Systematic Innovation

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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

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The Resilience Zone

At the end of last month, I published a blog article regarding, what I think is a better way of mapping complexity (Reference 1). It was a bit of a strawman. Something I thought might burn on exposure to the outside world. But so far it seems to have stayed somewhat flameproof, and hence now creates an opportunity to explore it a little more broadly. I thought what I’d do here is look at, probably the most important zone on the Landscape, the place where organisations, and especially innovation teams need to be in order to ensure that they have a chance of success in their endeavours. Here’s the Complexity Landscape model I ended the first blog article with:

Probably easiest to read the blog article if you want to know all the details regarding why the axes look like they do, and why the various different segments of the picture are labelled the way they are. In summary, though, the basic overall idea is to map the manner in which a system is being managed relative to its surrounding environment. This might mean, for example, a ‘system’ comprising a team of individuals working within a larger organisation, where the rest of the larger organisation is the ‘external environment’, or the ‘system’ could be the entire organisation, such that the external environment becomes the world beyond the boundaries of the organisation.

The four different segments of the vertical axis – chaotic, simple, complicated and complex – then relate to the four different strategies used to manage and coordinate whatever ‘system’ we are focusing on, and the four different segments of the horizontal axis represent the same four ways of segmenting the surrounding environment.

The most important line on the Landscape is what I labelled the ‘Ashby Line’. This line is named after the father of cybernetics and the person who gave the world Ashby’s Law of Requisite Variety. Which, to paraphrase slightly, states that the variety present in the system must be greater than the corresponding variety in the external environment if the
system is to survive. The way the Landscape is drawn, an organisation operating above the Line satisfies Ashby’s Law, and one operating below the line doesn’t. The region above the line, therefore, becomes the ‘Resilience Zone’. This is the Zone that organisations need to be operating within if they are to be sustainably successful.

Hopefully, so far so good: organisations need to look at the complexity of their environment and make sure they possess a greater level of complexity management capability. What makes this difficult in real life are two big forces. Building slightly on the description I gave in the blog article, these two forces are:

Firstly, serving to cause the level of complexity in the external environment to increase are the effects of globalization and, more generally, the 2nd Law Of Thermodynamics which, crudely speaking says that the level of disorder and randomness of life, the universe and everything goes up over time. Or, almost, disorder tends to increase, but only so far as the so-called ‘edge of chaos’:

Whenever chaos occurs, it tends to be sufficiently unstable that ‘some’ sort of order emerges. Tornadoes and other extreme (chaotic) forms of weather, for example, don’t last.
for ever. And neither do wars. And, though it might not feel like it at the moment if you live in the UK, neither will the chaos of Brexit.

The second force could be thought of as the F.W.Taylor Law Of Efficient Working. Since Taylor began studying ‘work’ and how to do it more efficiently, ‘standardisation’ as become the main modus operandi of nearly every enterprise on the planet. Standardisation is great for achieving economies of scale. Standardised operations are much more amenable to automation, and, if we can’t automate, we can at least break tasks down to small enough chunks that it becomes possible to rapidly train an unqualified person to do them. Unqualified people generally being cheaper to employ than qualified ones.

Whether ‘standardisation’ is a natural force or merely one that Taylor’s well-intentioned but nevertheless blinkered way of thinking has instilled deeply enough that most managers think it is natural, the overall effect is that when enterprises allow themselves to move in this ‘natural’ direction, they make themselves very vulnerable to crossing the Ashby Line in the wrong direction.

If ‘nature’ causes systems to veer in the direction of failure, that means enterprises need to deploy conscious strategies to ensure that they stay on the right side of the Line. Again, these fall into two basic categories: things we do inside the system to enable complexity to be accommodated and embraced, and things we do to manipulate the external environment and/or our relationship with it:

(Looking at the vertical arrow, I’m struck by how nearly everything described by W. Edwards Deming in his ‘Fourteen Points For Management’ is consistent with what organisations need to do in order to better embrace the inherent complexities of having humans working in organisations – Reference 2. Not that there can be such a thing as a playbook when it comes to managing complexity, but if there was, Deming’s fourteen points would be somewhere close to it.)

One of the measures we’re in the process of establishing at the moment is what we’re thinking of as an organisation (or team within a larger organisation) ‘Ashby Margin’. At the
moment, the scale we’re looking at goes from -1 to 1. An organisation scoring ‘0’ is one that is sitting right on the Ashby Line. A positive score means they’re in the Resilience Zone, and a negative score means they’re vulnerable to failure. A score of -1 means they sit right on the Disintegration Line, and are in danger of falling in to imminent chaos. Our current suspicion is that there are presently more organisations operating with a negative Ashby Margin than there are those with a positive score. More on that front, no doubt, as we finalise how best to (automate) the measurement procedure.

In the meantime, let’s have a quick look at one or two examples of successful businesses and how their position on the Landscape enabled that success. I thought I’d use the automotive industry as my foundation, since I think that it’s the industry where some of the innovations that have taken place are already well known, and hence will ideally allow readers to focus on how they help explain the different portions of the Resilience Zone.

Let’s start with Henry Ford and the Model-T Ford. The Model-T was the first mass-produced car in the world. From 1908, when the first model was launched, through to 1927 when production ceased, the Model T was quite literally the ‘machine that changed the world.

The initial Ford story represents a classic example of an enterprise operating above the Ashby Line in the Simple-Simple domain. Ford took advantage of F.W. Taylor’s thinking about simplification and standardization of work, and at the same time was able to eliminate all of the complexity of the market by, a) making available a completely new step-change mode of transport to customers, and, b) saying to them things like, ‘any colour you like as long as it’s black’ (why black? Answer because this was the paint colour that dried the fastest, and so was the most time-saving). The market, in other words, did things Ford’s way, not the other way around.

