Transactional TRIZ, Theory, Application, and Execution, Part I: Theory

Jack Stuart
Jack.Stuart@BankofAmerica.com

This series of articles will make the case for a version of TRIZ that applies for transactional, service or business applications. The first article will address the relationship between intelligent problem analysis, creativity and components of creative problem solving. This analysis is appropriate for all philosophies of TRIZ.

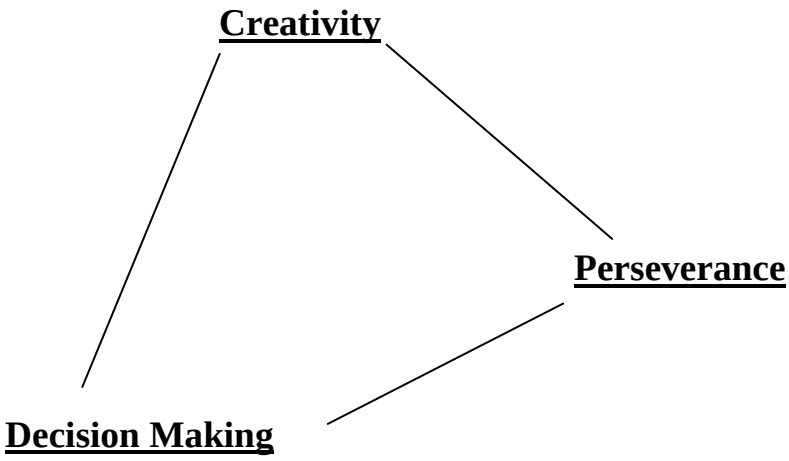
However, beyond philosophy, many non-manufacturing people often have a difficult time with the nomenclature associated with manufacturing techniques. And with that, they believe the tools and examples are not relevant to their workplace. The author has found this true in both Six Sigma and Lean training events. But when the material is changed ever so slightly to be put in terms of the business environment in which they serve, the users are quite adept at utilizing the same tools and examples with which they formerly had issues.

The second article will present a case for a Transactional Triz matrix. The modification here will be much more than cosmetic. And the third article will offer a relatively cosmetic modification of ARIZ to convert the language to be more accessible to people who solve transactional problems.

The Jack Stuart Theory of Intelligence

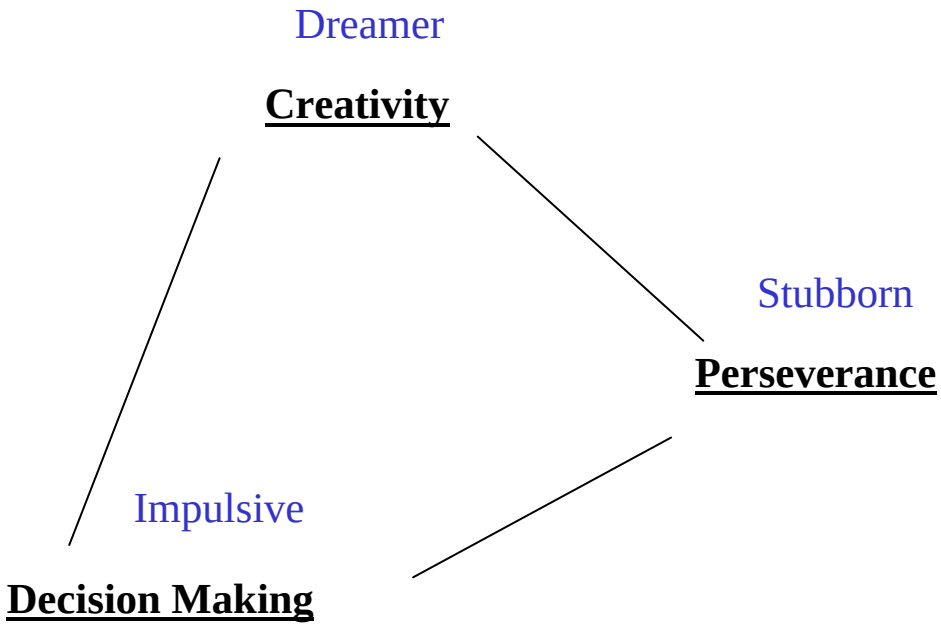
There are many models that describe intelligence, but this theory is aimed at being applied to gap analysis when a situation or process is not performing to standard. The Theory proposes that intelligence is the balance of Creativity, Perseverance, and timely Decision Making, as pictured in Figure 1. Koestler, in his book *Act of Creation*, points out that the Latin verb (*cogito*) for 'to think' etymologically means 'to shake together,' and *intelligo* means 'to select among.' What will be found upon reflection is that these three characteristics are required, the creation to be the defeat of habit, and the decision to go with the best pathway. If any of these three are overemphasized, there will occur an out of balance situation.

