This article is a modified version of a paper presented at the ETRIA TRIZ Future Conference held in Florence Italy on 3-5 November 2004.

THE NEXT COMMON SENSE: PHILOSOPHY-LEVEL INTEGRATION OF TRIZ INTO AN INEGRATED BUSINESS AND MANAGEMENT INNOVATION PROCESS

Darrell Mann
Systematic Innovation Ltd
darrell.mann@systematic-innovation.com

Abstract
The article describes a philosophy-level integration between different innovation-related methodologies. The article illustrates the high level of convergence between techniques that have started from quite independent roots. It also describes some of the conflicts that exist between some of the methods, and possible means by which they might be resolved such that a higher level integrated business and management philosophy might emerge.

1. Introduction

The world of business books is big business. With over 1800 management-related texts published every year, the choice facing any manager is overwhelming. The level of choice often becomes a serious problem when it comes to deciding which texts are appropriate in which circumstances.

One of the main underlying ideas behind the original TRIZ research was to distill best practice from any and every kind of source and place it within a global knowledge framework. Few if any innovation philosophies have taken such a broad-reaching perspective. The initial focus of the TRIZ research was, of course, in the realm of technical knowledge. It is a strong testament to the initial researchers that when the first attempts to translate the basic pillars of TRIZ into a Western business context, much of the framework remained valid. Given the initial success in applying TRIZ to business and management problems, a concerted programme of research to model and integrate successful business solutions has been in place since 1998. As with the original TRIZ research, the goal of this business research has been to define, identify and integrate best business practice into a coherent business and management innovation toolkit, methodology and philosophy (Mann, 2004).

The article records some of the key findings of the business and management research that now act as the foundations of a fully integrated systematic innovation capability bringing together the best features of TRIZ, Lean, Six-Sigma, Quality Function Deployment, Neuro-Linguistic Programming, Complexity Theory, Cybernetics, and a host of other successful business tools. The emphasis throughout the article will be on the presentation of a philosophy-level integration of each contributing school of thought. The article pays particular attention to the conflicts and contradictions present in many of the different management perspectives, and shows how each one can and must be successfully eliminated in a win-win way before successful integration can occur. By way of an illustration, both TRIZ and Lean philosophies suggest that waste is a bad thing that needs to be 'eliminated', whereas it is viewed as an essential innovation enabler in complex adaptive systems. A win-win resolution of this waste and no-waste contradiction is therefore necessary before any of the three methods may be successfully integrated with one another.

As will be discussed in the article, a host of similar contradictions existing between other methods have had to be understood and resolved. Specific conflicts to be discussed in the article include:

- the parallel need for simplicity and complexity in organisations
- top down versus bottom up management philosophies (otherwise known as ERP versus common-sense)
- the parallel desire for independent and inter-dependent organisation designs
- variation-reduction as both a good and a bad thing
- the parallel need for both stability and instability in an organisation
- the customer as someone who is always right and often also wrong

A final section of the article summarises the current state of integration between different management philosophies and projects what the next major business paradigm shifts will occur and their likely impact on the world of business.

2. Philosophy-Level Integration

In the terms of evolutionary S-Curves, the TRIZ-based systematic innovation method is approaching some form of fundamental limit – Figure 1. To go beyond these limits – in other words, to find a new paradigm, higher level of creativity capability – is therefore likely to require an expansion of TRIZ in fundamental ways. Thus, while some integration activities look set to enable small-scale optimisation benefits to be accrued, more substantial shifts in capability seem likely only through more profound shifts in the underpinning philosophy.

The Figure 1 image has previously discussed by Mann (2003 and 2004), alongside a discussion of other tools that are believed to operate at both a philosophical as well as methodological level. Mann (2003), for example, discussed the philosophical pillars of Six Sigma, Complexity Theory and Cybernetics (in the form of Stafford Beer's 'Viable System Model') and speculated on how they might complement or at least influence the application and evolution of TRIZ. Mann (2004) expanded this list to also include Lean, Quality Function Deployment and the general umbrella of tools and techniques that might be thought

of as belonging to a family called 'sustainability' (in this case, sustainability in the context of environmental and social sustainability). Bridoux (2002) also speculated on the philosophical level impact to TRIZ, this time through the possible integration with NLP. Whilst not daring to speculate on how the philosophical pillars of each of these different methods might integrate to form the higher level capability suggested by Figure 1, both previous references did speculate on what the combined philosophical pillars resulting from integration of the studied methods might be.