This strategy worked for a while. But then Alfred P. Sloan at General Motors wondered if customers might want colours other than black. GM decided it was incumbent upon them to serve customers who were becoming increasingly sophisticated, by offering them a broad range of options and choices. The company achieved this by essentially throwing lots of money at the problem, creating multiple different brands to serve different type of customer, and lots of different factories, with some scope to design and manufacture.
vehicles that best suited their own chosen market niche. Alfred P, Sloan’s GM effectively moved to the Complicated-Complicated zone on the Complexity Landscape:

GM’s innovation, naturally, prompted all the other car manufacturers to move into the same domain. By the late 1920s there were close to 200 different car manufacturers operating in the market. Many of them, because GM had opened the dangerous door marked ‘the customer is always right’, were forced to adapt to the inevitable complications that came with fickle humans. The car industry became great optimisers, doing the best they could to offer customers as many different options as possible, while still being able to mass-manufacture with a workforce that was as unskilled as possible.

Give workers mind-numbing jobs for long enough, however, and its only a matter of time before customers begin to suffer the consequences. This is okay when their expectations – e.g. with things like reliability – are low, but over time, these expectations inevitably drift upwards and so it became incumbent upon the car companies to add things like quality, reliability, and life into their complicated economic calculations. It was only when Toyota hit their stride and established the Toyota Production System, however, that customers really began to experience a step-change. Mind-numbing dull work turns out not to be a great foundation for building reliable, long-lasting cars. In many ways what TPS was set up to do was instill the idea of ‘continuous improvement’ into the DNA of the business, and actively seek the brains of all the workforce to help make sure it happens. TPS effectively forced the car industry to do this:
Treat work-ers like they have a brain and empower them to implement the ideas that get generated within local ‘quality circles’ and you’ve crossed in to the Complicated-Complex Zone. Every automotive OEM has to some extent adopted TPS like procedures and protocols, but not all of them have genuinely crossed the complicated-complex boundary. Many are still hampered by command-and-control management systems that have adopted the tangible parts of TPS, but have largely failed to appreciate the importance of the intangible human emotion factors. Fortunately for those that haven’t, the automotive industry’s relation with the external world of the customer is still at the ‘complicated’ stage. Customer’s are offered lots of choice, but not yet a choice that allows them to buy anything other than a ton or more of metal and plastic. When customers begin to demand ‘mobility’ rather than a ‘car’, that’s the time the automotive OEMs will have to embrace the fact that their complicated marketing strategies no longer make sense, and that they will have to embrace a whole new level of market complexity. In that respect, we might already begin to see that the innovation of organisations like Uber, Lyft and Ola is that they’ve already made the fundamental jump into the complex market domain…

…whether they’re operating with a positive Ashby Margin is probably a matter of some debate at this point. One guarantee, however, is that whichever one of the three (or next new player) best builds the non-Command-and-Control heuristics needed to successfully operate in the Complex-Complex domain will be the one that gets to survive and thrive the longest, progressively sucking more and more of the value from the traditional automotive OEMs.

References
# Systems (Three Different Kinds)

Ask ten systems engineers to define what a system is and you'll get at least eleven answers. Worse: they're probably all correct. Worst: the differences, valid as they might be, create enormous potential confusion and as a result of this, most attempts to change 'the system' end in failure. Here are some of the more common definitions of the word:

<table>
<thead>
<tr>
<th>Definition</th>
<th>Source</th>
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<tbody>
<tr>
<td>to place together</td>
<td>Latin <em>systema</em> from Classical Greek - from <em>synistanai</em>, to place together from <em>syn-</em>, together + <em>histanai</em>, from <em>syn-</em>, together + <em>histanai</em>, <a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A set of elements in interaction</td>
<td>(Bertalanffy 1968) <a href="https://www.sebokwiki.org/wiki/">https://www.sebokwiki.org/wiki/</a></td>
</tr>
<tr>
<td>The cohesive interactions between a set of parts</td>
<td>(Hitchins 2009, 59-63) <a href="https://www.sebokwiki.org/wiki/">https://www.sebokwiki.org/wiki/</a></td>
</tr>
<tr>
<td>A system is an interconnected set of elements that is coherently organized in a way that achieves something (function or purpose)</td>
<td>(Donella Meadows, Thinking In Systems) <a href="http://donellameadows.org/systems-thinking-resources/">http://donellameadows.org/systems-thinking-resources/</a></td>
</tr>
<tr>
<td>a set of variables selected by an observer</td>
<td>(W. Ross Ashby) <a href="https://cepa.info/fulltexts/892.doc">https://cepa.info/fulltexts/892.doc</a></td>
</tr>
<tr>
<td>A viable system is any system organised in such a way as to meet the demands of surviving in the changing environment</td>
<td>(Stafford Beer) <a href="https://en.wikipedia.org/wiki/Viable_system_model">https://en.wikipedia.org/wiki/Viable_system_model</a></td>
</tr>
<tr>
<td>a multitude of interconnected elements that possesses a common property which is not reduced to the properties of these elements</td>
<td>A. Bogdanov Universal Organizational Science. Tectology. Book 1 – M., 1989. – P. 48.</td>
</tr>
<tr>
<td>A way of doing things</td>
<td><a href="https://dictionary.cambridge.org/">https://dictionary.cambridge.org/</a></td>
</tr>
<tr>
<td>a portion of the physical universe chosen for analysis. Everything outside the system is known as the environment. The environment is ignored except for its effects on the system</td>
<td><a href="https://en.wikipedia.org/wiki/Physical_system">https://en.wikipedia.org/wiki/Physical_system</a></td>
</tr>
<tr>
<td>A way of working, organizing, or doing something which follows a fixed plan or set of rules</td>
<td><a href="https://www.collinsdictionary.com/">https://www.collinsdictionary.com/</a></td>
</tr>
<tr>
<td>A set of things working together as parts of a mechanism or an interconnecting network; a complex whole</td>
<td><a href="https://en.oxforddictionaries.com/">https://en.oxforddictionaries.com/</a></td>
</tr>
<tr>
<td>A set of principles or procedures according to which something is done; an organized scheme or method</td>
<td><a href="https://www.oxforddictionaries.com/">https://www.oxforddictionaries.com/</a></td>
</tr>
<tr>
<td>A group of interacting, interrelated, or interdependent elements forming a complex whole</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>Definition</td>
<td>URL</td>
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<td>-----------------------------------------------------------------------------------------------</td>
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<tr>
<td>An organism as a whole, especially with regard to its vital processes or functions</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A group of physiologically or anatomically related organs or parts</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A group of interacting mechanical or electrical components</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A network of structures and channels, as for travel, communication or distribution</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
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<tr>
<td>A network of related computer software, hardware, and data transmission devices</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>An organized set of interrelated ideas or principles</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A social, economic, or political organisational form</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>An arrangement or configuration of classification or measurement</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>An organised and co-ordinated method; a procedure</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>A naturally occurring group of objects or phenomena</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>The prevailing social order</td>
<td><a href="https://www.yourdictionary.com/">https://www.yourdictionary.com/</a></td>
</tr>
<tr>
<td>a method or complex of methods</td>
<td><a href="https://www.collinsdictionary.com">https://www.collinsdictionary.com</a></td>
</tr>
<tr>
<td>A group or combination of interrelated, interdependent, or interacting elements forming a collective entity; a methodical or coordinated assemblage of parts, facts, concepts, etc</td>
<td><a href="https://www.collinsdictionary.com">https://www.collinsdictionary.com</a></td>
</tr>
<tr>
<td>any scheme of classification or arrangement</td>
<td><a href="https://www.collinsdictionary.com">https://www.collinsdictionary.com</a></td>
</tr>
<tr>
<td>a network of communications, transportation, or distribution</td>
<td><a href="https://www.collinsdictionary.com">https://www.collinsdictionary.com</a></td>
</tr>
<tr>
<td>orderliness; an ordered manner</td>
<td><a href="https://www.collinsdictionary.com">https://www.collinsdictionary.com</a></td>
</tr>
<tr>
<td>a particular set of actions for doing something</td>
<td><a href="https://dictionary.cambridge.org">https://dictionary.cambridge.org</a></td>
</tr>
<tr>
<td>a group of organizations that work together for a particular purpose, or have similar activities</td>
<td><a href="https://dictionary.cambridge.org">https://dictionary.cambridge.org</a></td>
</tr>
<tr>
<td>An organized, purposeful structure that consists of interrelated and interdependent elements (components, entities, factors, members, parts etc.)</td>
<td><a href="http://www.businessdictionary.com/">www.businessdictionary.com/</a></td>
</tr>
<tr>
<td>A set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem</td>
<td><a href="http://www.businessdictionary.com/">www.businessdictionary.com/</a></td>
</tr>
</tbody>
</table>

