Effective Organizational Integration of TRIZ

David W. Conley, Intel Corporation
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Abstract:

Since the effective integration of TRIZ into an organization can result in significant gains, careful planning and implementation of a systematic innovation program is advised. There are manifold considerations when designing a lasting and successful TRIZ program. Some of these considerations include: where is the business in its evolutionary journey, is the organization open to change, what parts of the organization can benefit the most from the initiation, and are there other company programs that may support, or benefit from, the introduction of a systematic innovation program? This paper explores the parameters requiring study when introducing TRIZ into an organization, makes suggestions as how to design a successful integration program based on those parameters, and proposes TRIZ program changes over time.

Key words: TRIZ, Introduction, Program Planning, Evolution, Organizational Integration

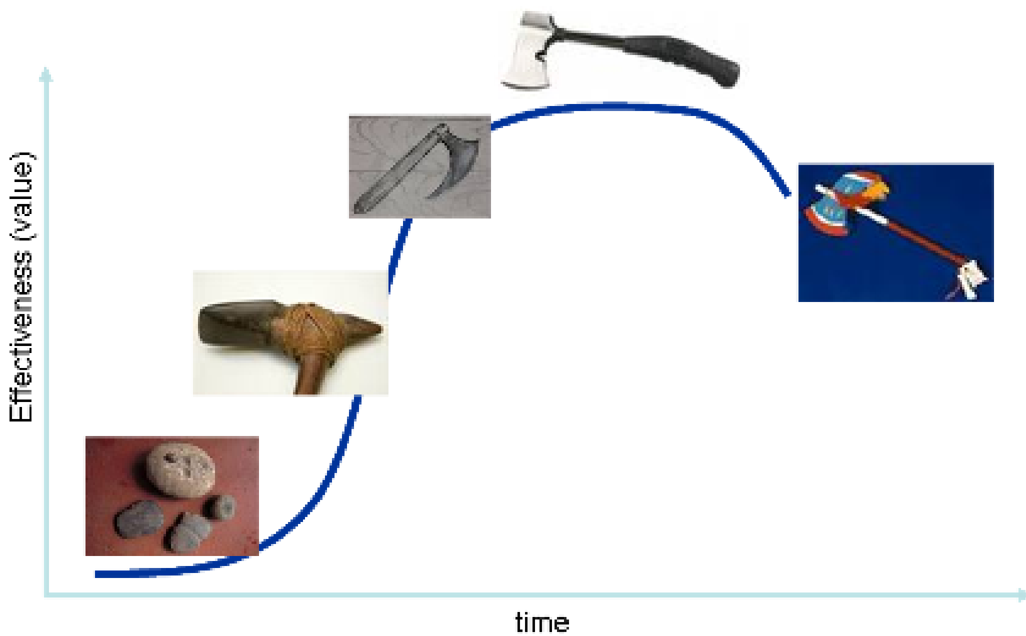
Preference:

In the strictest sense The Theory of Inventive Problem Solving (TRIZ) refers to classical TRIZ which is bounded by a specific set of exceptional tools. Since the development of classical TRIZ, supplementary tools and methods have been developed that provide support ranging from additional capabilities in applying classical TRIZ to expanding systematic innovation concepts into business and other "softer" sciences. As such, the term TRIZ will be used in this paper as reference to any and all applications of classical TRIZ, expanded TRIZ tools and general systematic innovation concepts and methodologies. Since this paper will explore subtle, yet important, non-linear organizational characteristic that play a role in the determination of how to best implement a TRIZ program, the S-curve model will be used to assist with many aspects of the analysis. For those unfamiliar with S-Curves it will suffice to know that this model refers to how the change in system attributes often trace an S shape curve when observed over time. S-curves can be observed in a wide variety of situations ranging from the growth of microbes in a Petri dish to the ability of a tool to deliver its value (see Figure 1 – S-curve of Tool Evolution).

