Systematic Innovation

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In this month's issue:

The Systematic Innovation e-zine is a monthly, subscription only, publication. Each month will feature articles and features aimed at advancing the state of the art in TRIZ and related problem solving methodologies.

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

Readers' comments and inputs are always welcome.
Send them to **darrell.mann@systematic-innovation.com**

More On Three-Legged Stools

One of the reasons the three-legged stool frequently finds itself used as a business metaphor is that, whether knowingly or otherwise, a stool with three legs is a really good example of a minimum system. We first wrote about three-legged stools in April 2010 (Issue 97 of this ezine), when we were looking at innovation as a system. This time around, we broaden the metaphor to look at businesses more generally.

By definition, any enterprise is a system. Systems exist to deliver useful functions to one or more customers. A really good reason for examining any industry through a system lens is that it allows us to identify universal patterns of behaviour that allow comparisons between different industries to be made. Some industries do better than others. Those that do better tend to understand the fundamental workings of systems – especially complex ones – better than those that perform badly. By studying the most successful systems – as the Systematic Innovation research programme has been doing for the past 17 years and 3.5 million case studies – we can learn how to help those performing less well to improve.
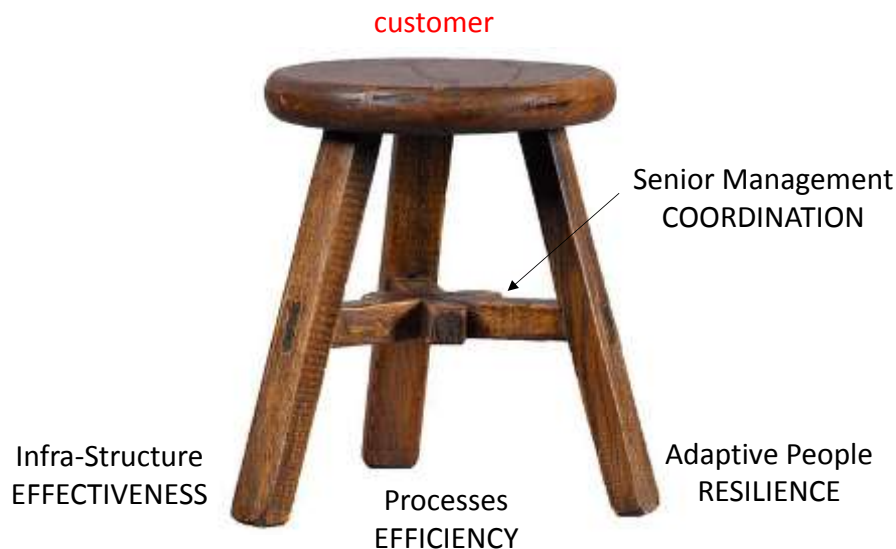
There is currently a perception in some quarters that many enterprises are struggling to function effectively in a world where systems become more and more interdependent and more complex. Also not helping is the fact that the public and political perception tends to work in rather shorter timescales, and so even the best organisations are tending to find themselves under pressure to transform.

Before looking at what might need to be done to help organisations re-think their place in the world, it is worth exploring some of the other universal characteristics of complex systems in order to begin to objectively begin to map global systems-thinking best practice taken from all domains:

All systems need to include a certain minimum number of elements. A three-legged stool does a good job of illustrating these elements. A stool is a system. Its main useful function is to provide a safe, comfortable platform for someone ('the customer') to sit on. One essential element, therefore, is the interface that permits that customer to take the weight off their feet. The three legs then provide the stability necessary to keep the platform at the desired orientation. In the usual business metaphor, these three legs represent the three main elements that form the core trilemma that face any organisation – the simultaneous need to be effective (doing the right things), efficient (doing them well) and resilient:

customer

Infra-Structure
EFFECTIVENESS

Processes
EFFICIENCY

Adaptive People
RESILIENCE

The three legs of the stool offer the greatest level of strength to the stool and safety for the user if they are connected to one another. The struts connecting the three legs are the equivalent of the strategic management team running the organisation and making sure that the three legs are connected and that the relative load between them is balanced:

customer

Senior Management
COORDINATION

Infra-Structure
EFFECTIVENESS

Processes
EFFICIENCY

Adaptive People
RESILIENCE

Also fundamental to the success of the stool is that ground on which it rests. We might think of the ground as the societal and political terrain on which the stool must stand. In any real world situation, we know that the terrain is rarely level and often prone to shifts that require the orientation and relative length of the legs.

For many industries, the terrain in recent years has been such that many organisations have had to place considerable emphasis on the Efficiency leg. In such a world, the Resilience leg is often seen as 'wasteful' and therefore increasingly surplus to requirements. Many organisations are now beginning to reap the adverse consequences of this erroneous assumption – they've become so efficient (the efficiency leg on the stool has become so unbalanced compared to the other legs) that their ability to adapt and change has been trimmed below a critical mass. In an Efficiency-dominated terrain, it is difficult to justify apparently making the resilience leg much more stout than it 'needs' to be.

We think the un-balanced Effeciency leg extension to the three-legged stool metaphor is a useful image to keep in mind when examining the majority of organisations. Especially the ones sitting at the first and second Levels of the Innovation Capability Maturity Model.