From a TRIZ perspective, strange as it might seem, founder, Genrich Altshuller does not give a definition of systems. His focus, of course, was the “Technical System”. It becomes clear from the context of his descriptions of technical systems that he means some system...
pertaining to technology and technical objects. The three laws formulated by Altshuller then give an indirect definition of what a Technical System is:
1. The law of completeness of system's parts.
2. The law of “energy conductance” of a system.
3. The law of coordination of system parts ('similar to an orchestra, to a sports team and is good when all “parties” plays organically, harmoniously')

From our perspective – where there’s a certain sense of guilt that we’ve also never really taken the time to offer up a definitive definition – the simplest way to define what a system is would look something like:

\[ \text{A collection of elements that do something} \]

or

\[ \text{A collection of elements that effect change} \]

When we then take into account the complexities of the world, taking up Altshuller’s lead, we can clarify these definitions further by taking into account the idea of a ‘minimum’ system. In fairness to Altshuller and team, at this point, it is worth noting that mankind’s knowledge of complex systems was somewhat limited when the original TRIZ research was being undertaken. Most ‘technical systems’ in the 1950s and 60s were what we might today think of as ‘complicated’ rather than ‘complex’. Today, by contrast, we experience complexity almost everywhere we go, and it is rare to encounter problems that are anything but complex. The moment we cross the line from complicated and enter the realm of complex, we need to think about three distinctly different kinds of system.

**System 1 – ‘Controlled’**

Let this first type of system be the ‘collection of elements that do something’… ‘useful and in a coordinated fashion’. i.e. the sort of system that we are able to design in order to achieve a desired useful outcome. This is the sort of ‘system’ that, when we are designing it, needs to follow the rules described by the modern form of the Law Of System Completeness:

This is the picture we use almost all the time when we’re talking about systems, and as such probably doesn’t merit any further discussion here. In that, if we know we have a requirement to achieve a desired, useful outcome – like for example, ‘educate children’ – then we know that we’re only going to be able to have a hope of delivering those outcomes if each of the six minimum elements are present.

**System 2 – ‘Uncontrolled’**

Oftentimes, when we design a ‘controlled’ system (i.e. System 1) that is expected to operate in a complex environment, in addition to delivering the useful outcomes we desired to achieve, we also find ourselves with a number of unexpected non-useful

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outcomes. We might, for example, set up an education system and find that, while it does serve to educate children, we also end up with a highly undesirable situation where there is a substantial achievement gap. Nobody designed the system with the intention of creating this gap, but we got one anyway. The fact that an outcome was produced, however – and this is a critical idea if we’re to actually solve the problems created as a result of these kinds of unexpected outcome – means that it was produced by ‘a system’. A system that we might think of as ‘uncontrolled’. Which in turn is a system that looks like this:

\[
\begin{array}{cccc}
\text{Engine} & \text{Transmission} & \text{Tool} & \text{Interface}
\end{array}
\]

Per what the S-Field part of TRIZ tells us, the minimum requirement to achieve a function is two substances and a ‘field’. If we stick with the Law Of System Completeness block diagram, we can see that the two ‘substances’ are the Tool and the Interface, and the ‘Field’ is the ‘Engine’. The ‘engine’, however, only gets to do its job if there is a ‘Transmission’ to connect the source of energy to the tool.

What’s missing from this ‘uncontrolled’ system are the Coordination and Sensor elements. The two things that are required in order to ensure that we obtain good outcomes and not bad ones. This is not to say that a system without Coordination or Sensor can’t generate useful outcomes, but rather that we have no control over whether it does or not.

The implications of this kind of uncontrolled system are quite profound when it comes to solving a problem like an ‘achievement gap’ in schools. If there is an achievement gap, then, by definition, that outcome was produced by an Engine, Transmission, Tool and Interface. Which in turn means that if we wish to eliminate said achievement gap, we need to find and eliminate at least one of the four elements.

Or. Add appropriate Control and Sensor elements in order to bring the uncontrolled outcome under control.

