TRIZ - Definitions and Characterization, David Conley

What is TRIZ?
TRIZ is a Russian acronym that stands for Teoriya Resheniya Izobreatatelskikh Zadatch. The English translation is "The Theory of Inventive Problem Solving." The TRIZ methodology was conceptualized and developed by Genrich Altshuller and his colleagues beginning in 1946 in the former USSR. His process involved reviewing hundreds of thousands of patents to understand how engineering systems evolved over time. Particular attention was paid to understanding how innovation was harnessed to solve difficult engineering problems in novel ways. Fundamentally, the objective of TRIZ is to discover how inventors invent. The development of TRIZ as an international science of creativity continues and has so far spanned over 60 years and encompassed the analysis of some three million patents. Elemental to the process is the understanding of how engineering system contradictions can be sufficed without the use of compromise.

TRIZ:
- applies trivial solutions to non-trivial problems
- eliminates unfocused solutions
- TRIZ and the analytical tools developed to function within the TRIZ framework do not guarantee a problem will be solved but they do guarantee an improvement in the engineering system being addressed

Paradigm:
TRIZ eliminates categories of unworkable solutions so the professional does not have to work to find them

Advantages:
- High efficiency
- High predictability
- Independent of psychological inertia

Main Postulate: Engineering Systems do not develop randomly but rather according to objective evolutionary trends. The evolutionary trends are a natural result of Engineering Systems competing for resources ($s, energy, political support, etc.) within an economic, political, and technology environment. Analogous to the natural selection law from biology, the Engineering Systems most suited to the environment develop and flourish. The evolutionary trends describe typical features of winning Engineering Systems.

What is classical TRIZ?
The TRIZ analytical tool set is designed to refine and sharpen a single problem. The concepts and methodologies are part of the public domain.
- **Prediction Trends (Trends of Engineering System Evolution)** – Statistically proven directions of Engineering System development that describes the natural transitions of Engineering Systems from one state to another. These directions are statistically true for all categories of Engineering System.
- **Inventive Principles (Principles) –** A problem solving tool that provides generalized recommendations for modifying a system to solve a problem formulated as an Engineering or Physical Contradiction (an Inventive Principle is an abstract model of the solution to the problem). Only 40 principles were defined by an analysis of all 40,000 "innovative" patents originally analyzed by Altshuller.

- **Standard Inventive Solutions** – a set of 76 typical solutions, in the form of Substance-Field (Su-Field) Models, to typical problems that are also expressed in the form of Su-Field Models.
- **Substance-Field Analysis** – a part of Standard Inventive Solution application that models a problem and potential solutions in the form of a substance-field interaction (also used in the ARIZ analysis process)
- **ARIZ** - A problem solving tool that transforms a complex engineering situation into a well defined model of the problem, which can be solved effectively using a wide spectrum of TRIZ tools.

What is contemporary TRIZ?

In industry today the term TRIZ is used somewhat loosely but generally refers to a process for accomplishing systematic innovation. The process most certainly utilizes classical TRIZ and is often combined with other tools that augment the classical TRIZ tool set. These additional tools include, but are not limited to: cause and effect chains, functional modeling, trimming, multi-variant decision matrices, and other processes.

- **Cause and Effect Chain Analysis** - An analytical tool that identifies the Key Disadvantages of the Analyzed Engineering System. This is accomplished by building cause-effect chains of disadvantages that link the Target Disadvantages to its fundamental causes.
- **Function Analysis –** An analytical tool that identifies functions, their characteristics, and the cost of System and Supersystem Components.
- **Trimming –** An analytical tool for improvement of the Engineering System by removing (trimming) certain components and redistributing their useful functions among the remaining System or Supersystem Components.

Just as in other disciplines, TRIZ provides multiple ways to model problems and solutions as well as providing tools to help with the transition from problem to solution modeling.

For example:

Discipline	Model of Problem	Tool	Model of Solution
Math	10 X 20	Multiplication Chart	200
Chemistry	HCl + NaOH	Reaction Formula	NaCl + H_2O
TRIZ	Engineering Contradiction	Altshuller's Matrix	Inventive Principles
TRIZ	Su-Field	76 Standard Solutions	Specific Standard Inventive Solution
TRIZ	Physical Contradiction	Separation, Satisfaction, Bypass Algorithms	Inventive Principles
TRIZ	Physical Contradiction	Library of Effects	Specific Effect
TRIZ	Functional Model	Library of Effects	Specific Effect

Go to **InnomationLLC.com** for more information about TRIZ and Systematic Innovation for Business.