We also think, the more we find ourselves using the metaphor, to recognise the shortcomings of all metaphors in their inability to fully represent reality. One of the problems with the three-legged stool as model for business is that it doesn't adequately identify another essential system element: a means to determine whether the system is giving the customer the level platform they want, irrespective of the shifts in terrain that might have taken place. In an actual three-legged stool, the sitter decides for themselves whether the stool is level. In a business environment, the system needs a means to measure whether the stool is level. In effect, the business stool needs a spirit level:
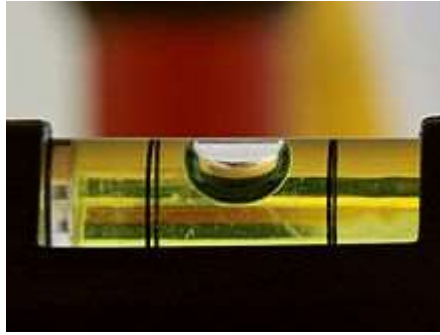
In this regard, one might begin to suggest that one of the main reasons for the increasing level of mistrust between people and large institutions – public or private – has occurred because the spirit-level measurement systems have been inadequate. Particularly when it comes to measuring and managing the intangible, emotional factors that inherently drive perceptions, whether of public or politician. In effect, if Industries may be said to be failing in recent times, for a large part, it has been a failure of measurement.

The next biggest source of perceived failure that Industries have tended to operate in a manner that assumes what happens in one will have no relevance to what happens in another. Think here about one of Altshuller's key findings during the early TRIZ research – the biggest innovations come from the transfer of solutions from one industry to another – and how infrequently this still manages to happen. The world is at a stage where, theoretically at least, there are a myriad opportunities to transfer proven solutions from one domain to another. In this regard, the stool metaphor again lets us down. A single stool is a good representation of a single system, but of course, ultimately no system exists in isolation from others. Especially in our rapidly globalising world. A more complete 3-legged stool metaphor would thus recognise that there are many other stools in the world:

Further, the Systematic Innovation research tells us that many of these other stools have to deliver the same basic functions and that anyone looking to design a new stool (or adapt their existing stool to suit new terrains) would be well advised to go explore how other more effective stools have been designed. This might mean going to look at other systems within the same industry, but more importantly it should also be taken to mean that the exploration should be made much more widely.

To take a specific example, on one of our recent client projects, it is one thing to recognise that when trying to design better ways of assessing underground sewer systems it is a good idea to go and see what other Water Companies have done, but quite another to go and look for equivalent problems in other industries. Accessing difficult to access

geometries and accurately assessing their condition is not a problem unique to the water industry. Oil & Gas, military surveillance, aerospace component inspection, steam plant, nuclear and a suite of other industries have had directly analogous, often more extreme version of the same basic problem.

One of the increasingly common trends aimed at helping to solve some of these system shortfalls or dysfunctions, particularly in large institutions, (e.g. financial institutions since the GFC, where to a large extent trust with the public has been deeply eroded), has been the establishment of 'watchdog' type agencies. Predominantly. They have become a politically-motivated attempt to re-balance what some in the political arena have perceived to be a poorly performing, unbalanced stool. Being an agency external to the 'system' proper, in terms of the stool metaphor, they are probably best viewed as a temporary 'wedge' sitting between the terrain and the stool:

Watchdog Bodies

This 'temporary-prop' extension to the stool metaphor is, we think, another useful extension. In that it helps to explain why, in the long term, watchdog bodies tend to make things worse rather than better. The prop sits between the floor (environment) and legs of the stool, and as such is part of neither. Because it is likely to be more attached to the terrain than the stool, it has little or no prospect of affecting the design of the stool. Indeed, as may be seen in the vast majority of other equivalent wobble-removing props in other domains, while the intentions might be good, the net effect of their existence on the stool is net negative.

One of the greatest of the negative effects is the creation of an adversarial us-versus-them fight in which any advice offered by the wedge is automatically viewed in a 'not invented here' mode by the incumbent parties operating within the system – in truth, the only ones that can possibly understand how the stool operates. To a significant degree in the UK, with bodies like Ofcom, Ofgas, Ofgem, this us-them fight has already reached a level that makes the delivery of any kind of sustainable change almost impossible to achieve. The most likely scenario being an uncomfortable tension between passive resistance and political game-playing, with each party 'proving' that they were in the right.

In the longer term, based on a fundamental success factor of almost every resilient organisation, being in possession of an evolving whole-system model is a vital tool in ensuring that effective and efficient investment decisions are able to be made by the senior management team coordinating the component enterprises. Our hope is that these extensions to the stool model helps to inform understanding of the issues at stake, and does so in a manner that permits meaningful resolution strategies to be installed.

Case Study: Measuring The Real NHS

Darrell Mann, Paul Howarth
Systematic Innovation/Akumen, UK

There are only two things wrong with the way we monitor the NHS:
*1) What we measure; 2) How we measure it.*

Like a lot of institutions, the Government is frequently guilty of measuring what's convenient and easy rather than what is meaningful. What is happening in the NHS at the moment offers a classic case of this mistake in action. It is very easy to measure things like mortality rates, cancelled operations or waiting time in A&E departments; not so easy to measure what the patient thought about their experiences. The big problem with measuring the simple stuff is that it quickly ends up diverting the system away from its real purpose.

The only purpose of making any kind of measurement is to direct improvement of a system. Put in place the right measures and we help to improve the system; put in place the wrong measures and we set in motion activities that create downward spirals that progressively detract from the real efficiency and performance of the system. Setting up a system to time how long a patient waits in A&E is easy, but very quickly, especially when we find that the results of our measurement reveal we're not hitting targets, we find ourselves forced to begin adding new measures to check that people aren't gaming the system, we put in place more complicated forms and protocols to assess why the targets weren't met and managers find themselves spending more and more of their time monitoring, justifying and managing the figures. All the time this is happening, of course, the poor old patient and the important matter of 'did we fix the patient?' finds itself pushed further and further into the background.

PanSensics, a measurement capability derived from over 16 years of development work with a range of MNCs around the planet, is about helping organisations to make better measurement decisions. The start point of a PanSensics exercise is to determine the measures that will help the system to achieve virtuous cycles of improvement. Most often this means measuring things that are traditionally viewed to be 'too difficult'. All we need to measure waiting time is a stopwatch and an Excel spreadsheet to enter the data. How on earth do we begin to measure patient experiences, or what they really felt about how they were treated by staff? Setting up things like the Family and Friends Test was a potentially valiant attempt, but as soon as we turn the input into numbers we just threw away the only potentially actionable knowledge content. The only way to meaningfully establish patient experience is through qualitative, narrative content, captured in an unbiased fashion.