**System 3 – ‘Human’**

Our most frequent definition of what makes a system complex talks about ‘two or more humans’. Something we tend to emphasize somewhat less is a parallel belief that each of us is already ‘two or more’ people. Not to say that everyone on the planet is schizophrenic, but rather that, as has become ‘normal’ in today’s thinking thanks to Daniel Kahneman’s classic book, ‘Thinking Fast And Slow’, the way we all think is controlled by two different parts of our brain, crudely, our limbic ‘system’ and our pre-frontal cortex. Our version of the same idea is another of our frequently used expressions, ‘a person makes a decision for two reasons, a good one and a real one’. The ‘good’ one being all the (slow) conscious stuff our prefrontal cortex comes up with to rationalize our (fast) limbic-generated ‘real’ reason decisions.

The implications for these two brain parts is that, whether we like it or not, any ‘system’ that includes human beings in effect possesses two ‘Coordination’ elements. If we generalize that a step further to encompass the idea of systems that comprise multiple humans, it means that all six of the minimum elements that make up the Law of Completeness are also doubled up. The Law of (Human) System Completeness, in other words, looks like this:

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The implications of this, too, are potentially quite profound. Sticking with the ‘system’ that somehow manages to generate an ‘achievement gap’ outcome, rather than being a type 2 ‘uncontrolled’ system, might actually be a type 3, Human system. Which perhaps then leads to the somewhat more depressing conclusion that there are humans operating in the education system that, despite the fact they might say (good reason) they don’t want an achievement gap, their limbic system is making decisions that will ensure an achievement gap is the generated outcome.
Not So Funny – 40 Inventive (Shoe) Principles

After last month’s criticism of the fashion industry’s lack of creativity, we faced a backlash. Armies of angry fashionistas carrying placards outside our offices. Chants of ‘you’re not fit to wear the shirt’. It was, frankly, time for us to hang our heads in shame. And apologise. Even though, it turns out, the ‘you’re not fit…’ song was me mis-remembering things. The song was actually being sung by the supporters of my football team when the ‘players’ again capitulated after playing for an hour. Meanwhile, the SI research team was busy gathering examples of fashion industry creativity to make up for our scurrilous accusations. Creativity winners by a mile turned out to be the shoe design segment of the industry. Without ever using TRIZ, the shoe designers of the world have demonstrated they knew the 40 Inventive Principles all along…

Principle 1, Segmentation

Principle 2, Taking Out

Principle 3, Local Quality

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Principle 4, Asymmetry

Principle 5, Merging

Mono-shoe. Great brand name, too.

Principle 6, Universality

Principle 7, Nested Doll
Principle 8, Anti-Weight

Principle 9, Prior Counteraction

(leave backward footprints)

Principle 10, Prior Action

(for those awkward moments when you’ve run out of plates)

Principle 11, Beforehand Cushioning
Principle 12, Equi-potentiality

Principle 13, The Other Way Around

Principle 14, Curvature

Principle 15, Dynamics
Principle 16, Slightly Less, Slightly More

(bit of a trade-off with this one: expanding shoe saves parents money, but are likely to traumatize offspring for life)

Principle 17, Another Dimension

(Sorry, Mexico!)

Principle 18, Vibration
Principle 19, Periodic Action

Principle 20, Continuity Of Useful Action

Principle 21, Hurrying

Principle 22, Blessing In Disguise

(the blessing being that you can tell people you’re wearing the shoes as a punishment, rather than that you chose to wear them)
Principle 23, Feedback

(no animals were harmed, etc)

Principle 24, Intermediary

Principle 25, Self-Service
Principle 26, Copying

Principle 27, Cheap Disposable

Principle 28, Mechanics Substitution

Principle 29, Fluid
Principle 30, Flexible Shells & Thin Films

Principle 31, Holes/Porous Materials

Principle 32, Colour Change

(for that 'just-stepped-in-dog-poop' look)

Principle 33, Homogeneity
Principle 34, Discarding & Recovering

(so that’s what the tooth fairy does with them)

Principle 35, Parameter Change

(thanks, Lady Ga Ga)

Principle 36, Phase Transition

Principle 37, Relative Change

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Principle 38, Strong Oxidants/Enriched Atmosphere

Principle 39, Calmed Atmosphere

(steel toe-caps – just in case)

Principle 40, Composite
Our patent of the month this month takes us to the New Jersey-based enterprise, Electrocore LLC. US10,252,074 was granted to a trio of inventors at the company on 10 April. The company has been around and offering non-invasive nerve stimulation therapies for over 15 years now, but this new patent sounds like a significant step forward. Despite the fact that the application has been in the USPTO system being debated since 2012. Here’s what it has to say about their business and the problem requiring to be solved:

The field of the present invention relates to the delivery of energy impulses (and/or fields) to bodily tissues for prophylactic purposes. It relates more specifically to the use of non-invasive devices and methods for transcutaneous electrical nerve stimulation and magnetic nerve stimulation, along with methods for averting imminent medical disorders using energy that is delivered by such devices. The disorders comprise the following medical problems: asthma attacks and COPD exacerbations, epileptic seizures, migraine or other headaches having sudden onset, ventricular fibrillation/tachycardia, myocardial infarction, transient ischemic attacks or strokes, atrial fibrillation, panic attacks and attacks of depression.

The use of electrical stimulation for treatment of medical conditions has been well known in the art for nearly two thousand years. It has been recognized that electrical stimulation of the brain and/or the peripheral nervous system and/or direct stimulation of the malfunctioning tissue holds significant promise for the treatment of many ailments, because such stimulation is generally a wholly reversible and non-destructive treatment.

Many therapeutic applications of electrical stimulation involve the surgical implantation of electrodes within a patient. In contrast, devices used for the medical procedures that are disclosed here stimulate nerves by transmitting energy to nerves and tissue non-invasively. They may offer the patient an alternative that does not involve surgery. A medical procedure is defined as being non-invasive when no break in the skin (or other surface of the body, such as a wound bed) is created through use of the method, and when there is no contact with an internal body cavity beyond a body orifice (e.g., beyond the mouth or beyond the external auditory meatus of the ear). Such non-invasive procedures are distinguished from invasive procedures (including minimally invasive procedures) in that invasive procedures do involve inserting a substance or device into or through the skin or into an internal body cavity beyond a body orifice.