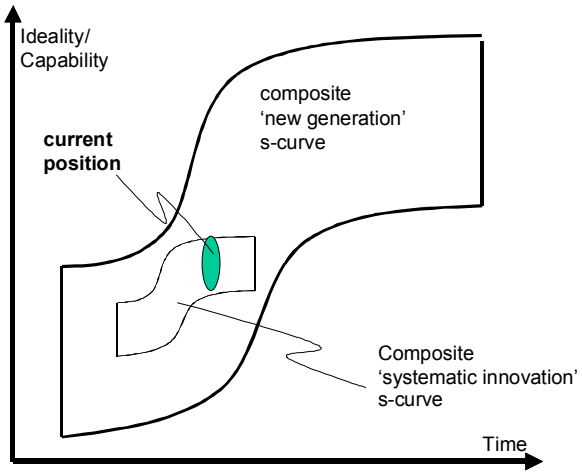

Figure 1: Evolution of Systematic Innovation Capabilities in S-Curve Terms

The total list of pillars resulting from the combination of the different considered philosophies, then, is presented in Figure 2.

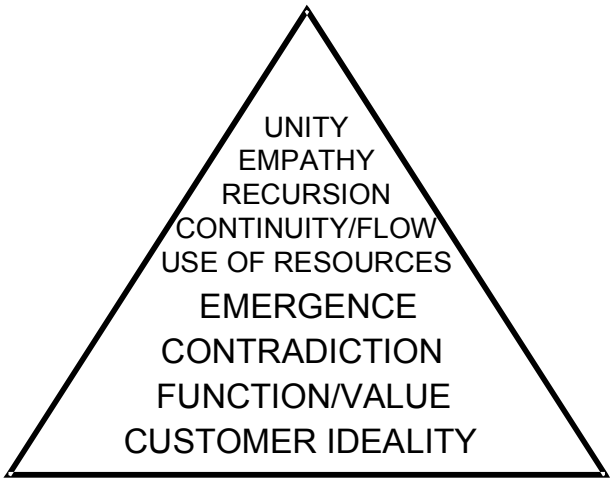

Figure 2: Philosophical Pillars Of Integrated Systematic Innovation Capability

Detailed examination of these pillars reveals a high degree of consistency. The fact that such convergence is achieved from such different start points is encouraging. On the other hand, it

is also clear that there are a number of inconsistencies between some of the ideas present. The resolution of such inconsistencies is considered to be an essential step in progressing to a genuine new paradigm in our understanding of the dynamics of innovation and evolution. This then leads us to a discussion about right-versus-right conflict resolution:

3. Right-Versus-Right Conflict Resolution

Right-versus-right conflict means that both sides of an argument are correct. Or rather they believe themselves to be correct. One of the most compelling ideas in 'A Theory Of Everything' (Wilber, 2001) is that in these right-versus-right conflicts, it is necessary to move to a higher level of understanding in order to resolve the conflict. In other words, if both A and B are 'right' and they conflict with one another, there must exist a higher level model in which both A and B are permitted to be correct. The basic idea is illustrated in Figure 3. The basic idea of resolving conflicts by transition to a higher level is, of course, one of the strategies used in the resolution of physical contradictions in TRIZ.

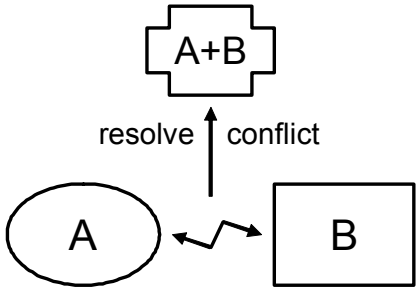

Figure 3: Resolution Of Conflict Between Two Methodologies Occurs Through Understanding At A Higher Level

Knowledge, then, of some of the other physical contradiction resolution strategies found in TRIZ allows us to explore possible means of resolving such right-versus-right conflicts. Specifically we might arrive at an understanding whereby the A and B under consideration may both be right, but at different conditions (e.g. different times or spaces). Looking beyond the separation principles, it may also be that A and B may be 'right' per se, but one or both is an incomplete model. In the next section, we explore these two basic situations – 'conditionally necessary' and 'necessary but not sufficient' in order to begin to explore a resolution to some of the conflicts that exist between different philosophies:

3.1 Necessary But Not Sufficient

One of the main pillars of Lean is the elimination of waste. Bicheno (2003) details the so-called 15 different types of waste required to be considered by management in an organization. The idea that 'waste is a bad thing that should be eliminated' is one that immediately sounds a chord with our common sense. Indeed, waste elimination is a necessary activity for any organization hoping to remain competitive in our rapidly globalizing world; there can be little mercy for any organization that believes they can survive and thrive in the midst of wasteful systems. But then Wolpert (2000) informs us that almost every major advance in the thinking of mankind has run counter to the prevailing

common sense. Could it therefore be possible that there is a flaw in the common sense view that waste should be eliminated? The evidence from an increasing number of companies appears to be a resounding yes. Rather than discussing the specifics of any one of such companies, it is easier and more beneficial to consider a case of waste elimination from nature. The natural world is a cruel and harsh place, and in order to survive within it, all life-forms face an ongoing struggle. The careful use of resources, therefore, is an essential factor; anything carrying around resources surplus to survival or reproduction requirements is at an evolutionary disadvantage to one that is living a leaner existence. For the dodo (Figure 4), the need for flight became progressively less and less as the need for an ability to forage on the ground increased. Consequently there emerged an evolutionary advantage to any dodo that no longer 'wasted' resources on wings capable of flight. And so, over time, this evolutionary pressure meant that the wing evolved to be little more than a balance aid during foraging (plus possibly a degree of thermal control). Flight-capable wings became a luxury and thus eligible for elimination.

Figure 4: The Dodo

Everything in this system is fine, until such times as a new threat emerges. In the case of the dodo, as soon as man appeared on their scene, then suddenly the need for flight became an essential survival capability. Unfortunately, however, it was a capability that the dodo no longer possessed. Net result; extinction.

The moral of the dodo story is that while waste elimination is always a good strategy, we always need to keep an eye on emerging new threats that might transform something currently viewed as wasteful into something that might turn out to be an essential resource.

In many ways, the same idea of necessary but not sufficient applies in Six Sigma and the drive within that philosophy for the elimination of variation. Again we may see the innate common-sense of removing inconsistency in manufacture and other processes, but again there is the danger that as we progressively hone those processes towards perfection, we lose the spark that can help us to see the road to better systems. Variation elimination is always great, but always needs to bear in mind that the standard deviation and the mean are two very different things. It is perfectly legitimate, in other words, to seek to work towards a standard

deviation of zero, but at the same time we need to be absolutely clear that we are working to achieve the 'right' mean.

We might take this story a stage further by considering another methodology and another animal analogy. Henry Ford once famously quoted that if he'd asked customers what they wanted, they would have asked for a faster horse. The big idea behind this quote is that customers are frequently incapable of seeing into the future and thus incapable of predicting what the future evolution of systems might be. Customers are great at asking for better versions of what they already have, but incredibly poor at asking for things they don't have.

Quality Function Deployment (QFD) exists to help companies to better understand the 'voice of the customer'. Again we might see the idea of necessary but not sufficient present in the philosophy of QFD: Few companies can expect to survive for long if they chose to ignore the needs of their customers. Hence, capturing the voice of the customer is absolutely essential to future success. But capturing this voice is not sufficient if the voice is unable to see beyond incremental improvement of what already exists. An undoubtedly stronger QFD operating paradigm emerges if it is used in combination with the predictive capabilities of TRIZ. Thus the model in which, first, TRIZ trends are used to identify 'possible' futures, and then second a QFD analysis allowing customers (and, importantly, people who are not yet customers) to make their voice heard on the various merits and de-merits of such possibilities is a step towards a more ideal system. Admittedly it is not a complete one since, by definition, we are asking the customer to pass comment on a future innovation from the perspective of a present day context. This indeed may well be the current limiting contradiction that must be resolved in achieving the next level of integration between TRIZ and QFD.

3.2 Conditionally Necessary

The second category of right-versus-right conflict possibilities is that a paradigm is relevant based on the presence of certain conditions.

Perhaps a good example of a methodology that exists in this 'conditionally necessary' category, then, is Axiomatic Design (Suh, 1990). Axiomatic Design is built around two central design axioms; the first that it is important to ensure that the different functional requirements in a system are independent from one another, the second – abstracting slightly - that the more efficient design is the one with the minimum level of superfluous content. The second axiom is directly analogous to the idea of resources in TRIZ and waste elimination in Lean. The first axiom on the other hand is in many situations in conflict with ideas in TRIZ, specifically the evolution of systems towards and Ideal Final Result end stage. In the TRIZ model, the 'ideal' solution is the one that delivers the required functionality with zero cost or harm. Inevitably as systems approach such a destination the different functional requirements and the related design parameters become coupled with one another.