Capturing and manipulating numbers and quantified data is easy. Making sense of qualitative, narrative information is not something that Excel is going to do for any of us

any time soon. PanSensic analysis, on the other hand, is all about making sense of narrative inputs. Here's a typical result of a live dashboard analysis of patient opinions across, to date, 157 of the UK's hospitals:

X Axis -Patients view of staff attitude
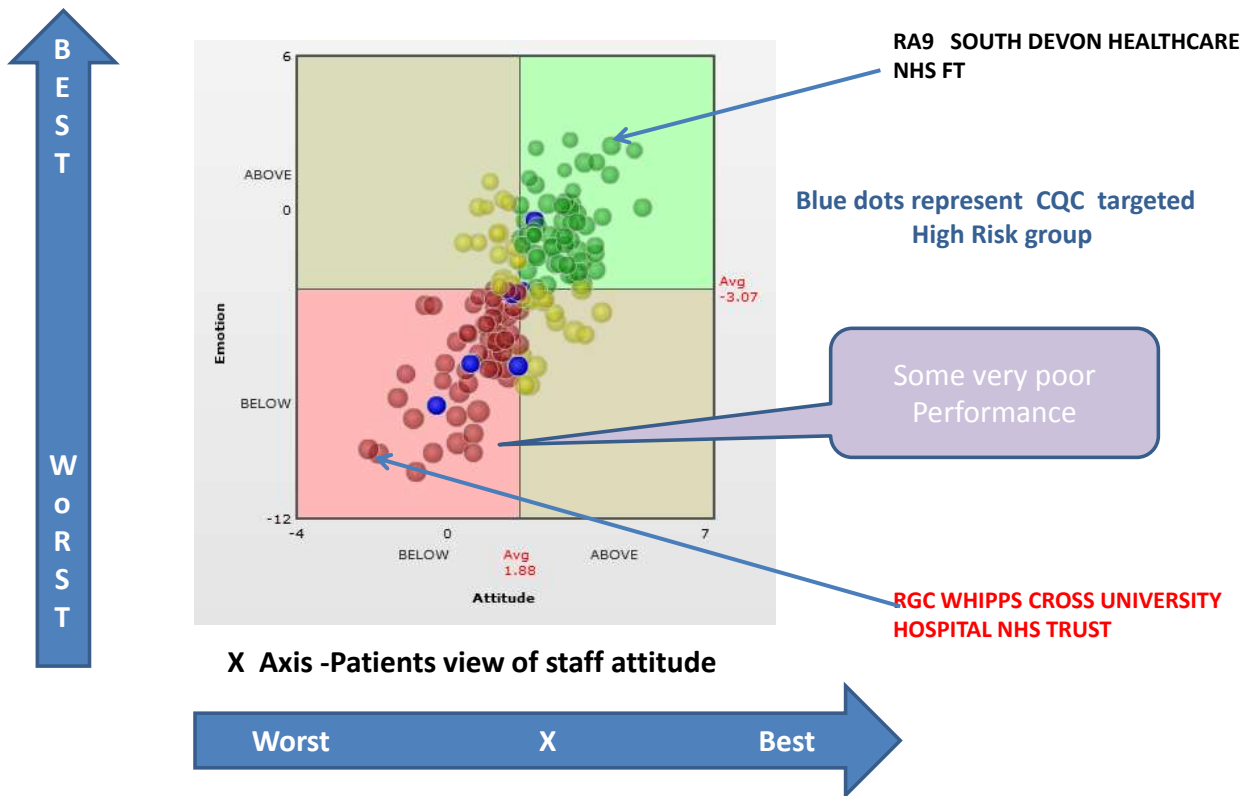
This kind of analysis comes through scraping tens of thousands of patient opinions in order to extract meaningful emotion and attitude content. Our start point is this kind of narrative data, readily available through several on-line sources in the UK (people seem to love talking about their NHS experiences!):

ys) if a complaint is made and ones that refuse to make a drink during the night when asked by an elderly person anything else? disgusted at the dishonest and unproffesional assessments that are made by senior nursing staff so that they can discharge elderly patients and thus deprive them of their legal enti	Offensive
on who never complains or has ever found the need to write regarding a poor experience before i was so dejected, annoyed and disrespected by alledgely one of the senior team i felt i had to put my experience in writing to prevent more vulnerable and elderly patients being sujected to such disgusting treatment i	Offensive
al hospital number and then extension to change this appointment, i spoke to the rudest man he certainly should have been put on a course on how to speak politely to the public and even suggested that i was out of order going on holiday as my follow up appointment was very important i told him that i was not cancelling	Offensive
sister was in shock anything else? the overall level of care was appalling, most of the staff didn't seem to care what we needed and were insensitive & very rude it seems that to get anything done you have to ask several times before anyone even listens & threaten not to leave if you are to be s	Offensive
this hospital and can assure you where choice allows me, it will definitely be my last consultants are not prima donna's and need to learn how to speak to people in a caring, sympathetic and respectful manner if the consultant had taken the time to ask the right questions, listen to what i had to say and the route cause	Offensive

What the PanSensic engine then does with this raw input is, first of all, conduct a host of weighted-keyword searches to associate a given narrative opinion to a host of different categorization tools. In the case of the above figure, it's emotion and attitude categories we're looking for, but more generally it could any of myriad others (trust, engagement, bullying, stress, authenticity, etc – Reference 1). Capturing keywords is relatively easy, the only real problems being that there are lots of them and, because humans tend to frequently talk in terms of metaphors (References 2, 3), they can be quite subtle. It has taken us several years to accumulate and build our keyword ontology and content, but even with this, the real power of PanSensic, however, only really begins to appear in the next phase of the analysis, where we make a semantic analysis to check that the keyword makes contextual sense. Thus, if a person uses the word 'arrogant', it is important to know *who* is the subject of the expression before being able to draw a conclusion that the comment is relevant to a given analysis.

