Translating TRIZ Lines of Evolution to Business and Management

Jack Hipple
Innovation-TRIZ

As the science of TRIZ developed, we went from simple contradiction analysis to standard solutions, a general algorithm (ARIZ), and eventually to Lines and Patterns of Evolution. This is again one of these areas where long time TRIZ Scientists debate how many lines and patterns there are, what they are called, etc. In this discussion, I am going to use the high level 8 lines that I and others learned from Boris Zlotin and Alla Zusman, TRIZ Masters. No offense is intended if you think there are more or less lines, you call them something else, use different verbiage to describe, etc. Many "new" lines have been defined, which in some cases are merely subdivisions of the top level lines, while others can be considered actually newly defined. These next two columns are about applying the thinking imbedded in these lines as opposed to an academic debate. This will at least provide a framework to assist you in translating whatever lines you are using, or what you call them. We can all debate these points at a future Altshuller conference panel discussion.

These are the 8 lines I am going to use:

1. Lines and patterns of invention and evolution exist
2. Systems evolve toward a more ideal state, resolving contradictions
3. Systems evolve unevenly (non-uniform development of system elements)
4. Systems become more dynamic and controllable over time
5. Systems oscillate between simplicity and complexity
6. Systems evolve and improve through the matching and mis-matching of elements
7. Systems progress toward higher frequency field use (simple example: mechanical, thermal, chemical, electronic, electromagnetic)
8. Systems evolve toward less human involvement

We'll cover the first 4 in this newsletter and the next 4 next month.

The first point to mention is that we need to replace the word "system" (which is a great word for technical systems and engineering problems) with something more general like businesses, organizations, or something similar-- OR we need to understand that system is not a term restricted to technical systems. It's not that technical systems don't have an impact on TRIZ thinking around businesses, but it's more helpful to use a term that describes more generally the environment we are discussing. You can use whatever terminology you want-just keep in mind that we are talking about systems involving people and business systems. Let's start with the first line.

1. Lines and Patterns Exist

For those of us in the TRIZ community who deal mostly with technical problems, the fact that

that there are definable and repeatable trends in system evolution is not surprising-it is the basic foundation of TRIZ. It is also a way of pro-actively using TRIZ principles in business strategy. Products and system don't evolve randomly and in fact, if one company understands this better than others, it can provide a significant competitive advantage. Frequently, however, we find it difficult to convince others that there are predictable trends, and that these same trends cut across numerous areas of science, technology, and business. The fact that Altshuller elucidated "S" curves decades before the Harvard Business School, (and the fat he gets no credit) still amazes me.

Let's take a look at a widespread tool such as Six Sigma. When GE began to use it and claimed multi-million dollar results, everyone jumped on the bandwagon-a trend developed. Why was it so popular and successful? Because it provided a rigid structure for problem analysis that was lacking. It eliminated the "guessing" that goes on all the time with regard to the root cause of a problem. It also provided a rigid training and certification structure so that everyone understood the expected skill levels (green belt, black belt, master black belt). We find similar systems, not necessarily all liked or used to the same degree, in personnel planning, personnel evaluations, project management, and succession planning in large corporations. Many trade associations and non-profit groups have instituted standards and qualification exams to provide some sense of normalcy when someone says they are an expert in something. We are wrestling with this exact issue within the TRIZ community. So a preliminary question you might ask could be, "what patterns of business management used by others or in other industries that might be useful to me?" Just as in normal TRIZ problem solving, it is easy to get carried away with our egos and think we are the only people in the world with a particular type of problem, where in reality; this is almost never the case. It's just our egos and jargon that make us think this way. One of the huge barriers to the acceptance of TRIZ in many organizations is that there is disbelief that there can actually be "standard "solutions to problems, regardless of the nature of the industry or technology.

Many of these patterns are very discontinuous, which makes them a little harder to accept. Many forecasters, futurists, and stockbrokers love to extrapolate lines and trends without recognizing, as Altshuller did, that progress is usually accompanied by a jump to a discontinuous alternative line. It's so simple to extrapolate with a ruler! Regardless of whether they are continuous or discontinuous, the lines are there and not studying and using them is fraught with danger. A simple example that most of you have heard from me before is the folks who were optimizing the design and feel of buggy whips when the internal combustion engine came along (note the sharp break from mechanical to chemical energy field use). So the point of this first "line" is that there ARE lines and it's critical for you to first of all accept that fact, and secondly, search for the ones that apply to you, no matter how discontinuous or uncomfortable they are to you. They will often point to important new strategic directions for a business, which if recognized soon enough and planned for, will provide significant competitive advantage.

2. Systems evolve toward a more ideal state over time

This topic, in general, has been discussed in previous issues related to business and organizational problems. What does it mean in the sense of system and business evolution? Quite simply, a system or organization evolves to a more ideal over time. My personal experience also

tells me that this advancement may have some forward and backward lurches to it due to the natural reaction of humans to change (especially when it affects them!). Note that this can be viewed from all kinds of different perspectives and that's what makes applying TRIZ principles in this general area so interesting and complex. Let's say we are in the banking business. What might an "ideal final result" statement be for the executive management team? How about maximizing deposits, paying minimum interest, eliminating all risk and not needing insurances, and working without employees? Do you think the definition of ideality for the current branch manager is the same? Maybe if his/her job is guaranteed no matter what--but who has these any more? Wouldn't your definition be to provide idea customer service at minimal cost to your customers? How to provide remote smiling faces at the drive windows? What about the depositor? Possibly different definitions of ideality depending upon background and age? Some elderly depositors can't or won't use electronic entry equipment and want to actually see someone. What if you're the manufacturer of the automated teller equipment that might be displaced by all Internet banking? There is no right or wrong here, but not thinking through everyone's definition of the ideal result could cause a business decision based on just numbers to go astray and actually be counterproductive. In most technical systems, it is possible (might take a little time) to define the ideal result, but with people involved, there is never a black and white answer and definition of the Ideal Final Result. It is critical, when using TRIZ (or for that matter any problem solving tool or process!), to make sure that we have thought through everyone's definition of an ideal situation and plan accordingly.