Body:

An organization's willingness and capacity to effectively utilize a new methodology or tool set is substantially dependent on the particulars of how and where the introduction is made to the operation. A well planned and executed introduction will undoubtedly result in a higher utilization and better results per utilization than a methodology implementation that is more or less dropped onto the organization. A successful introduction of TRIZ to an organization is just as dependent on a variety of organizational considerations as any other improvement program and will therefore benefit from a study of the environment it is to be

Figure 1 – S-curve of Tool Evolution



implemented within. There are a multitude of possible considerations when planning the introduction of TRIZ into an organization. This paper will explore just a few and make recommendations as to how a TRIZ program may be designed to improve its synergy with the target organization.

The first question an organization should ask is why it needs TRIZ. The answer is not intended to determine whether or not TRIZ should be deployed, since any organization will benefit from this somewhat new facet of problem solving, but rather where within the organization, and what aspect of, TRIZ should first be introduced for maximum results. Since the goal of a TRIZ program is to improve the ability of the target organization to innovate it is easy to understand that the objective should be to maximize the rate and quality of innovation the program seeks to provide. Maximizing the innovation an organization enjoys from a TRIZ program requires some special considerations. For instance, if the target organization is in need of product innovation, their implementation plans could look different from that of a firm whose need is based around manufacturing system problem solving. Moreover, a firm operating in a mature industry in need of infusion of new ideas and operational models will require different TRIZ implementation plans than a company operating in a “start-up” industry that mostly needs to improve the base functionality of its products or services. Further, the answers to the question WHY can more readily point to WHERE in the company TRIZ would be most useful and WHAT aspects of TRIZ should be deployed. For example, an organization may be a mature one in that its business and engineering system are evolved and well tuned, but it has a new product line that requires substantial development and tuning. Turning to the S-Curve model**;** just as different aspects of a product or an engineering system can reside at different points on the S-Curve (see Figure 2 – Auto Functions and their S-curve), so can different aspects of an operation or business process (see Figure 3 – Organizational Functions and their S-Curve).

Understanding where an organization, engineering system, product, or business process is on the S-Curve will help determine how to apply TRIZ to issues in a