After that, we still need to make an assessment of whether the comment is being expressed for genuine or ulterior reasons. The bane of the market analyst's life is eliciting information from consumers only to find that what's been said bears little if any connection to actual behavior. People will often tell you they love your new (say) shampoo, but that usually has no causal link at all to whether they will spend their hard-earned money on it next time they're in the supermarket. Paraphrasing the words of J.P. Morgan, people say things for both good reasons and real reasons. There might be a good reason a patient labeled a clinician as arrogant, but it's only the real reasons they did so that will drive their attitudes and therefore future behavior. Developing this kind of 'real-reason' contextual relevance engine is where the PanSensic capability really begins to deliver uniquely powerful value to users.

Being the most difficult part of the PanSensic challenge, this contextual relevance algorithm has been the subject of the longest period of validation. As might be expected, it is still not 100% accurate, but the latest version of the tool has just crossed the 90% barrier for the kind of general, un-controlled patient opinion data source we've used for the sample analysis here. When we're able to work with a client to design better questions (general rule: the more we can elicit metaphor-rich, story-like narrative, the more accurate the PanSensic analysis results will be), we can typically raise the accuracy of the analysis to the mid to high 90s percentage-wise (Reference 4).

Here's what the overall PanSensic algorithm structure looks like:
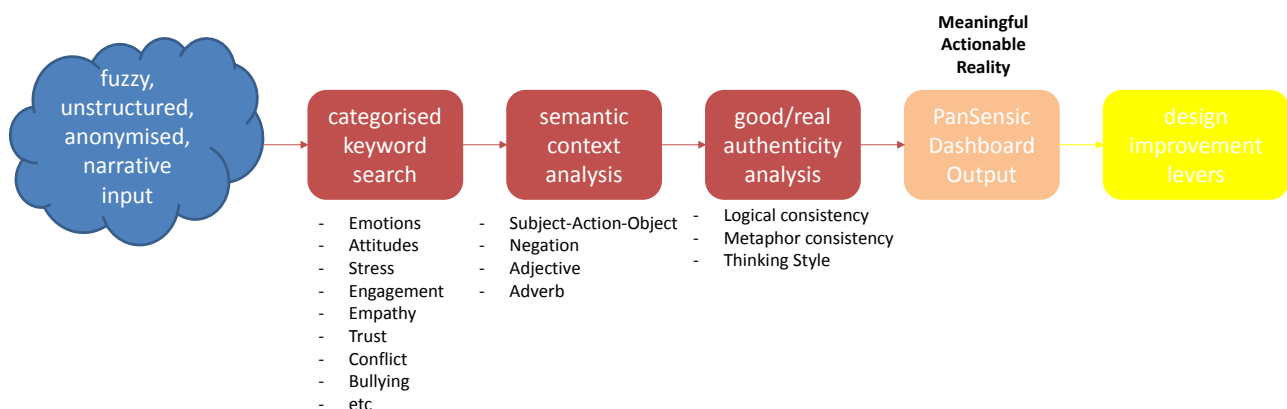
The model reached its current form through a multi-year series of validation activities initially within the FMCG domain. For FMCG organisations, who have all lived for some time now in a highly competitive world in which one product offering is almost identical to

any other, the difference between understanding the sometimes enormously subtle cues that determine whether a consumer picks your product off a supermarket shelf or your competitors has meant that they have had to devote tremendous effort to solving the good-reason/real-reason authenticity problem. They have the most extreme version of the good//real mismatch and hence have had the greatest motivation to solve it. Getting the analysis 90% right or 95% right is the difference in their world between a failed product launch and their next billion-dollar brand.

In their world, too, the only true validation of the process comes through actual value-generating success stories. It is one thing to measure the right things and measure them in the right way, still another to act on the findings to design a new product or new way of messaging that product. This, then, is where the real PanSensic validation happens: can the dashboards be connected to the levers that will then allow the performance of the system to be improved? Based on the delivery over the past decade of several billion dollars of new value for organisations and creation of an overarching sense-design-respond methodology (Reference 5), the early answer would appear to be 'yes'.

The good news for the NHS and other domains is that, now the capability exists, it doesn't have to be re-invented. As such, PanSensics offers the Service an unprecedented opportunity to leverage from the hard work of others that have walked the same meaningful-measurement path already. And in so doing to answer one of the most challenging findings of the recent Keogh Report: *"This review found that providers and commissioners are struggling to understand and take full advantage of the enormous and very rich set of data available on quality"*

PanSensics: Reality. Insight. Meaning.

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1) Mann, D.L., Howarth, P., 'PanSensics: Measuring What's Important Rather Than What's Easy', SI White Paper Series, www.systematic-innovation.com
2) Geary, J., 'I Is An Other: The Secret Life Of Metaphor And How It Shapes The Way We See The World', Harper, 2011.
3) Mann, D.L., Howarth, P., 'Jupiter$^\mu$: Closing The Say/Do Gap', SI White Paper Series, www.systematic-innovation.com
4) Mann, D.L., 'PanSensics: Measuring What's Important Rather Than What's Easy', keynote address at Hargraves Institute Annual Conference, Sydney, March 2013.
5) Mann, D.L., Özözer, Y., 'TrenDNA: Understanding Populations Better Than They Understand Themselves', IFR Press, 2009.