Potential advantages of non-invasive medical methods and devices relative to comparable invasive procedures are as follows. The patient may be more psychologically prepared to experience a procedure that is non-invasive and may therefore be more cooperative, resulting in a
better outcome. Non-invasive procedures may avoid damage of biological tissues, such as that due to bleeding, infection, skin or internal organ injury, blood vessel injury, and vein or lung blood clotting. Non-invasive procedures generally present fewer problems with biocompatibility. In cases involving the attachment of electrodes, non-invasive methods have less of a tendency for breakage of leads, and the electrodes can be easily repositioned if necessary. Non-invasive methods are sometimes painless or only minimally painful and may be performed without the need for even local anesthesia. Less training may be required for use of non-invasive procedures by medical professionals. In view of the reduced risk ordinarily associated with non-invasive procedures, some such procedures may be suitable for use by the patient or family members at home or by first-responders at home or at a workplace, and the cost of non-invasive procedures may be reduced relative to comparable invasive procedures.

Despite its attractiveness, non-invasive electrical stimulation of a nerve is not always possible or practical. This is primarily because the stimulators may not be able to stimulate a deep nerve selectively or without producing excessive pain, because the stimulation may unintentionally stimulate nerves other than the nerve of interest, including nerves that cause pain. Accordingly, there remains a long-felt but unsolved need to stimulate nerves totally non-invasively, selectively, and essentially without producing pain.

So, in crude terms, what we have here is a collateral damage problem, the key word in the last sentence being ‘selectively’, i.e. we want to stimulate the right nerve and avoid stimulating all the other things around it. Here’s how we might map that problem onto the Contradiction Matrix:

| IMPROVING PARAMETERS YOU HAVE SELECTED: |
| Productivity (44) |
| WORSENING PARAMETERS YOU HAVE SELECTED: |
| Loss of Energy (27) and Safety/Vulnerability (38) |
| SUGGESTED INVENTIVE PRINCIPLES: |
| 24, 28, 10, 35, 39, 15, 1, 14, 18, 9, 31, 5 |

And here’s the first two Claims of the patent, describing the main inventive steps:

1. A method of averting an onset of an acute medical event in a patient, the method comprising: detecting a signal via a sensor [Principle 23], wherein the signal is at least one of physiological or environmental, wherein the signal is at least one of within, on, or about the patient, wherein the signal includes a value; forecasting [Principle 10] the onset of the acute medical event based at least in part on the value; positioning a contact surface of a housing against an outer skin surface of a neck of the patient, wherein an electrical impulse generator [Principle 28] is positioned within the housing and wherein the contact surface is integral with the housing; generating an electrical impulse with the electrical impulse generator; and transmitting, via the electrical impulse generator, based at least in part on the forecasting, the electrical impulse non-invasively and transcutaneously through the outer skin surface of the neck of the patient to a selected nerve fiber in the patient to treat the acute medical event, wherein the electrical impulse is sufficient to avert the acute medical event, wherein the acute medical event is selected [Principle 1] from a group of events comprising an asthma attack, an epileptic seizure, an attack of migraine headache, a
transient ischemic attack, an onset of atrial fibrillation, a myocardial infarction, an onset of ventricular fibrillation or tachycardia, a panic attack, and an attack of acute depression.

2. The method of claim 1, further comprising: generating a shaped [Principle 15] electrical impulse within the housing; and wherein the transmitting comprises transmitting the shaped electrical impulse to the patient through a conducting medium positioned within the housing.

Put in lay-person terms, the invention solves the contradiction by anticipating the onset of a medical problem such that a profiled nerve stimulation algorithm can be selected and then transmitted to the relevant (vagus) nerve to cut off full onset of that problem. Kind of like, ‘in forty minutes it looks like you’re going to have a migraine, press this against your neck and press the button now to stop it from happening’.
Budding authors have literally hundreds of books to choose from if they’re looking for ‘help’ to make their writing better. Nearly all of them seem to be weak imitations of Joseph Campbell’s ‘Hero With A Thousand Faces’, or Christopher Booker’s ‘Seven Basic Plots’. These are the two people that effectively did the literary equivalent of what Genrich Altshuller did for the world of technology: go and find patterns. Once you know what the patterns are, everything else is just noise. Once Campbell and Booker revealed the ‘first principles’ of successful literature, there wasn’t going to be much for anyone else to say. Unless they managed to dig deeper into those first principles – into neurology for example – to see if anything lies beneath. Which is precisely what author, Will Storr, has attempted to do in his new book, The Science Of Storytelling. Better yet, he passes our meaning-maker test. In that he’s actually a do-er (he’s published two successful novels) as well as a thinker. Plus he teaches. Which means he’s obliged to not just understand how his subject works, but how it works in the context of everything around it.

If you want to check out what that looks like when it all gets put together, I recommend you take fifteen minutes out of your day and watch his TEDx talk: https://www.youtube.com/watch?v=P2CvIGuRq4E
Which, fortunately, also serves as an elegant overview of what you’ll read in the book’s 272 pages. Eudaemonia, the Sacred Flaw, The God Moment, cause-and-effect networks, ‘symphonies of change’, there’s a lot on offer here. As with most things in life, it could have been better if Storr had known something about TRIZ. He doesn’t use the word contradiction, but when you add what TRIZ tells us about the importance of revealing and resolving contradictions (per ‘The Ordeal’ in Campbell’s work), it serves only to enrich Storr’s many insights rather than negate any of them.

I imagine this book, like the Hero With A Thousand Faces and The Seven Basic Plots, will still be within touching distance, on the bookcase next to my desk in ten years’ time. The story The Science of Storytelling has to tell is way bigger than the one prospective author’s might want to hear. It is the story of all of us. Why we are all ‘homo narrans’. Why innovators need to get better at telling their story. And how they should set about doing it.
With 20/20 hindsight, it makes perfect sense that Jennifer Warnes’ exquisite 1986 album, Famous Blue Raincoat: The Songs of Leonard Cohen, became a critical and commercial success. After all, Cohen is now widely regarded as one of the great songwriters and poets of the modern era, and the always-underrated Warnes was enjoying a hot streak that included singing two Best Original Song Oscar winners—“It Goes Like It Goes,” from Norma Rae, and her inescapable chart-topping duet with Joe Cocker on “Up Where We Belong,” from An Officer and a Gentleman—and another nominee, “One More Hour,” from Ragtime.

