform the function. IFR is the achievement of ideality.

Here is the tricky part: The IFR for any ideal system is that the function of the machine exists but the machine itself does not. **Thus in TRIZ nomenclature, ideality represents the state in which performing a desired function or effect occurs without the need for the system.**
This event of IFR as it applies any successful course, is that point when the teacher (the system) falls away. Thus, the teacher is no longer needed to achieve the result that is the continued learning and successful application of the related tools and skills by the pupil without the assistance of a teacher.

Another Example of Ideality

The following example is one that is presented often in TRIZ training literature. It illustrates clearly that achievement of IFR is a real and possible goal.
A meat plant in South America required that refrigeration systems be installed in its cargo planes. Competition increased and the owners of the plant sought to reduce delivery cost. It became obvious that they had to increase the amount of product per air shipment. It was determined that the weight of the refrigeration system would be replaced with that of meat. Flying at an altitude of 15,000 – 25,000 feet the air temperature is below 32 degrees F so no refrigeration system is needed. Thus, using existing resources costing nothing they brought the system to Ideality.

Achieving the ideal is not only desirable, it is possible. In great part it is only our imaginations that limit our innovative achievement of the ideal. One of the first steps in TRIZ innovative problem solving is to ask questions like this: If everything were working properly, what would this system or process look like? What is the ideal here? Only after a clear picture of the ideal is drawn can we then ask questions that begin our work: What do we have to do to achieve that ideal?