When working with groups of people from different functions within an organization, it is very insightful to separate them and ask for these definitions prior to group discussion. The discussion is often more useful than the final agreed Ideal Final Result Statement.

3. Systems evolve unevenly with time

When we are talking about technical systems, it is easy to find many technical illustrations of uneven system advancement toward ideality and contradiction resolution. We can consider the car or the bicycle as examples which we have used in our training workshops. The bicycle at first only had one wheel and absolutely no accessories. Then two wheels. Then a pedal, and brakes, different size wheels, transmissions, etc. Each time, the advancement was to bring the bike closer to the ideal result (from some users' point of view) and increasing complexity at the same time. The same thing happened in car development. We had wheels and engines, but when the car could go more than a few miles per hour, we discovered (guess what!) the need for brakes. Then when we could go more than 10 miles per hour and there weren't any good roads, we discovered the need for shock absorbers. Then came superhighways and all kinds of other system improvements, not only to the car, but to the transportation system.

How does this apply to organizational and business systems? Well, consider the implementation of a program such as Six Sigma in a large corporation. It changes a lot of things, but not all at the same time. Its first impact is probably on the manufacturing floor. If we have discovered the limitation to achieving this to be a vendor supplied raw material, then the problem moves to somewhere else (at least temporarily). Possibly the raw material inspection and qualification process. Maybe it then turns into an instrument control and measurement problem, which in turn may affect your training and hiring protocols. All of these sub-systems may reach their ideal

final result at different times, because we are not focusing on all of them. The lesson here is that, just as with technical systems, think ahead! What's the next contradiction? The next limitation? In my chemical industry experience, we used to call these "bottlenecks" and it was always good planning to know where the next one was before you really needed to know. These thought also apply to the human side. If your business is changing and evolving into new fields, has your training kept up? Are you still hiring from the same schools? The same technical expertise? Any of these could be your new bottleneck. So ideally, the next series of changes you would have thought about ahead of time and be prepared with a plan. The preparation takes care of itself. Remember the "do it in advance" inventive principle that we discussed in a previous lesson?

4. Systems become more dynamic and controllable over time

Regardless of whether we are discussing technical or non-technical systems, this "dynamism" line is one of the most useful and obvious (sometimes in hindsight) in the TRIZ lectionary. It simply says that systems and products become more dynamic, controllable, and responsive over time. Just think about the numerous examples across many products and systems: car seats that adjust automatically to the driver based on which key is inserted, lights that control their intensity, numerous variable speed motor control devices. Some of you have seen our example of the dynamic system used by a few airlines to control the quantity and quality of food service (when it exists!) based on the average fare paid per seat on the plane. Folks flying to Orlando for vacation get different refreshments that those going to JFK who may be on international business related trips. Of course, to do this requires up to date information (remember the discussion we had on resources? Information, whether you capture and use it, is a key resource that's there all the time.

What about employee appraisal, evaluation, promotion, and pay increase systems? Are they the same for everyone, everywhere, all the time? Does that make any sense? Many companies still do it that way! If we understood what motivated different people, we could probably design a compensation system that not only was less costly, but improved morale-now that's an ideal result! Consider time off from work vs. money, child care vs. life insurance. Cafeteria benefit packages are seen more often now that utilize this line of evolution. Different age groups have different concerns. So do individuals vs. families. What about opting out of health insurance without losing all your benefits (maybe your spouse has insurance that can be leveraged). Could a terminal illness trigger immediate benefits within a company plan in the same way it does at Prudential Life Insurance?

What does your organizational structure look like? One of those box flow charts? Should the "chart" be changed (maybe even flipped upside down once in a while!) for a specific business situation? Should who reports to who (not the person, the role or function) be the same every week or month? What if we thought strategically, ahead of time (TRIZ inventive principle #10, Preliminary Action) what the organizational structure should look like for a market change, a hostile takeover, acquiring a new business (what kind?). How powerful would that be to you while your competitors are just struggling with trying to figure out how to get started? This line of dynamism is one of the most useful and powerful in the TRIZ lexicon. Take everything that's part of a business system and ask how we could make it more dynamic, more responsive, and more controllable. And while you're doing that, ask for each question, to or for whom?

Homework: You are the President of ABC Company who has decided to do a total review of the company's' performance evaluation and compensation program. You are planning an off-site meeting with your senior staff and have decided to use the thoughts from this lesson as the structure for the meeting and discussion. What are some of your preliminary thoughts? What reaction do you expect from the VP of Engineering, your VP of Director of Human Resources, your VP of Manufacturing, and your VP of Marketing and Sales?

NEXT MONTH: Translating Patterns of Evolution (II)