But in early 1986, when work began on Famous Blue Raincoat at Hollywood Sound, no major labels wanted to touch it. Cohen had almost no profile in the U.S. at the time—he was, and still is, most popular in Europe, though the U.S. has finally caught up in recent years. And a few high-profile songs notwithstanding, Warnes had not exactly been burning up the charts with her solo albums.

The idea for the album—which became known, colloquially, as “Jenny Sings Lenny”—had been germinating for several years. Warnes went way back with Cohen—she was a backup singer on his 1972 tour, remained close friends with him, and then worked on Cohen’s 1979 album, Recent Songs, his world tour of that year (which played Europe, but not North America) and on his Various Positions album in 1984. The Recent Songs album and tour also brought the other main force behind Famous Blue Raincoat into Warnes’ orbit: bassist Roscoe Beck and the Austin-based jazz/fusion group he was part of, Passenger. The band backed up Cohen for a number of tracks on the album, and then formed the nucleus of Cohen’s backing group on the tour (captured well on the Field Commander Cohen live album, released in 2001).

Warnes and Beck became close over the course of the tour, and it was on long bus rides between cities and in hotels all over that the seeds were planted to someday make an album of Cohen’s songs, couching the songwriter’s lyrics in more challenging and imaginative settings. “I thought the lyrics deserved elegance,” she says today. Over time, those discussions evolved into something more concrete, but the proposed album still lacked a home.

“MCA said, ‘Who would buy that?’ and the truth is I didn’t know,” Warnes says with a laugh. “But then this small indie label, Cypress Records, took it and, even though we had
a very, very small budget to work with, we got it rolling. It was the first record that Roscoe or I had ever produced, separately or together, and we just said, ‘We can do this… can’t we?’ And we did, with the help of some of the finer people in the city; we managed to pull it off. Roscoe and I felt it doesn’t matter if you haven’t done it before if your vision is clear and you’re committed.”

It helped that both Beck and Warnes were very well-connected in L.A. Warnes had been recording there since the late ’60s and worked with many of the city’s A-list session players, and the more recent L.A. transplant Beck had also established himself as a musical force around town; in fact, he regularly played at local nightspots with a group of session heavies that included guitarist Robben Ford, drummer Vinnie Colaiuta and keyboardist Russell Ferrante—all of whom turn up on Famous Blue Raincoat, along with a couple of Beck’s former associates from Passenger, pianist/arranger Bill Ginn and saxophonist Paul Ostermayer. Other local luminaries who helped out included synth titan Gary Chang, keyboardist/arranger Van Dyke Parks, percussionist Lenny Castro, bassist Jorge Calderón, guitarists Fred Tackett, David Lindley and Michael Landau, and a host of backup singers associated with Ry Cooder—Willie Greene, Arnold McCuller, Bobby King and Terry Evans. Signing on to engineer was Bill Youdelman, who was well-known for his expert live recording work, as well as his studio chops, having worked on such projects as Sting’s Bring on the Night, Warren Zevon’s Stand in the Fire and Weather Report’s exceptional live album, 8:30.

Warnes, Beck and Youdelman were determined to record the album as “live” as possible in the studio. “There was something about the feeling of ‘live’—as Ry Cooder called it, ‘the goddamn joy!’—that really took me by the throat,” Warnes says. “I knew that record had to have the feeling that there was a place where it was recorded and there were real people playing and we were capturing some magic in the studio.”

Most of the basics for the album were tracked live (with Warnes even singing a couple of keeper vocals with the group), but that was not the case with this month’s Wow feature, “First We Take Manhattan.” The song was one of three Cohen songs introduced on Famous Blue Raincoat—the others were “Ain’t No Cure for Love” and “Song of Bernadette” (which Warnes co-wrote and, unlike the other two, Cohen never recorded). Like so many Cohen songs, “First We Take Manhattan” is quite cryptic lyrically—you’ll find fan and critic interpretations that say it is about political and/or psychic extremism, the dispossessed, or, 180-degrees from that, about the perils of the music business. Warnes has her own ideas, but notes, “Leonard works from a stream-of-consciousness sometimes, and I don’t always know what the lyrics mean. I just need some seed of truth to be there.” Cohen himself, who recorded the song himself after Famous Blue Raincoat came out, has been heard to say of the lyrics, ‘I think it means exactly what it says. It is a terrorist song. I think it’s a response to terrorism. There’s something about terrorism that I’ve always admired. The fact that there are no alibis or no compromises. That position is always very attractive. I don’t like it when it’s manifested on the physical plane – I don’t really enjoy the terrorist activities – but Psychic Terrorism. I remember there was a great poem by Irving Layton that I once read, I’ll give you a paraphrase of it. It was ‘well, you guys blow up an occasional airplane and kill a few children here and there,’ he says. ‘But our terrorists, Jesus, Freud, Marx, Einstein. The whole world is still quaking.’"

Beck says, “The first thing recorded in 1986, once we were officially making the record, was a click track and a sequenced bass for ‘First We Take Manhattan,’ which I hurriedly constructed after hearing the rehearsal the day before our first tracking date, and having the uneasy feeling that it wasn’t going to happen the following day. Vinnie [Colaiuta] had set up the night before and got his sounds, so I asked if he would do a favor and play to
this click track and sequencer (Principle 20). Jennifer went into a booth and did a vocal, as well. Vinnie was familiar with the song because we had rehearsed it previously. He played that drum track in one take and I just smiled real big and said, ‘There’s my drum track.’”

The next element to be added to the song was Stevie Ray Vaughan’s loose, bluesy guitar part, which contrasts so nicely (Principle 37) with the metronomic drive of the main rhythm. Beck knew Vaughan from Austin, and each had sat in with each others’ groups in the past, so when Beck heard that Vaughan was going to be at the Grammy Awards in L.A. in February 1986, he tracked him down at his hotel and asked if he would play on “Manhattan” that very night. Vaughan had not brought a guitar to L.A., but agreed to use one of Beck’s Stratocasters. A session was booked at the Record Plant, with Tim Boyle engineering, and in the wee hours of the morning, Vaughan laid down several takes for Beck and Warnes.