Figure 2 - Auto Functions and their S-Curve

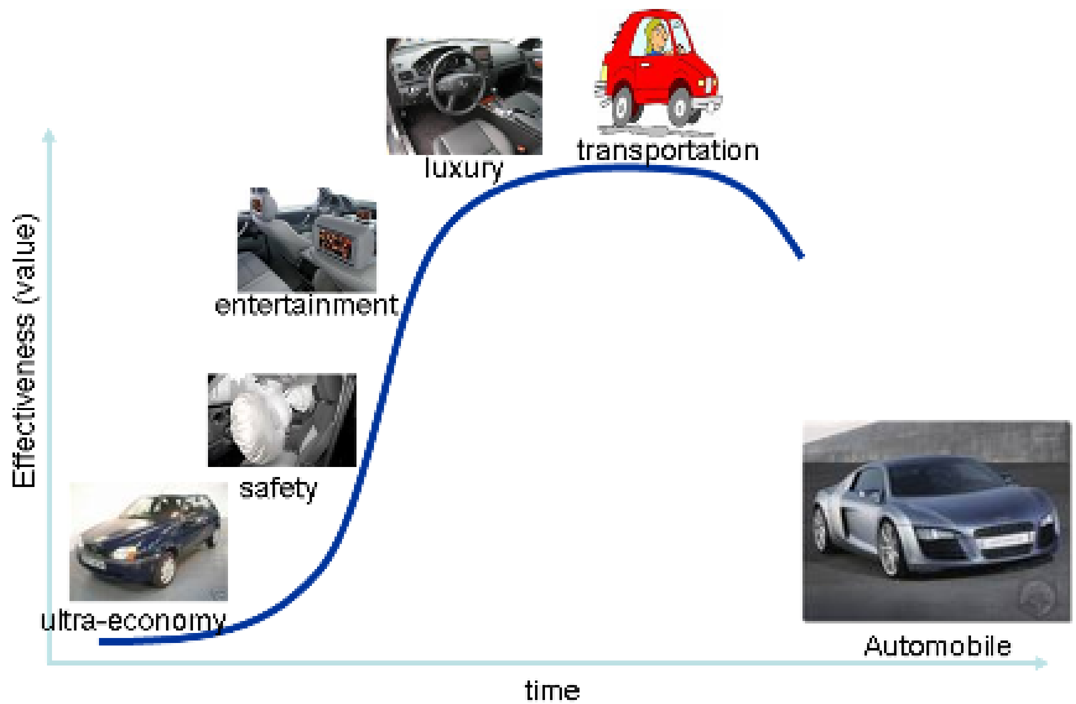
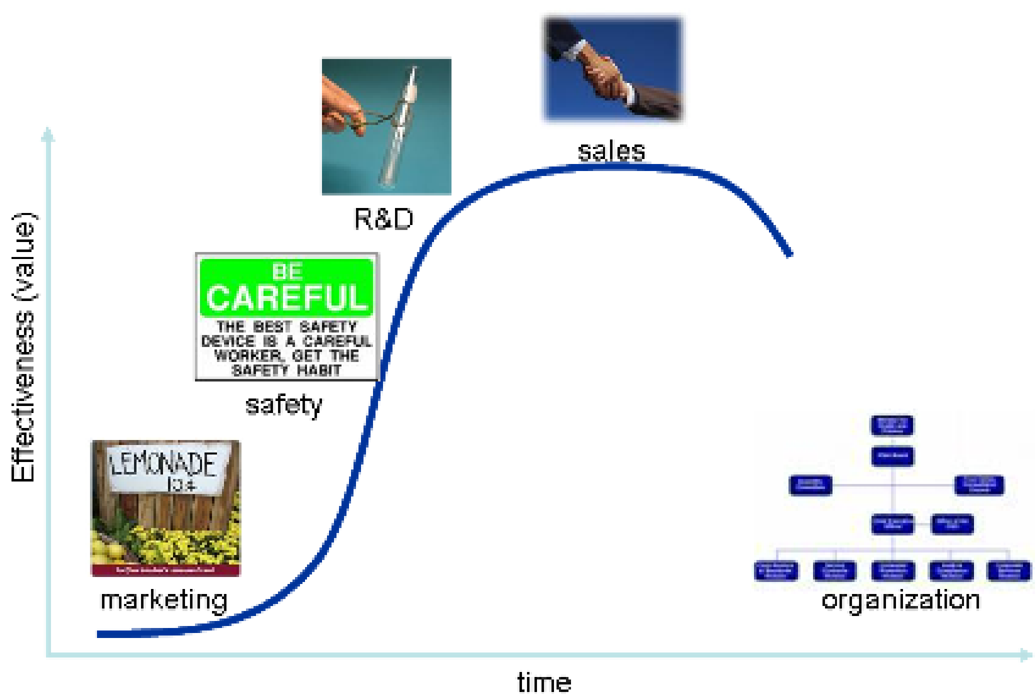
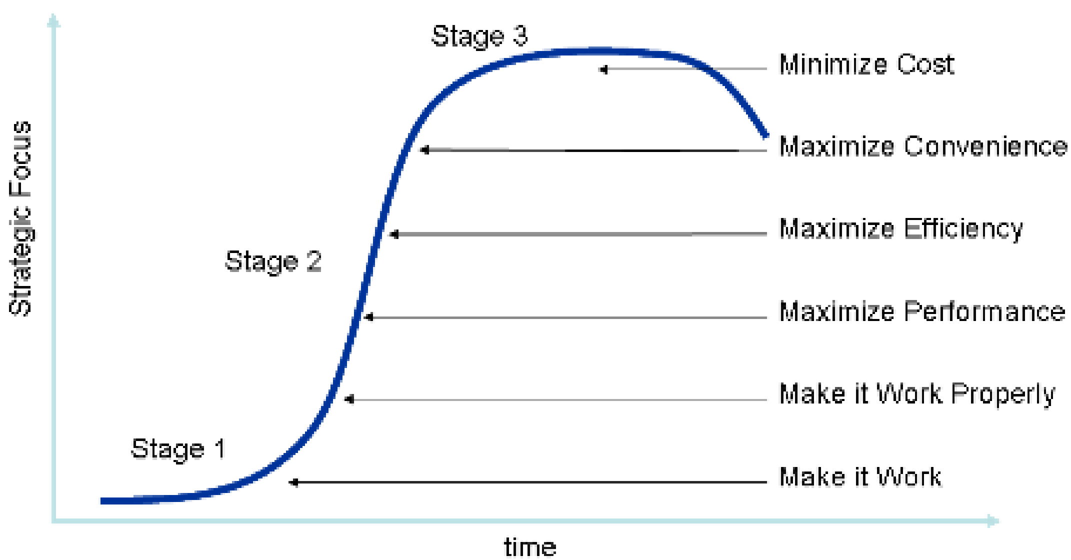