Figure 1: Components of Intelligence



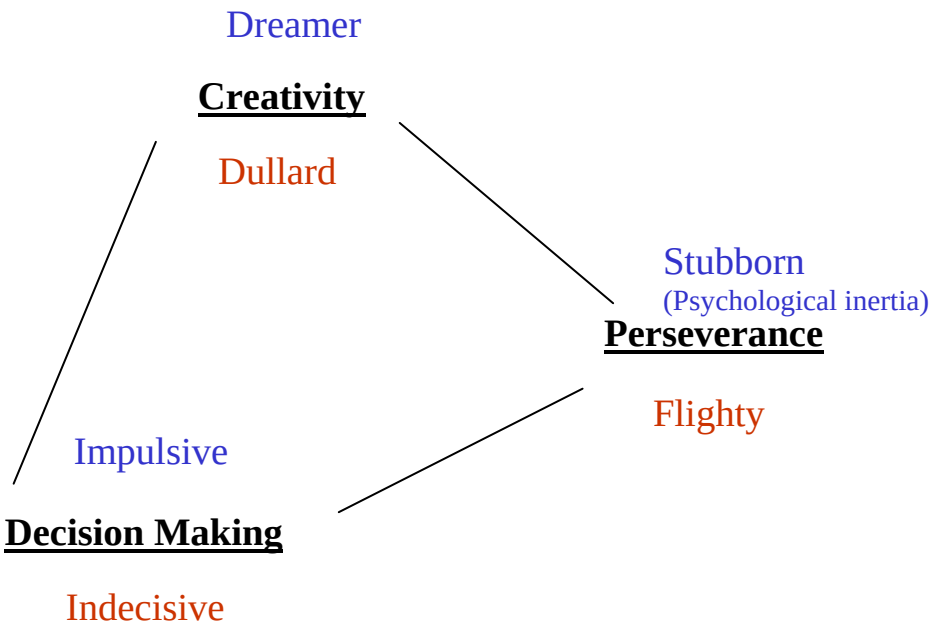
The Theory then proposes that if any of components are found in excess, the characteristics are given a different description as follows in Figure 2. Persons who "over-create" can be described as 'Dreamers', those who persevere beyond reasonable effort are called 'Stubborn' and those who make decisions prematurely are given an 'Impulsive' label.

Figure 2: Too much of a good thing?



But not only excess of the trait but deficiency in it will be viewed with a less than favorable description as we see in Figure 3.

Figure 3. What if we fall short on a skill?



Here, the opposite of Impulsive is called 'Indecisive,' people who lack the ability to stay on task are considered 'Flighty,' and those who lack creativity are branded as 'Dullards.'

But to apply the Theory to a useful end, we must go beyond description and find where this sort of model can be applied. It has been the author's observation that the excessive characteristics are much less flaws than they are compensating characteristics. In fact, the Dreamer is responding to one or both of his flaws; that he is Flighty and/or Indecisive. And the Impulsive decision maker is compensating for a lack of imagination (Dullard) or inability to follow through on earlier decisions (Flightiness). And the Stubborn person is covering an Indecisive or un-Imaginative flaw.

