

# Systematic Innovation



## e-zine

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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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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](mailto:darrell.mann@systematic-innovation.com)

# Corporate Anorexia (Or: When Lean Goes Wrong)

I spend a fairly large proportion of my time these days feeling more than a little bit embarrassed to be British. Trying to get home before Christmas to find that the biggest airport in the country was 'closed', leaving me 20 hours late and landed in the wrong city and (worse) tens of thousands of people stranded probably didn't help my mood. Watching the news over the Christmas period didn't help much either. It seems like wherever I look our systems don't work anymore.



Figure 1: Failing (British) Systems In The News

Or rather, they don't when something out of the ordinary happens. Like a large amount of snow falls in a short space of time, or the ambient temperature stays below freezing for a

longer than normal period of time. But, hold on a minute, didn't we used to be able to cope with such things? 30 centimetres of snow might have closed Heathrow for a few hours in the past, but suddenly travelers are expected to endure five days of 'flight cancelled' messages on the Departures Board? People have found themselves with no water for a few hours following a freezing spell, but (as in Northern Ireland right now) surely not for over a week?

I believe that all of these instances are symptomatic not of a bit of extreme weather (datum to keep in mind: Helsinki airport has been closed due to weather for approximately 3 hours in the last twenty years), but of something rather more sinister. My hypothesis? Lean.

Not Lean as it was originally conceived, however, but rather the crude bastardisation of the original thinking that has occurred in a rather large proportion of today's organizations.

Like a lot of things, some very smart initial thinking often gets diluted to the point where the smart thinking ceases to be smart any more. The big idea underpinning Lean is 'waste is bad and so should be eliminated'. A statement that few would argue with. Indeed it is a statement that has passed through 'common sense' to become accepted dogma. It would take a very brave person inside any organisation these days to argue against adopting Lean principles.

But let's have a look at what we actually mean when we say 'waste'. Depending on which author you're reading, there are a host of different ways and means of classifying the different types of waste. Figure 2 lists 15 types of waste as may be collated when looking across a broad spectrum of the different classification methods.

*waste – process, business (employees, managers suppliers, etc), pure  
waste of over-production  
waste of waiting  
waste of transporting  
waste of inappropriate processing (using a hammer to crack a nut)  
waste of unnecessary inventory  
waste of unnecessary motions  
waste of defects  
waste of untapped human potential (empowerment)  
waste of inappropriate systems (over-specified computers, machines, etc)  
waste of energy and water  
wasted materials  
service and office wastes (excess meetings, food, photocopying, etc)  
waste of customer time  
waste of defecting customers*

**Figure 2: Different Types Of 'Waste'**

Now, an important question. Take a couple of minutes. Which one is the odd one out?

Found it?

Probably not.

Before revealing the answer, let's take a moment to work out why the question is a difficult one: Like the majority of 'improvement' initiatives inside organizations, the initial big idea has to be communicated from the Board down the food chain so that everyone understands what is trying to be achieved. The moment we get below CEO level,

however, and people are immediately forced to look at the big idea and work out how it can be applied to those things they are able to do something about. Inevitably, someone working in the HR department, or on the shop-floor of a production line, or cleaning the desks at night is able to do something about a relatively small proportion of the full spectrum of possibilities. Everyone below CEO in fact can only *do something* about those things that lay within their remit, and, by definition, this can only a fraction of the total.

And which is the one that almost no-one has any direct control over (probably including the CEO)?

Answer: the last one in the list.

All the others are very tangible, measurable wastes. Wastes that people within the organisation have the authority to do something about within their silo of the business. But 'defecting customers' has nothing to do with what happens inside either your silo or indeed inside the organization. A defecting customer is a waste that occurs outside the system. It is therefore a difficult one for anyone to do anything about...

...and as a consequence, it usually gets left off the list (in fact, in many organizations, it never makes it onto the list in the first place – do a Google search on 'Lean Wastes' and see). And the moment that happens, the original elegant and appropriate Lean philosophy has been corrupted and the organization is well on the way to the sort of failure shown in Figure 1.