Figure 3 – Organizational Functions and their S-curve



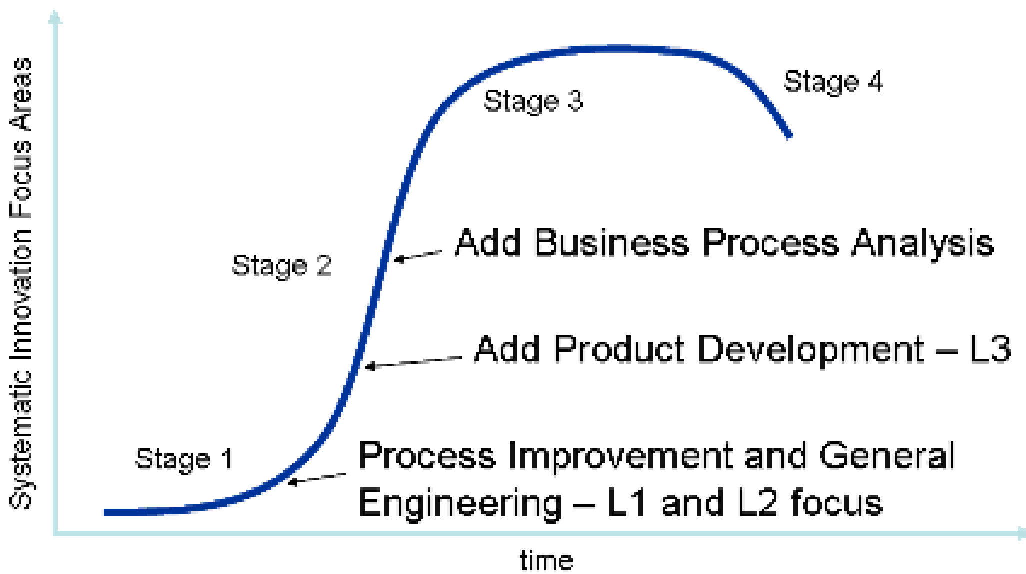
particular area or for a specific product. For example, system that primarily resides on the S-Curve in stage one will benefit from merger with more mature systems. As an illustration, to speed the acceptance and advancement of eye tracking technology (ETT) its capabilities could be applied to the laptop and personal computer. One way to help support that merger between ETT and computing platforms could be to train product developers in the use of TRIZ tools such as contradiction analysis and the Engineering Trends. Further, a business system that primarily resides on the S-Curve in stage two might benefit from efficiency improvements and could profit from having its general operations people trained in the use of TRIZ process analysis and trimming techniques (see Figure 4 – Strategic Focus Areas for Organizations). Analogous to repeated patterns on different scales represented in fractals, organizations have systems characteristics that vary throughout the operation and on different operational scales. S-Curve analysis can be used to analyze the same system across multiple areas and operating scales and apply different TRIZ implementation strategies to distinct operational areas accordingly.