Picture this triad as corners of a triangle and the center of the triangle rests on a pin. The balanced triangle will indicate an intelligent approach and if a corner is raised, then another corner (Or perhaps even two for some unfortunate few) must logically be lower.

So the point here is that the diagnosis will depend not on the excesses of these traits but on the deficiencies. And the cure for the shortfall in intelligence will depend on the tools used as the substitute for natural talent. So what do we have by way of tools?

Figure 4. What Tools Do We Have When We Fall Short? How Do We Act Smart When We Aren't

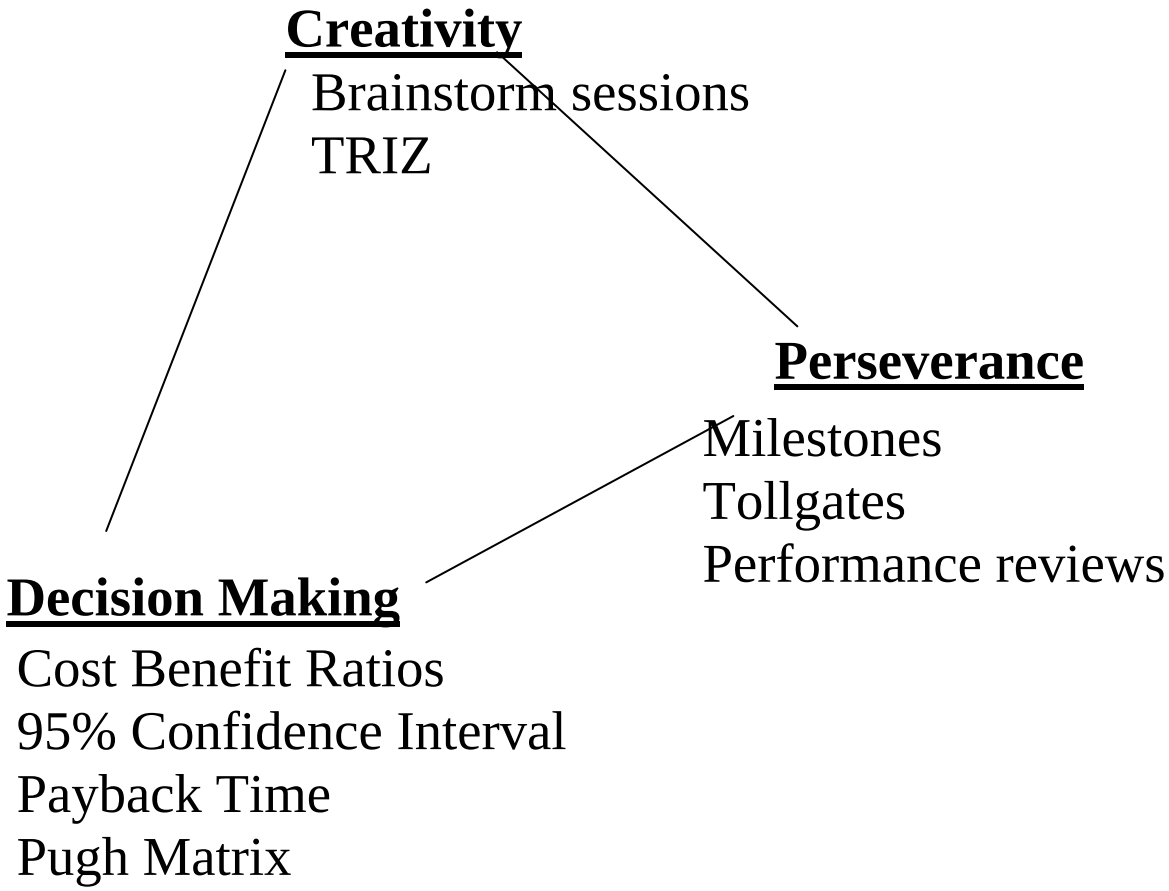


Figure 4 shows some typical techniques that are used to substitute for natural or intuitive actions. Milestones, tollgates and performance reviews will serve to keep people on track when their tendency might be to abandon a task prematurely. The typical business school techniques of Payback time and cost/benefit ratios aid in helping the manager to make prompt decisions. The Pugh matrix aids the mental organization when many choices seem to create analysis paralysis. And in Six Sigma the 95% confidence interval is able to help those normally wait until they are perfectly convinced in a decision; which, in our world of infinite possibilities, is a dysfunctional attitude. More Creativity is called to action when Impulsive Decision Making is seen (The person can't seem to find a good choice to land on). Or it will be needed when Stubborn behavior is seen (No one will leave a serviceable choice unless they see a better one).

The need for Creativity

Humans are pattern seeking animals. Once we find these patterns we use them to predict actions in the future. These patterns are called stereotypes and they utilize a

reduced model to predict a range of similar conditions. These patterns or paradigms, are often very useful and efficient. We cannot afford the time and effort to treat everything we see with new eyes.

However, often this pattern analysis works at an illogical level when applied in inappropriate conditions. A cat will never again sit on a hot stove once it gets singed. However, it usually won't get anywhere near a cold one either. The cat has trouble breaking its paradigm. And so humans have paradigms that have been successful before, but won't always work. This is also called psychological inertia, or stubbornness. To break this requires that we see things from a new perspective. And tools can help do that.

This brings the discussion to Creativity. Brainstorming and the many variations of the technique has been the traditional method of compensation in unimaginative situations, but Altshuller (1) suggests why this technique has limitations. He points out these limitations that his TRIZ approach overcomes:

1.) Brainstorming may not be cost efficient. There may be no evidence that 10 people thinking for a day on a problem will have any more ideas than 1 person thinking for 10 days.
2.) Brainstorming design restricts criticism to encourage new ideas. This might serve to abandon the germ of a perfect solution in favor of a more fleshed out and enticing alternative, but in the end, not the ideal.
3.) In order to minimize restrictions on the creative part of brainstorming, the process may generate a lot of ideas that never have a logical pathway to the ultimate solution. And in an infinite world, they may displace an opportunity to come upon the ideal solution.
4.) Success might breed lack of success. He identified 5 levels of problems and concludes that techniques that will work at the lowest levels have little chance at the highest. But yet, if the levels of difficulty aren't addressed, this won't be obvious. As creatures of habit, we go back to what has worked before. In particular, brainstorming is designed to liberate ideas that the group members have, but have suppressed. If the best ideas come from other fields with which the members are not familiar, no amount of brainstorming will find them.

One of his most popular tools, the contradiction matrix uses a list of 39 engineering parameters to create a set of about 1600 (38x38) possible conflicts. So when one parameter is getting better, another one gets worse. From the resulting grid of conflicts, Altshuller applied his analysis of tens of thousands of inventive solutions and found they could be generalized into 40 solution principles.

This and the other tools were meant to apply a scientific approach to creativity. This is something that seems at odds with the idea that science is method and creativity is quite non-methodical.

His set of creativity tools required:

1.) Stating the problem correctly
2.) Giving potential solutions a direction
3.) Using different tools for different levels of problems

Since TRIZ utilizes these concepts, it seems to work better than brainstorming, especially for complex problems.

While theory without application is just a dream, execution without theory could be a nightmare. Therefore, it might be prudent to address two theoretical concepts underlying TRIZ application: A.) A comprehensive attack plan. Does TRIZ offer enough variation in approaches to aid the dullard to an adequate creative solution? B.) Validation that dilemma/contradiction identification is suitable to correct problem statements.

What does a Creative genius do, that we might not?

Annette Moser-Wellman (2) describes five approaches to creativity and gives each approach a descriptive name.