The slightly unsettling (Principle 17) passages of spoken German at the beginning and end of “First We Take Manhattan” was an idea of Lewy’s—“We wanted to snag people’s attention, and that was Henry’s call,” Warnes comments.

When the album was released in late 1986, “Bird on a Wire,” “First We Take Manhattan” and “Ain’t No Cure for Love” garnered considerable radio play on different formats, and the album as a whole was embraced by Cohen’s followers, Warnes’ fans and also, more generally, audiophiles who were impressed by its deep and pristine sonics. The record breathed new life into Cohen’s career in the U.S., and also helped establish Warnes as a serious artist in ways that her previous chart triumphs had not. Coincidentally, in 1987 she also scored a Number One hit with her duet with Bill Medley from the mega-popular soundtrack for Dirty Dancing, “(I’ve Had) The Time of My Life” (another Oscar winner!). Famous Blue Raincoat continues to earn respect and new fans with each passing year. It remains perhaps Warnes’ crowning achievement.

“When you have the proper alchemy and all the secret good wishes of everyone, fireworks can happen,” Warnes says, in true Principle 38 fashion, “and you know you’re on to something. About midway through the record, we knew it was great. Nobody was shouting about it at that point, but Roscoe and I knew we were sitting on something fantastic.”

For me I’d say the album is one of the records I’ve played the most over the years. For a long while, I didn’t know why I kept coming back to it. Sure, it’s a really well-done record and Cohen’s songs – lyrics in particular – are as good as pop or rock music ever got, but why does the spoken German intro and Vaughan’s amazing guitar work still give me a thrill every time I hear it? The answer, I now think, is in the three-way contradiction between Cohen’s brutal words, Warnes’ sweet voice singing them, and Vaughan’s bluesy ahead-of-the-beat-behind-the beat guitar fills. Watch the video for First We Take Manhattan and we see it features all three. We also see that they never meet. The combination shouldn’t work. But, ultimately, the fact that it shouldn’t means that it does. Beautiful contradictions, beautifully solved.

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Discovering how atoms — such as a single layer of carbon atoms found in graphene, one of the world's strongest materials — work to create a solid material is currently a major research topic in the field of materials science, or the design and discovery of new materials. At the University of Missouri, researchers in the College of Engineering are applying one of the first uses of deep learning — the technology computers use to intelligently perform tasks such as recognizing language and driving autonomous vehicles — to the field of materials science.

"You can train a computer to do what it would take many years for people to otherwise do," said Yuan Dong, a research assistant professor of mechanical and aerospace engineering and lead researcher on the study. "This is a good starting point."

Dong worked with Jian Lin, an assistant professor of mechanical and aerospace engineering, to determine if there was a way to predict the billions of possibilities of material structures created when certain carbon atoms in graphene are replaced with non-carbon atoms.

"If you put atoms in certain configurations, the material will behave differently," Lin said. "Structures determine the properties. How can you predict these properties without doing experiments? That's where computational principles come in."

Lin and Dong partnered with Jianlin Cheng, a William and Nancy Thompson Professor of Electrical Engineering and Computer Science at MU, to input a few thousand known combinations of graphene structures and their properties into deep learning models. From there, it took about two days for the high-performance computer to learn and predict the
properties of the billions of other possible structures of graphene without having to test each one separately.

Researchers envision future uses of this artificial intelligence assistive technology in designing many different graphene related or other two-dimensional materials. These materials could be applied to the construction of LED televisions, touch screens, smartphones, solar cells, missiles and explosive devices.

"Give an intelligent computer system any design, and it can predict the properties," Cheng said. "This trend is emerging in the material science field. It's a great example of applying artificial intelligence to change the standard process of material design in this field."

Perhaps one of the most important implications of the team’s work is that it provides the perfect mechanism for helping to destroy the more dysfunctional elements of the global patent system. Morally-bankrupt, Monsanto, for example, patented close to 300 molecular variations around soy beans in the last twelve months. I reckon that with a little tweaking the Missouri AI solution could generate ‘all’ the other billions of possible combinations of soy bean – and every other plant structure – publish them and make sure evil-doer’s like Monsanto have to find more ethical ways of doing business. Time for a collaboration with breakthepatentstranglehold.com I think.

Read the full article here: https://www.nature.com/articles/s41524-019-0165-4
I wasn’t sure whether to put this one into the ‘Best Of The Month’ or ‘Wow In Music’ sections of the ezine, but ultimately, this month’s publication of (Baby Boomer) David Hepworth’s homage to the long-playing record could really only fit here. I was born right on the cusp of the Boomer-Nomad transition, and as such could have fallen on either side of the divide. I think, ultimately, I fell on the Nomad side, but in doing so, I didn’t escape the importance of LP records. A Fabulous Creation (spot the lyric, Boomers!) offers up a rip-roaring ride through the glory years of the 12” diameter lump of vinyl, starting with the release of The Beatles’ Sgt Pepper album in 1967, and fizzling into irrelevance with the release of Michael Jackson’s album, Thriller. The LP actually came into existence in 1948, but, in archetypal S-Curve terms, it didn’t hit a Tipping Point until Sergeant Pepper taught the band to play. Which in turn coincided with the coming of age of the Boomer generation. Suddenly LPs were not just an important cultural statement, but also the glue that held the generation together. It was a time when people sat down in a darkened room with their friends with the sole purpose of listening to an artist’s new record. You might not be able to afford furniture in your dingy, unheated flat, but guaranteed, whatever disposable income you had was going to be spent on a hi-fi and a steady stream of vinyl to play on it. Walking down the street with a bundle of albums under your arm was a de-rigueur sign of how socially valuable you were. 12” badges of honour.

I have no idea whether Hepworth understands the idea of S-Curves or not. I suspect he doesn’t. Which, if it is true serves only to add to the validity of the story he weaves over the course of his 320 pages. Sgt Pepper gives us our Tipping Point; 1977’s album, Rumours, by Fleetwood Mac gives us the peak of the curve; and thereafter we hear about a slow decline that turns into a tailspinning plummet once Sony launched the Walkman in 1980, and a new generation decided that listening to music by yourself was better than with others, and that the mobility (and illegal copy-ability) offered by compact cassettes was the way to go. The end of the story comes, according to Hepworth, with Michael Jackson’s blockbuster album, Thriller. A record that was the first output of what would now call itself an ‘industry’. Moreover, one that was no able to demonstrate a formula for success. After Thriller, nothing was the same ever again. Record companies either sought

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to repeat the blockbuster formula, or acquiesced to the idea that most LPs contained one or two good songs and a lot of ‘filler’, and that the new generation weren’t going to pay for filler any more. Rather they were going to tape only the good bits.