Figure 4 – Strategic Focus Areas for Organizations



A second TRIZ introduction consideration is what facet of the organization might benefit from the fastest uptake and highest number of wins during a TRIZ program initiation. One strategy could be to introduce and train technical employees in the general manufacturing, process or facilities engineering arena. The reasoning behind this suggestion is two fold. First, the classical TRIZ tools were developed for electro-mechanical and thermal type problems and systems. While TRIZ tools can be used outside this arena they are most readily introduced against this background. Secondly, the tool sets traditionally taught at the introductory and mid-levels are well applied to the engineering and physical contradiction resolution that is often required in system improvement and problem resolution. The Engineering Trends (ETs), traditionally only presented in detail at advanced levels of study, are quite useful to product or system development efforts. Therefore during early TRIZ implementation phases, in the absence of ETs knowledge, it is advisable to concentrate practice materials on existing system contradiction resolution and performance gap closures such as reflected in many manufacturing, process or facility type engineering problems. Once the TRIZ knowledge level of the organization reaches a sufficient level then TRIZ can more easily be applied to new product, process, or system development and advancement by way of the ETs. Further, after the engineering and product development groups have a strong foot hold in TRIZ methodologies and tool sets then the TRIZ tribal knowledge will most likely be high enough to support the exploration of TRIZ into business process and operational teams (see Figure 5 – TRIZ Focus Areas for New Organizations).

Figure 5 – TRIZ Focus Areas for New Organizations

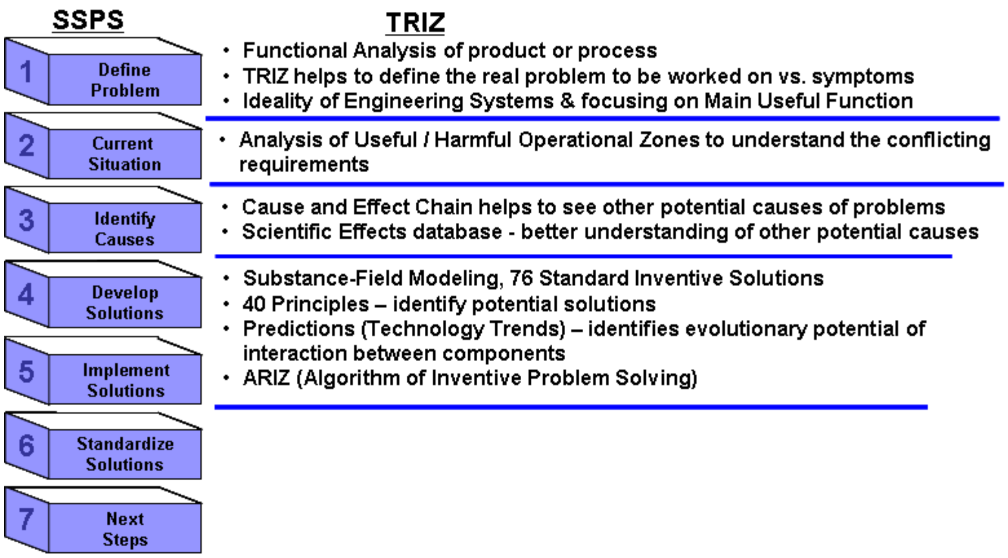


A third consideration of how and where to introduce TRIZ into an organization has to do with how capable of change that organization is. The term change-able will be used to refer to an organization's ability and willingness to make changes necessary to support the implementation of solution concepts generated by TRIZ. While one of the attractive features of TRIZ is that it seeks to simplify systems with elegant solutions, it is hard to imaging a problem solving system that does not require at least some level of change. The more change-able an organization is the more readily it will be able to absorb and effectively utilize any newly introduced system, process, methodology, or procedures. TRIZ solutions, being generated from a holistic and focused analysis of contradictions and causes, should be given high priority for implementation. Very much like the fractal aspect of systems and sub-systems, an organization does not have the same flexibility across, or throughout, the entire organization. With that in mind it stand to reason that an analysis of organizational readiness for change be conducted to help focus a TRIZ implementation plan. For example, most product development groups are already set up to explore and implement changes. The group designs new systems and develop prototypes which are then cultivated into final products for manufacturing. The product development business process is designed to facilitate new ideas and features. On the other hand, some parts of an organization will have processes and controls that are actually designed to manage and limit change. This attribute is sometimes focused around manufacturing or production groups where some changes are applied cautiously because they can have unexpected consequences at other points in the process. Regardless of how an organization is structured in relation to supporting change it is important to understand the change readiness profile of an organization while designing a TRIZ program.