So which is right? Ideal Final Result or the Independence Axiom? It is an argument that requires somewhat more than a simple either/or answer. According to the Wilber model of Figure 3, the answer ought to come from a synthesis of both. On the way to such a synthesis, however, we might again look to nature to see which side of the IFR/Independence fence

natural systems tend to fall. Evidence from such systems tends to show that efficient use of resources is the dominant evolution driver, and that the stronger the competitive pressures, the greater this resource-efficiency drive becomes. The 2002 Axiomatic Design conference (ICAD, 2002) reported that natural systems rarely if ever achieved Independence and that the higher the competitive pressures, the further from Independence a solution was. Thus, in order to make maximal use of resources, natural systems tend to produce designs which are coupled increasingly strongly as competition increases. We might, therefore, extract from this early evidence that the relevance of the Independence Axiom is conditional upon the level of competitive pressure. Thus, in a benign environment the Axiom may be true, but in a highly competitive environment, the effective use of resources becomes a more significant design driver – Figure 5.

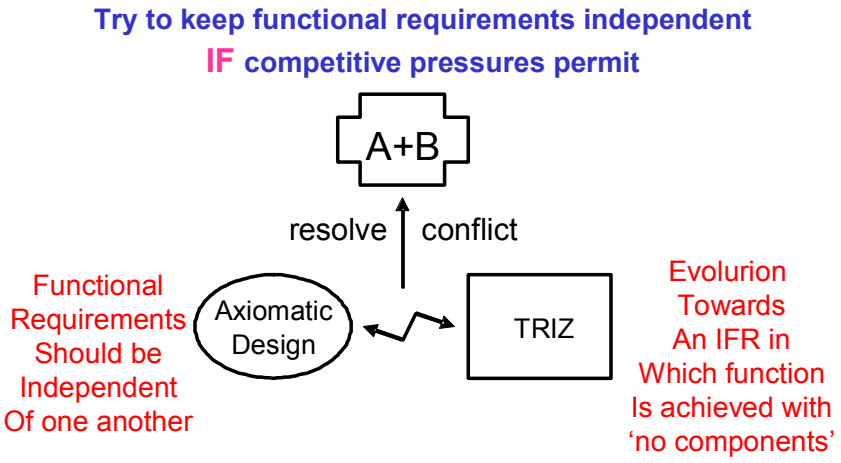

Figure 5: Complexity Increases And Then Decreases Trend

Other examples of 'conditionally necessary' ideas become apparent when the complexity increases and then decreases trend uncovered by TRIZ researchers is taken into consideration. This trend – illustrated in Figure 6 – is present in all systems, whether technical or business or, in this case innovation and creativity methods

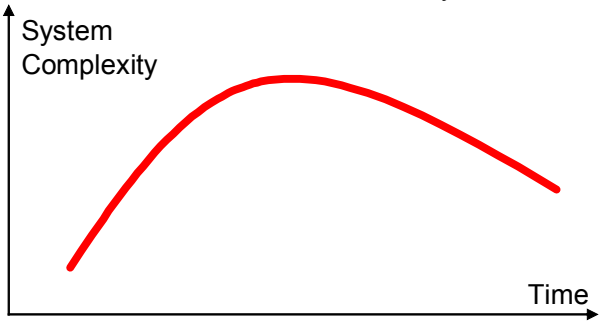

Figure 6: Complexity Increases And Then Decreases Trend

A commonly observed phenomenon related to this trend is the publication of a growing plethora of books following the emergence of a new idea as it gradually enters the public

consciousness. A classic example of such a phenomenon may be seen in such 'methods' as Business Process Re-engineering (BPR) and Customer Relationship Management (CRM). In both of these cases we see the emergence of a whole industry of authors seeking to expand and capitalize upon the initial 'common sense' idea of an originating text.

Then, after some period of expansion of the method, along comes a text offering an opposing view – 'why BPR doesn't work' or 'why CRM doesn't work'. Such texts emerge as users of the methods begin to realize that what is a common sense idea under certain conditions becomes exactly the opposite under other conditions. Thus, to take CRM as a specific example, if a company is doing nothing to foster effective relationships with its customers then doing something is likely to prove a better option. In this situation, CRM may be thought of as 'necessary'. But beyond a certain point, it becomes apparent that 'managing' customers is a strategy that is actually the wrong way around. Our TRIZ knowledge of the evolution of systems towards the IFR and the emergence in such situations of systems that operate 'by themselves' should tell us that CRM is but a staging point along a path to that ideal.

