

This article will also be published in the April 2005 issue of the Australian magazine, Manufacturers Monthly. Dr. Ahmed offered it to the TRIZ Journal to be used by people who need a short explanation of what TRIZ is, and what it can do for an organisation. We look forward to future articles on applications.

ANALYSIS MANAGEMENT: TRIZ and Systematic Innovation - An Overview

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TRIZ is a structured collection of solutions to technology problems found in diverse industries at any level of complexity. These solutions have been extracted over the past 40 years from the worldwide patent pool into a small set of rules and methods. The beauty of TRIZ is that it is a style of thinking as well as a set of methods and that the essential knowledge base of TRIZ is available free of cost in the public domain.

Is TRIZ the next wave of technology hype? Consider that it originated in the 50's and 60's as a systematic study of high quality patents from around the world to discover a common reasoning process behind the inventions. Pioneering work initiated by the visionary G. Altshuller (1926-98) in Russia continues to gain momentum worldwide. TRIZ has now evolved into a proven innovation system and has gained wide acceptance with key manufacturers in the USA, Europe, Korea, Japan and China.

How does TRIZ work?

Any industrial problem requires us to cope with complex issues within the limits of our expertise and the technical knowledge base available to us. TRIZ greatly enhances these resources.

We begin with a clarification of the problem by narrowing our focus from the large systems level, to the sub-system, to the component, to the function, and finally to the parameter level. Now the problem can be studied in its most basic form. In the second stage we use TRIZ methods such as 40 inventive principles or 76 standard solutions (all obtained from world wide patent analysis) to generate a number of feasible solutions matching best of class patents in other industries. In the third stage the most promising solution is transformed from a elementary concept and detailed back into a usable form. This last stage is extremely important as it forms the competitive advantage of a company in how well a solution direction is converted by the users into a new product, process or invention in their field of interest. The domain knowledge and process experience of the users closely interact with TRIZ at this iterative development stage.

Some further aspects of TRIZ thinking are:

- ◆ Every product, process or technology follows predictable trends of evolution. Situational awareness of position on this trend is critical to strategy and planning.
- ◆ The concept of ideality is found throughout TRIZ, being gain over pain or the quest for increased value obtained at ever decreasing costs. Over time, every system evolves towards increasing ideality.
- ◆ Unique approaches are used to enhance mental agility, including imagining perfect solutions of maximum ideality, thinking at microscopic levels of functionality, and studying the time, space and sub-assembly interactions within a task.
- ◆ Functions are the currency of TRIZ. Harmful, missing or excessive functions are also considered simultaneously with the required functions within a system.
- ◆ In TRIZ any input not fully utilised is considered a valuable resource. An aggressive, continuous approach to resource management includes the modification of harmful

effects into good and emphasis on problem solving within strict confines of existing resources.

- ◆ TRIZ actively encourages the user to utilise known scientific and engineering phenomena / effects that may provide a needed break-through. Systematic, indexed knowledge banks are part of TRIZ software.

The applications of TRIZ in routine or innovation activities of a company:

Long Term Strategy: Using on-going TRIZ analysis of technology evolution provides management with an understanding of the company's competitive position and its future growth potential. At the mature end of the cycle, it can help indicate the future direction for a paradigm shift in technology based on similar industry data.

NPD Opportunities: TRIZ provides evolutionary trends for common design parameters based on which the untapped potential of a product design can be seen. Generally shown as a radar-plot, this is an excellent visual representation of hidden opportunities for new product development and refinement. TRIZ has several tools to initiate and sustain NPD programs.

Lean Manufacturing: TRIZ at heart is pure lean thinking. At the higher level, it strives to drive the system towards ideality where increasing output is obtained from fewer resources (money, space, manpower, time). TRIZ also provides the tools to study the process at the mechanism level and to continually develop innovative solutions to production and logistics issues.

Six Sigma: The use of TRIZ is a standard recommendation for the Improve stage in the DMAIC cycle and forms an essential part of the Design for Six Sigma process.

Innovation and R&D: This is the core activity of TRIZ and one where TRIZ provides more features, capability and methods than any other methodology. It is a quick way to begin innovation programs at any level. Qualitative reasoning utilises the instinct and experience of the user. It does not require high-level mathematical or scientific training.

Rapid Changeover and SMED: Many of the methods developed by S. Shingo for rapid changeover at Toyota have remarkable parallels in the independently developed TRIZ.

Continuous improvement: The constant switching in TRIZ reasoning between the larger picture view and minute details ensures that improvements are carried out efficiently. The quest for increasing ideality provides the long-term motivation for sustaining such programs within the organisation.

There is a wealth of information on TRIZ and systematic innovation on the Internet which interested readers should access. TRIZ is an ideal approach for SMEs and large organisations to gradually develop a deep culture of innovation and continuous improvement in their existing set-ups at an affordable cost.

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