One last consideration when design a TRIZ program is to understand what other vehicles are available to act as a symbiotic partners with TRIZ. Regardless of where TRIZ is as a methodology in the market place it will surely be a stage 1 on the S-curve in relation to any new organization it is introduced to. One recommendation from TRIZ, for supporting the advancement of any system that resides at stage one on the S-Curve, is to merge it with other leading systems. Are there other pre-existing systems or processes in the organization that could benefit from the support of TRIZ? For example, many business processes, regardless of how well they identify and categorize production, process or other operational short comings, have virtually nothing to add during their solution generation phases. TRIZ, on the other hand, not only has excellent problem modeling tools but also incorporates equally impressive solution modeling tools. Considering Lean under this light will quickly reveal that while it is excellent for identifying the seven types of waste, it has little to nothing to offer in so far as how to eliminate the waste once recognized. TRIZ can be utilized within an existing Lean program to generate solution models and concepts to bolster the waste identification and elimination abilities of Lean. Another example is Seven Step problem solving. Seven Step is simply a business process to insure a problem solving team uses a methodical process when analyzing and solving problems. Unfortunately, it does nothing to provide tools to support the execution of the seven steps. TRIZ can easily be inserted into the Seven Step frame work to provide systematization around problem identification and solution generation (see Figure 6 – Seven Step Problem Solving and TRIZ). In summary, existing programs within an organization can be very good candidates for creating a win-win relationship with TRIZ. TRIZ can provide useful tools to the host business processes while the host business process provides a mechanism for the introduction of TRIZ into the organization.

In summary, there are multiple considerations requiring analysis when planning and designing a TRIZ program. Four of those areas for consideration have been discussed in this paper. First, understanding why an organization wishes to implement a TRIZ program will help focus the implementation plans and shed light on the particulars of where within the organization it should be first introduced and what aspects of TRIZ would be most beneficial. Secondly, a related but subtlety different consideration from the first is what portion of the organization would be most capable of utilizing entry level TRIZ training. The TRIZ journey can be a long one for some but it is important that the organization as a whole positions itself to utilize its TRIZ knowledge as quickly as possible, even if the organization is quite new to the systematic innovation concepts. Thirdly, understanding how change-able various parts of an organization are can be a determinant in understanding where to first apply the TRIZ methodology within that organization. The more capacity an organization has for change the quicker TRIZ wins can be enjoyed by the organization as a whole. And finally, comprehending existing business, and other improvement, processes can produce opportunities for merging TRIZ into mutually beneficial relationships with those existing processes.

Figure 6 – Seven Step Problem Solving and TRIZ



Acknowledgments:

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Biography:

David W. Conley received a BS of Nuclear Engineering from Texas A&M University in 1983. After receiving his Commission from the United States Air Force (AF) he joined the AF Weapons Laboratory where he performed plasma physics and space nuclear propulsion research. While in the AF, David also took assignments at Los Alamos and Brookhaven National Laboratories and served on the NASA Interagency Nuclear Safety Review Panel. Once separating from the AF, and receiving a Masters of Finance form the University of New Mexico in 1989, he started his private sector career at Johnson and Johnson. Following five years in the medical products industry David worked for a time at Philips Semiconductor and then joined Lockwood Greene Engineers where he consulted to Intel Corporation in robotics design, installation and qualification. In 1995 he joined Intel directly where he has since held a variety of engineering and management positions. In 2006 David received his Level Three certification from the St. Petersburg school of the International TRIZ Association. Since, he has been active in the TRIZ community in technical and business problem solving, TRIZ training and training development, TRIZ program integration and pursuit of his Level Four TRIZ certification. In 2008 he joined the Altshuller Institute Executive Committee as the Publicity Chair. David has broad international business and engineering experience and currently lives in New Mexico, USA with his wife and his three sons.