- The Seer (Visualizes future) as represented by the question: *What solutions do I see in my mind's eye?*
- The Observer (Sees present) asks *What do I notice around me that leads to a solution?*
- The Alchemist (Cross-functional leverage) looks for: *What does this situation remind me of?*
- While the Fool (Harvests chance)poses the questions: What happens if I invert the situation? Come up with an absurd conclusion? What if I persevered?
- And the Sage (Reduce problem to essence) offers: *What simple solution could I create? What can I rekindle from the past?*

The author has found in surveys of quite possibly biased audiences that everyone seems to use at least two faces in their approach to solving problems, and almost no one uses all five faces. Therefore any suite of creativity tools would be well served to design the tools to utilize all five faces and Altshuller's TRIZ does just that. Analysis of that will be offered in the third article.

Why Two?

The last item of this article is a discussion on why TRIZ finds success in resolving contradictions by using such a small number of parameters to start to solve the problems that seem so difficult to solve. On the face of it, it is quite logical to assume that problems couldn't be much simpler than a dilemma (two horns). So why not? Well, it would seem that if it was that simple, someone even as dumb as us should be able to figure it all out before now. But apparently, we haven't.

Goldratt, and his Evaporating Cloud Theory, proposes that all problems can, and must be, reduced to the two part conflict. He then proposes moving the problem up from that point to a referee point where the resolution is a matter of priority. So, for example, if Purchasing needs to reduce the contract price they are paying and Warranty needs to reduce rebates and fixes to customers for poor product, the resolution may lie in the mutual boss of both who might then insist on using a common measure of "Total cost of Ownership," which will break the conflict caused by the independent metric systems of the two separate departments.

Koestler (3) proposes that creativity is the perceiving of a situation or idea in two self-consistent but habitually incompatible frames of reference which he calls "bisociation." He goes to great lengths to point out that in all cases of art, humor, problem solving and what we could call cases of creativity, that the case not only allows

the unacceptable condition (Dullness, if you will) to be reduced to two elements, but requires it to be. What we think of as more complex problems can be distilled as a series of bisociative conditions. He describes the process Gutenberg went through to find a practical way to print the Bible. He had to concern himself with ink transfer, which he thought woodblock rubbing could solve. But he had a problem with transferring 1300 pages of the bible, for which woodcarving each letter was a cumbersome solution. Then he thought of something more repeatable, the seal, which could be used repeatedly, but the ink transfer would be more difficult than woodcut. When he saw a wine-press he was able to connect two self consistent but normally incompatible ideas, wine-presses and seals. But he had to solve aseries of these to get to his final solution. He had to move past writing entire bibles with quill and ink and merge block rubbing for ink transfer, coin punches for casting multiple copies of the same letters, reusable seals for flexible design of pages and wine press for consistent ink transfer.

It is upon this basis that we can fulfill the first step of re-engineering the presentation of TRIZ that manufacturing has used so successfully. "The first step to intelligent re-engineering is to save all the pieces." In this case, we have to make sure what the pieces are. The contradiction, the problem statement, directional approach and a flexible multi-tier attack for different problem types are all elements that need to be retained to even hope to successfully claim a good translation to Transactional TRIZ.

In the next article, the discussion will center around the development of a Contradiction Matrix that is transactional based rather than manufacturing based. The final article will cover the approach of convert an ARIZ for transactional use and also deal with a common tendency to prefer simplicity over complexity in tool usage.

References:

1.) Altshuller, Genrich (1999) *The Innovation Algorithm*, Technical Innovation Center, Inc. Worcester, MA
2.) Moser-Wellman, Annette (2001) *The Five Faces of Genius*, Viking press. NYC, New York
3.) Koestler, Arthur (1964) *The Act of Creation*, Penguin Group. London

Jack Stuart was introduced to TRIZ in a seminar offered by Ellen Domb in 2001 and has had a, perhaps, unhealthy obsession for the contradiction matrix ever since. He was curious whether a transactional version was available and when he was told it wasn't at the time, he set about trying to discover one. He has worked in Aerospace, Automotive, Educational and Financial institutions and served in both manufacturing and service sectors.