The same idea may be said to apply to the increasingly ubiquitous ERP business management tools. If there is one factor that unites delegates attending our workshops it is their dislike of various proprietary ERP systems. SAP in particular is the ultimate top-down command-and-control management tool. Anyone subjected to the rigours of such a system tends to find it an uncomfortable process. One hopes, therefore, that the phenomenal growth of SAP is, like CRM, an inevitable rise in complexity that must precede the emergence of a more ideal system. If a company has no means of managing the flow of value in and around the organization, then having something is almost inevitably going to be 'better'. But better is not the same as best. It is merely a stepping-stone to the Ideal system. In this sense, one may see SAP and its equivalents as a system at (hopefully!) the point of maximum viable complexity in its long term evolution – necessary today, but unnecessary in a future model where the complexity versus capability conflict becomes resolved and the system is able to progress onwards to its IFR destination.

4.0 Summary And Conclusions

Like any complex system, a higher level innovation capability – a new common sense if you will – looks set to emerge through a gradual synthesis rather than from any sudden step-change jump. According to Wilber again, this is a fundamental phenomenon that results from the fact that when we are born we inevitably start from a limited knowledge foundation. Further than this, according to Wilber it is fundamentally not possible for us to leap-frog from one level of understanding to another, but rather that we have to progress through each stage as a linear progression. Without understanding one level of understanding, it is not possible to appreciate the relevance of the next higher level. The evolution of human knowledge is thus constrained by the fact that all of us have to pass through a number of gates and that because the age of a population is inevitably a spectrum, there will inevitably be a corresponding spectrum of different people at different levels of understanding.

This then takes us back to the earlier discussion of simplicity versus complexity. According to the trend uncovered by TRIZ researchers, systems evolve through a trajectory which first sees complexity increase and then secondly, decreases again. Systems fundamentally get more complex and then less complex again. There is little we can do about this trend. The integration of TRIZ with other tools likely to be necessary to deliver the 'next common sense' may be expected to require at least some increase in complexity relative to the complexity that we experience today.

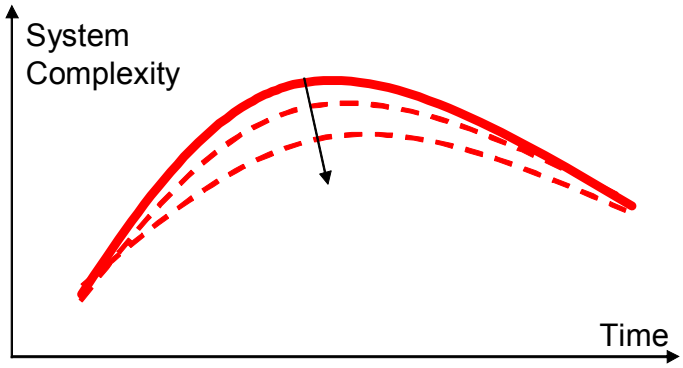

Figure 7: Limiting The Increase In Complexity In Systems

The 'inevitable' increase in complexity, however, can be managed. The experience of the evolution of technical systems says that there are things we can do to limit un-necessary rises in complexity – Figure 7. The road to the 'ideal' innovation and creativity methodology – that methodology capable of delivering the function with no cost or harm – is one full of choices. Methods and tools will come and go, evolving and merging into other ones. Thus, to take a single emotive example, we might ask whether the role of the TRIZ S-Field tool continues to be necessary in a world where function and attribute analysis (FAA) exists. The Inventive Standards might well remain useful as solution generation triggers, but the power and breadth of FAA is both greater and conceptually more robust than that found in the construction of S-Field models.

As TRIZ developers we all have a responsibility to keep the increasing-decreasing complexity trend in mind when we contemplate enhancements to the method. Are we adding unnecessary complexity is a question key to the successful deployment and spread of TRIZ.

4. References

Bicheno, J., (2003) The New Lean Toolbox, PICSIE Publications, Buckingham, UK.

Bridoux, D., Mann, D.L., (2002), 'Evolving TRIZ Using TRIZ and NLP', article presented at TRIZCON2002, St Louis, April 2002.

Mann, D.L., (2003), 'Beyond Systematic Innovation (Integration Of Emergence And Recursion Concepts Into TRIZ And Other Tools)', ECCI8 Conference, Mainz, Germany, September 2003.

Mann, D.L., (2004), Hands-On Systematic Innovation For Business And Management, IFR Press, UK.

Suh, N.P., (1990), The Principles of Design, Oxford University Press, Oxford.

Wilber, K., (2001), A Theory Of Everything: An Integral Vision For Business, Politics, Science And Spirituality', Gateway, London.

Wolpert, L., (1992), The Unnatural Nature of Science, Faber & Faber, London.