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Quite Funny – Re-Purposing Road Signs

The often mis-understood meaning of Inventive Principle 35, Parameter Changes is that it is rather than being about optimizing a system, it is about changing a parameter to create some kind of step-change. Graffiti artists of the world seem to understand the concept rather better than a lot of TRIZ users. Here are a few of our favourite examples of the art of making subtle parameter changes to road signs in order to give them a whole different meaning. A fairly common re-purposing of a no-entry sign to begin:

Slightly more subtle, on a more, err, spiritual theme:

I've also got a bit of a soft spot for this next pair, proving that pedestrians can play the game too:

Here's my favourite from, well, you guess where:

And on a kind of similar theme, I wish I'd been a fly on the wall when this one went live:

Or maybe politics and philosophy:

Or, finally, my favourite:

Patent of the Month - Switchable Solvents

Patent of the month this month takes a subtle shift away from what's become our normal focus on inventions that solve good contradictions, and how they do (or don't) fit the Contradiction Matrix. That said, US8,513,464, granted to a clutch of inventors at Georgia Tech and Queens University, Kingston, California, on August 20, is very clearly also about contradiction solving. The title perhaps gives the game away a little bit: we want a solvent and we don't want a solvent:

Here's what the inventors have to say about why there is a need for a switchable solvent:

Conventional solvents have fixed physical properties which can lead to significant limitations in their use as media for reactions and separations. Many chemical production processes involve multiple steps such as reaction, separation, extraction and/or dissolution, and often the type of solvent that is optimal for any one step is different from that which is optimal for the next step. Thus it is common for the solvent to be removed after each step and a new solvent added in preparation for the next step. This removal and replacement greatly adds to the economic cost and environmental impact of such processes. Therefore, there exists a need for a solvent that can change its physical properties.

Solvents are commonly used to dissolve material in manufacturing, cleaning, dyeing, extracting, and other processes. In order for a solvent to dissolve a material quickly, selectively, and in sufficient quantity, it is usually necessary for the solvent to have particular physical properties. Examples of such properties include dielectric constant, polarizability, acidity, basicity, viscosity, volatility, hydrogen-bond donating ability, hydrogen-bond accepting ability and polarity. At some point in such a process after the dissolution, separation of the material from the solvent may be desired. Such a separation can be expensive to achieve, especially if the solvent is nonvolatile as is commonly the case for polar solvents.

Moderate changes in temperature and pressure cannot be used as a method for dramatically changing solvent properties as they cause only minor changes in a conventional solvent's physical properties. Some high-pressure fluids can be continuously and reversibly changed by variations in pressure. Examples include supercritical fluids such as CHF.sub.3 (Jessop, 1999), and CO.sub.2-expanded liquids such as subcritical mixtures of CO.sub.2 and organic liquid (Subramaniam, 2002). A disadvantage of such fluids or liquids is the pressure required (greater than 25 bar and often greater than 50 bar) causes added expense, inconvenience and risk.

There is a need for liquids that are able to switch by application of a trigger from one form with a first set of physical properties to another form with a second and different set of physical properties.

And here's what the problem looks like using our contradiction mapping template:

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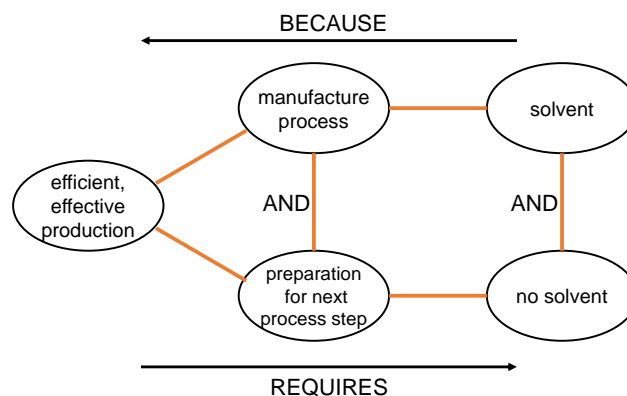
Mapping the contradiction onto the Matrix is easiest if we look up the conflict pair at the centre of the template. Here's what we get when we do that:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Manufacturability (41)

WORSENING PARAMETERS YOU HAVE SELECTED:

Loss of Substance (25) and Compatibility/Connectivity (33)

SUGGESTED INVENTIVE PRINCIPLES:

2, 13, 15, 19, 28, 34, 3, 33, 9, 6, 24, 12

That we get Principle 15, Dynamics, as a strong recommendation leads us to the fairly obvious conclusion that we make a solvent that is able to adapt its properties. One of those occasional situations where the Matrix gives us the right direction, but almost no practical help when it comes to the important matter of working out precisely *how* to make the solvent adapt it's behavior.

Ditto when we see the presence of Principle 24, Intermediary. Sure, it tells us that we might be able to solve the problem by adding something – some kind of trigger for example – to initiate the change in properties, but again, in the mysterious world of chemistry, knowing precisely what kind of intermediary to use is still a long way away.

That the inventors used carbon dioxide:

The trigger to change from neutral form to charged form may be exposure of the neutral form to CO_2, CS_2, or COS. Given its convenience, CO_2 is especially preferred. In preferred embodiments, solvents of the invention are not only switchable, but reversibly so, and removal of the trigger, e.g., removing CO_2, causes the charged form to switch to the neutral form.

Required them to possess a level of domain knowledge that TRIZ and the 40 Inventive Principles will likely never possess. In fact, the patent is much better seen as an example of what might best be thought of as a chemistry version of the Function Database: CO_2 now being discovered to affect the desired solvent/non-solvent transition in the base solvent material.