And, lest there be any doubt that this whole story was about Baby-Boomers, here’s the same picture again, but this time drawn onto a Generations Map:

Baby-Boomers: the last generation to decide, for the next forty minutes, there was nothing better to do in the world than listen to a record. That’s how it was in the golden age of the LP. It seemed as though there was all the time in the world.
Biolog – Long-Tailed Tit

Long tailed tits, recognisable by their undulating flight, a tail much longer than its small, pinkish body and generally flying in a small flock, are also known as ‘flying teaspoons’. You generally hear them before you see them as they flit along in small flocks. They often nest in hedges/bushes/brambles or thickets, making them difficult to find, particularly after the leaves have opened. The ones I have found have all been in hawthorns, blackthorns or brambles, making them harder for predators to reach. They may also nest in the fork of a tree trunk and branch. Whenever I have been lucky enough to find one, it has mostly been before any leaves are fully open or my attention has been raised by hearing the characteristic sounds that they make when they return to their nests. They are early nest builders so look out for them late February or March, before the leaves open. Their nest are beautifully elaborate.

The birds, being small, need insulation as they carry very little body fat. This places significant resource issues regarding the building of its nest: more temperature insulation means adding more material. Beyond this problem, like a wren, it is one of a few birds that makes a roof dome over its nest, which helps to retain warmth. Being closed, the long-tailed tit, however, then creates another problem – as the eggs hatch and the chicks grow, there’s less available space for them all. The nest, in other words, needs to get bigger, but achieving this creates a fundamental problem relating to the structural stability.

Here’s what this cluster of nest-related problems looks like when mapped on to the Contradiction Matrix:

- **Volume of Moving Object (7) and Temperature (22)**
- **Worsening Parameters You Have Selected:**
  - Amount of Substance (10) and Stability (21)
- **Suggested Inventive Principles:**
  - 30, 3, 31, 35, 28, 39, 36, 19, 33, 15, 24

So, how does the long-tailed tit solve the contradictions? It is made of (Principle 24) moss woven with (Principle 30) cobwebs and hair, then finished off with pieces of lichen. The
cobwebs are used to bind the (Principle 35) pliable moss to nearby branches and twigs and allows the nest to stretch. It is also used to weave and stick the lichen pieces to the outside of the nest, each piece of which is collected by the birds and held in place by the cobwebs. The dappled effect it makes, really helps with the camouflage, when used against a tree trunk or as in the nest above, against the sky. Some of the smarter birds can be observed raiding the same spiders, so that no sooner has the spider built its next web, along comes the tit to steal it and use it as a natural nest-glue.

Finally, when the structure is complete, the tits shift their attention to the insulation challenge. Here, both the male and female birds line the base with on average over 1500+ feathers (Principle 31), a few their own (Principle 33), but the majority being plucked from dead birds. Which the long-tailed tit has evolved to be especially alert to, keeping a keen eye out for birds of prey and the discarded remains of their smaller-bird dinner.

Overall, the long-tailed tit nest takes 3 weeks to build. It is one of the most sophisticated structures in the natural world: four different materials (Principle 3), doing four different jobs.
“In the received wisdom, which assumes that the problem is resistance, it follows that what is needed to overcome the resistance is leadership. So when the project fails, this is seen as resulting from a combination of staff resistance and poor leadership from managers… (this) is a fundamentally flawed model of change. It is flawed because it confuses cause with effect. Resistance is not the cause of failure; it is the outcome of failure. By the time resistance has set in, your project has already failed.”

Patrick Hoverstadt, The Fractal Organisation

News

Dublin
We’re very happy to announce our participation doing a keynote presentation and afternoon hands-on workshop at a ‘Trend Analysis’ Day with our good friends at the Industry Research & Development Group in Ireland. The day will take place at Newbridge on 12 June. More details and registration on the IRDG website.

TRIZ Festival
Darrell will be presenting a keynote (TRIZ and Complexity – seems to be a growing theme this year!) and a session on Systematic Service Innovation at this year’s big MATRIZ event, being held in Minsk from June 13 to 15. Flights and hotel have been booked. This is happening.

DTU
Darrell’s 2-day workshop for the Executive MBA students at the Danish Technical University in October is confirmed for 18 and 19 October. As per usual, this session is
nominally closed and for the registered students. This year, we’re planning to overcome the ‘outsider’ problem by scheduling a stand-alone ‘taster’ day on Thursday 17th. If anyone is interested in attending this session, please get in touch with Darrell to sort out the best way to reserve a place.

TRIZCON
Sadly, Darrell will not be able to attend this year’s US TRIZ Conference. The conference organisers will however be stocking a small number of our latest books and the new TRIZmeta cards.

US
Darrell’s trip to the US next month (nominally 23-31 May) is still slightly fluid. He has firm commitments on 24, 29 and 30th, and another one on either 23, 28 or 31, leaving the other two free. There’s also a possibility of extending the trip to include 3 and 4 June. All of which sounds quite complicated. The upshot is that if there’s anyone in or around the Chicago-Milwaukee-Minneapolis triangle that might want a day or two of Darrell’s time, let him know soonest to see what might be organizable.

Twitter
We’re happy to see that our TRIZ Journal Twitter page (@TRIZJournal) has now passed the 3000 mark. If you haven’t already followed the site, you’re missing out on what’s becoming the world’s biggest repository of 40 Principles examples… at least one new one every day… the more people participate, the faster the rate of accumulation becomes.

New Projects
This month’s new projects from around the Network:
  - Power – Innovation Strategy Workshops
  - Consulting – ‘21st Century TRIZ’ Workshops
  - Retail – SI Certification Workshops
  - Agriculture – Invent-To-Order Patent Study
  - FMCG – IP Bulletproofing Study
  - Military – Psychometric Measurement Programme
  - Transport – Technology Scouting Project