The main point, of course, is that now the invention has been made, it offers up a rather wonderful way to re-think how chemists think about getting solvents in and out of their processes. It hopefully offers some comfort that contemplating the 'impossible' – make the solvent get itself out of the process – is now actually very possible indeed. All in all, great testament to the importance of, if any problem is indeed solvable, defining a problem big enough to provoke some real step-change thinking.
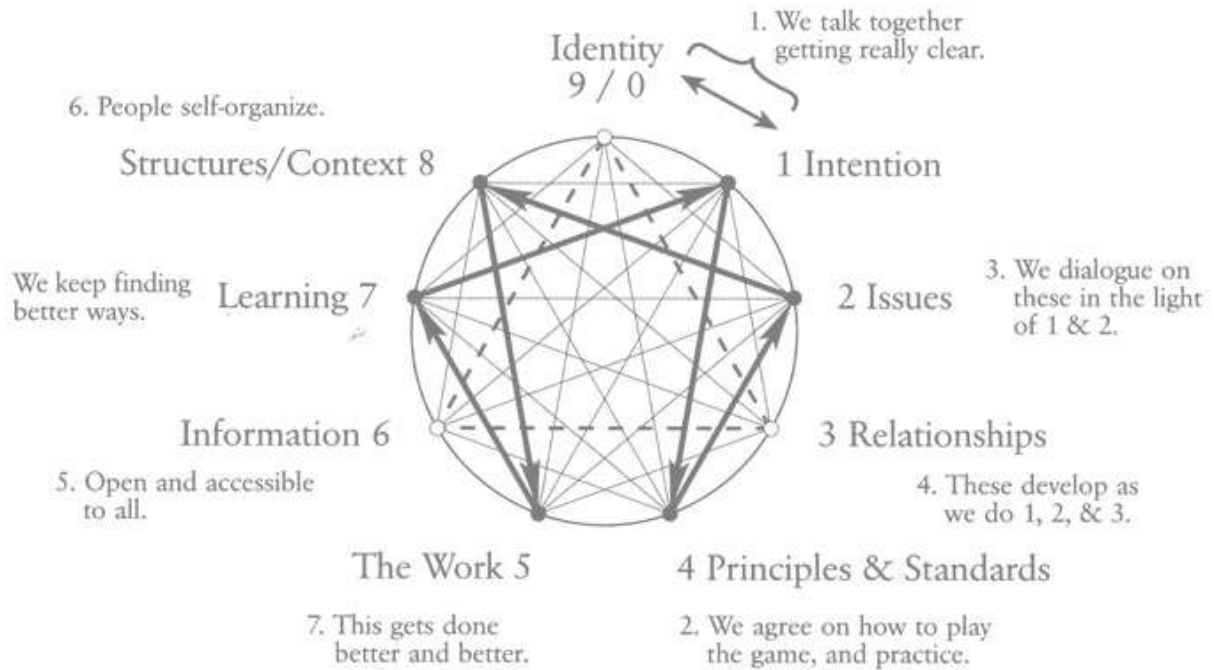
Best of the Month – The Leadership Dance
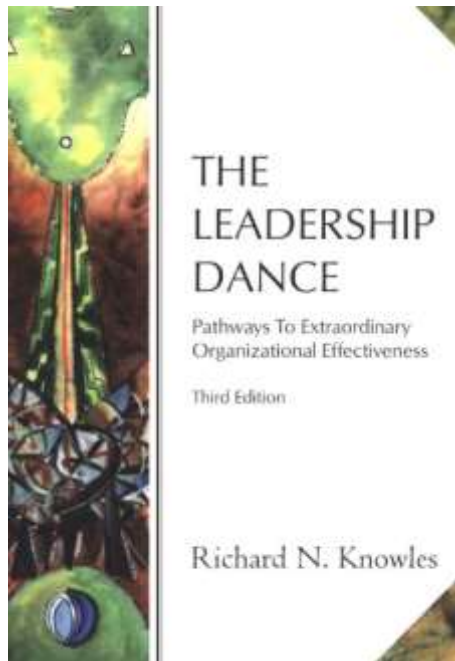
If you don't know of Dick Knowles, you probably need to. If you're interested in the seemingly lost art of leadership, and complex systems, not pushing rivers, and self-organising systems, you really have no choice. 'The Leadership Dance' tells the story of Knowles' personal journey in learning how to lead more effectively in our turbulent, unpredictable world. The newly discovered processes and models presented in this book, first published in 2002, are convincingly shown to apply to leadership tasks at all levels in the organization. Knowles spent the first 37 year chunk of his career climbing the corporate ladder in DuPont, a place where he delivered sustainable improvements in effectiveness of over 30 per cent. At its core the book is about the flow of energy and creativity inside organisations.

In the book, he introduces and describes his creation and development of the Process Enneagram(C) which, skeptical as some people might become as soon as they see the enneagram symbol, seems to be the missing link between complexity theory and practical application. In Knowles' hands, it becomes a rather unique tool that simultaneously helps people to solve complex problems, build the social connections they need to do the work and releases the emotional energy and commitment to do the work quickly and well.

Somewhat unusually, the first 70 pages of the book consist of a Foreword, 'The Story of the Journey'. Anyone tempted to bypass this and get to the real meat of the book (and it does contain a lot of real-world, real case-study meat), will miss out on a rare treat in the world of business books, a person that actually knows how to write compelling literature.

Never less than a joy, the main reason for recommending the book is that it's not necessary to agree with everything that Knowles writes in order to come away with a lot of food for thought. That he 'gets' the parallel concepts of evolution towards an ideal and of contradictions and the need for leaders to address and eliminate them should make the decision to get hold of a copy even easier for anyone interested in TRIZ and SI.

Identity
9 / 0

1. We talk together getting really clear.

6. People self-organize.

Structures/Context 8

1 Intention

We keep finding better ways.

Learning 7

2 Issues

3. We dialogue on these in the light of 1 & 2.

Information 6

3 Relationships

5. Open and accessible to all.

The Work 5

4 Principles & Standards

7. This gets done better and better.

4. These develop as we do 1, 2, & 3.

2. We agree on how to play the game, and practice.

If you need further persuading, a large part of the 'theory' part of the book is available on-line and for free. Check it out here - http://worldbusiness.org/wp-content/uploads/2013/06/pr082406.pdf - then do the right thing by takinge the plunge and purchasing a copy of the whole thing. Or indeed, pretty much anything else Knowles has produced. Aah, the sweet smell of books full of genuinely inspiring content.

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Investments – Oxygen Sponge
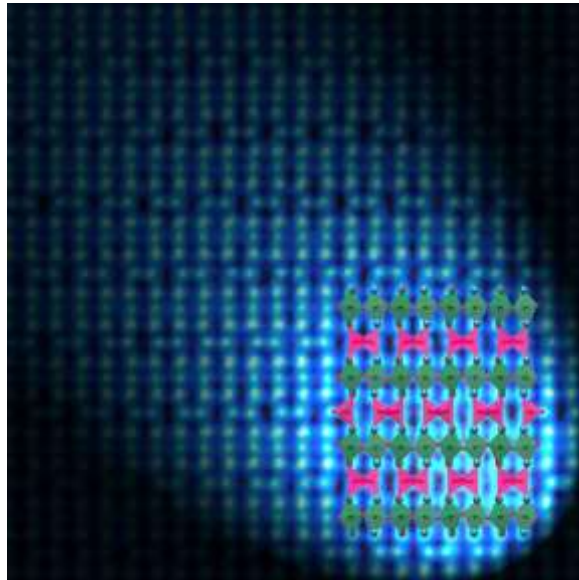
Scientists at the Department of Energy's Oak Ridge National Laboratory have developed a new oxygen "sponge" that can easily absorb or shed oxygen atoms at low temperatures. Materials with these novel characteristics would be useful in devices such as rechargeable batteries, sensors, gas converters and fuel cells.

Materials containing atoms that can switch back and forth between multiple oxidation states are technologically important but very rare in nature, says ORNL's Ho Nyung Lee, who led the international research team that published its findings in this month's *Nature Materials*.

"Typically, most elements have a stable oxidation state, and they want to stay there," Lee said. "So far there aren't many known materials in which atoms are easily convertible between different valence states. We've found a chemical substance that can reversibly change between phases at rather low temperatures without deteriorating, which is a very intriguing phenomenon."

Many energy storage and sensor devices rely on this valence-switching trick, known as a reduction-oxidation or "redox" reaction. For instance, catalytic gas converters use platinum-based metals to transform harmful emissions such as carbon monoxide into nontoxic gases by adding oxygen. Less expensive oxide-based alternatives to platinum usually require very high temperatures -- at least 600 to 700 degrees Celsius -- to trigger the redox reactions, making such materials impractical in conventional applications.

"We show that our multivalent oxygen sponges can undergo such a redox process at as low as 200 degrees Celsius, which is comparable to the working temperature of noble metal catalysts," Lee said. "Granted, our material is not coming to your car tomorrow, but this discovery shows that multivalent oxides can play a pivotal role in future energy technologies."

The team's material consists of strontium cobaltite, which is known to occur in a preferred crystalline form called brownmillerite. Through an epitaxial stabilization process, the

ORNL-led team discovered a new recipe to synthesize the material in a more desirable phase known as perovskite. The researchers have filed an invention disclosure on their findings.

"These two phases have very distinct physical properties," Lee said. "One is a metal, the other is an insulator. One responds to magnetic fields, the other does not -- and we can make it switch back and forth within a second at significantly reduced temperatures." The international team's design and testing of this novel advanced material from scratch required multidisciplinary expertise and sophisticated tools from such places as Argonne National Laboratory and ORNL, including Argonne's Advanced Photon Source and ORNL's Center for Nanophase Materials Science, says Lee.

"As we showed in this study, only through the study of a well-defined system can we build a framework for the design of next generation energy materials," said co-author John Freeland of Argonne. "This insight was made possible by merging the capabilities at Oak Ridge and Argonne national labs for advanced synthesis and characterization of novel materials."

Get the full story at:
Hyoungjeen Jeen, Woo Seok Choi, Michael D. Biegalski, Chad M. Folkman, I-Cheng Tung, Dillon D. Fong, John W. Freeland, Dongwon Shin, Hiromichi Ohta, Matthew F. Chisholm, Ho Nyung Lee. Reversible redox reactions in an epitaxially stabilized $SrCoO_x$ oxygen sponge. *Nature Materials*, 2013; **DOI: 10.1038/nmat3736**

Generational Cycles – Milky Way

Advertising to alienated Generation X Nomads is one of the most difficult challenges the advertising industry has to face out of all of the different generational archetypes. Which is a problem since people in their 20s and 30s are potentially a very lucrative sector of the market.

Right at the heart of the Nomad DNA is 'not selling out', and so when an advertiser tells a Nomad to go and buy something, especially if it is a big, evil MNC, they are very likely to reject the message. Even if what's being advertised is a perfect fit. For non-Nomads reading this, one way of thinking about the Nomads is the 'cutting our noses off to spite our faces' generation.

The reaction of some advertisers to this unfortunate trait has been to essentially give up and focus attentions on other generations.

That's one way of looking at the world. Another would be to examine the MNCs that have managed to pull of the seemingly impossible. Pretty near the top of the heap, was Volkswagen back at the turn of the century. Their 'Milky Way' TV advert for the Golf Cabriolet has become a classic. Even a rival shop called the spot perfection.

Before reading further, you might like to go and take a look at the ad. Just do a Google search on 'Milky Way VW' and you'll find it pretty easily.

Let's walk through the advert and try and pick out some of the reasons it managed to work so well with the Nomad audience:

Opening scene: late at night (important Nomad point 1), full moon, four not-so-attractive (important Nomad point 2), twenty-something adults driving along in their car. The roof is down and they're all sitting in silence (point 3), clearly enjoying the ride. The soundtrack playing in the background is Nick Drake's lost classic track, 'Pink Moon' (point 4 – see our previous article on this artist in e-zine issue 69). The group arrives at their destination, a cool-looking party, full of what look like similar, everyday twenty-somethings. The car pulls up, the four people look at each other and, again without any words spoken, the girl sitting next to the driver pulls an extremely subtle face (point 5) that prompts him to put the car in

reverse and head the four of them back out onto the highway to continue their night ride (point 6 – and punch-line of the ad, sometimes being alone-together is better than even the best party).

The camera pans and zooms out and the ad ends with the almost black scene fading to black, and a final shot says, 'Drivers wanted' (point 7 – explicit pull rather than sales push).

Throughout the whole advert, there are no voice-overs, no words, just the lyrics of Nick Drake's song

The advert won just about all of the prestigious advertising industry award that year. It also essentially reinvented the brand in the U.S, eventually turning into a whole series of similarly downbeat, humorously-skeptical, low-key masterpieces, including a particularly famous billboard for the New Beetle featuring the headline, "Helloooo, rich hippies!" (point 8 – make an occasional sly prod at the previous (sell-out) generation)

Next month: how to advertise to older Nomads, entering the 'pragmatic' phase of their lives.

Biology – Sycamore Seed

The main function of a tree (as far as other trees are concerned at least) is to make other trees. Trees tend to be about as immobile as it is possible for nature to be, and so making other trees that don't end up being too close to the current tree when they grow is something of a challenge. One of the most frequently used seed-spreading strategies evolved by trees have used other, more mobile, forms of nature as intermediaries: make a tasty fruit that someone will come along and eat, and have them deposit the seeds hidden within that fruit, along with some very useful accompanying fertilizer, and, hey presto, new tree.

The only problem is that growing tasty fruit around your seeds is a very expensive use of resources. Which in turn makes for an intriguing contradiction: how to disperse seeds a long way away from your current location, without consuming excessive material resources. Here's what the Contradiction Matrix has to say about this type of problem:

IMPROVING PARAMETERS YOU HAVE SELECTED:
Length/Angle of Stationary Object (4)
WORSENING PARAMETERS YOU HAVE SELECTED:
Amount of Substance (10)
SUGGESTED INVENTIVE PRINCIPLES:
4, 3, 31, 25, 17, 14

The sycamore tree has evolved a 'self-service' (Principle 25: make use of waste resources) solution to the problem by, first of all deploying gravity and aerodynamics: make a glider that will cause seeds dispatched from the top of the tree to glide as far away from the tree as possible. But then gliders have two wings, so why not design an asymmetric (Principle 4) glider that only needs one and turn the glider into a kind of helicopter:

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If by any chance you haven't seen a sycamore seed fly, you might like to check out YouTube. I suspect most people have. Which then brings into play another 'use of waste resources': fascinated small children that pick up sycamore seeds and spend their day watching them fly… most likely, further and further away from where they came.

Short Thort

"That all opposites—such as mass and energy, subject and object, life and death—are so much each other that they are perfectly inseparable, still strikes most of us as hard to believe. But this is only because we accept as real the boundary line between the opposites. It is, recall, the boundaries themselves which create the seeming existence of separate opposites. To put it plainly, to say that "ultimate reality is a unity of opposites" is actually to say that in ultimate reality there are no boundaries. Anywhere."
Ken Wilber
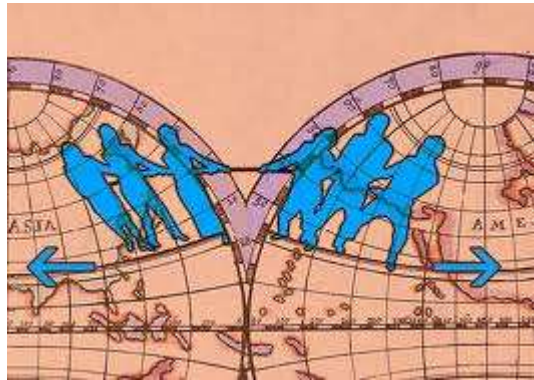
'When I define polarities in my work, I actually create the space between things. I point to the question I am actually interested in, without naming it.'
Alva Noto

News

Agilia
Just when you thought no-one in Europe was interested in applying TRIZ/SI in the IT world, we get an invite to keynote and conduct two one-day workshops at next year's Agile conference in Brno in the Czech Republic. 25-28 March are the dates for anyone interested in joining the 400 other participants usually drawn to the event. The conference website is www.agiliaconference.com.

Australia
Darrell's next trip to Australia looks like it will be 28 October to 12 November. Two-thirds of the dates already look like they're committed to client work, but anyone interested in reserving the available dates should contact Darrell directly… Speaking of Australia, it looks like we'll be at the 2014 Hargraves conference, doing a special session on Step-Change Commercialisation. More details on that one as soon as the conference website goes live next month.

UK TRIZ Forum
True to form, the late-July deadline for people to submit titles for the 1 November event sailed on by with barely one response. Good to know that the cat-herding traits of TRIZ/SI practitioners continues. Unless your name is Cara that is, the person tasked with

organizing the event. For the sake of her sanity, authors are politely requested to do the necessary. Preferably within an hour of reading this. Thanks in anticipation.

Projects
Perhaps an emerging sign in the innovation tsunami the world supposed to be caught in the middle of, we find ourselves with progressively more prospective new clients who don't want to learn about innovation tools or methods or capabilities, they 'just want the answer'. In some cases this means inventing to order. In others it's become 'give me *any* new product'. With that in mind, we have recently taken some of our own inventions off the shelf they've been sitting on for a couple of years now, and begun to put in place commercialization teams and projects to take advantage of the external funding they seem increasingly able to attract. With that in mind, we're interested in hearing from experienced project engineers and managers comfortable working in the inherent uncertainties and frustrations that form part of the innovation commercialization world.

New Projects
This month's new projects from around the Network:
> Government – ICMM study
> Automotive – SI mentoring programme
> Healthcare – TrenDNA workshop series
> Healthcare – PanSensic study
> FMCG – PanSensic study
> Oil & Gas – SI workshop series
> Medical Devices – PanSensic project
> Utilities – SI workshops
> Construction – Long-term strategic planning project
> Aerospace – Leadership & Innovation workshops

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