It is very easy to strip out 'waste' when you're only looking within your bit of the system. So, to take one of the Figure 1 examples, Northern Ireland Water chopped 500 jobs in 2007 in order to 'strip out waste'. Part of which turned out to be a substantial chunk of their emergency response engineering team. An easy target when everything is working fine ('look at those guys doing nothing in that office over there'). Not so great when something unexpected happens... and suddenly the desire to be lean has turned into anorexia. A 'waste' was stripped out of the system without realizing, until it was too late, that it wasn't waste at all from the bigger picture perspective.

As the National Health Service, BP, Rolls-Royce, Heathrow airport and Northern Ireland Water have already found to their cost, and no doubt a thousand others still to experience their 'bigger picture perspective' problem will find in the coming months and years, Lean – true Lean – demands a holistic view. Lean within a silo leads to a lean silo and a dysfunctional – anorexic – system. Lean within a silo is folly.

### **So What?**

You might rightly ask. Is this just a post-Christmas rant, or is there a point to this discussion? Hopefully, the latter.

And it is this. Everyone recognizes that when a system approaches maturity, it starts hitting some fundamental limits. The limits stay fixed, but the pressure to 'do better' ('eliminate waste') if anything only increases...

...and a contradiction emerges...

...which we know dictates that we either resolve it or accept that we are destined to live between a rock and hard place forever. Or at least until such times as the compression force destroys us.

It is expensive to run an airport like Heathrow. Especially following a protracted recession which has seen a fall in passenger numbers and therefore revenues. The trade-off way of

resolving this conflict is to not invest in snow-clearing equipment and pray for fine weather. The contradiction solving method says we have to change the system. Which in turn, when the system has already been 'optimised' to make best use of existing resources, means identifying some new resources. Preferably free ones. Resources that want to help because a win-win solution is produced.

On the fifth toe-curlingly embarrassing day of the BAA's inability to get the runways at Heathrow open, the company's COO appeared on the national news to thank the Government for their offer to bring in the Army to help clear the (30cm, remember) of snow from the runways, and to say that the help was not needed. Fair enough that he didn't want to (or couldn't) invest in more snow-clearing equipment earlier in the year before the snow fell; but bordering on a criminal act that he hadn't been on the phone to the local Army base to request their help five minutes after the (correctly predicted by the forecasters) snow started falling and the impending disaster began, never mind five days later.

The Army would've won – public goodwill, the opportunity to train on a 'real' mission, etc – BAA would've won and sure as damnit the poor stranded passengers would've won. Only problem: it was a solution that required someone to step outside their cosy, beautifully optimised silo.

Be warned, these incidents aren't a one off caused by some slightly worse than normal weather, they're the first signs of a corporate anorexia pandemic. The only cure for which is to start solving contradictions and transcending a host of artificially created and usually mis-conceived silos.

# ‘Effective’ Creativity?

I live in a world that exposes me to some of the – in theory at least – most creative minds on the planet. For this I feel extremely fortunate. Or rather, ‘mostly fortunate’. I say this because I’ve begun to become acutely aware that some of the people (insert image of drum-banging ‘creativity consultant’ here) that purport to be the most creative are actually amongst the least creative people I’ve ever met. For some time the dawning has caused me a deal of strife: how can people who earn their living by teaching people to be creative turn out to be so un-creative? As is so often the case, the problem centres around a poor definition of what we mean when we talk about ‘creativity’.

My five year old niece was, in classical terms, ‘being creative’ when she found a new place to store one of her crayons. The fact that she subsequently spent four hours in the Casualty department at the local hospital having it removed was a pretty strong hint that, though it was certainly came into the category of ‘novel’, it wasn’t a particularly effective solution to the crayon-storage problem. At least in terms of, I’ll bet she’ll never do it again. So, we might ask, has she now learned to be less creative as a result of the experience?

The question is an important one since there is an unfortunate modern trend in which any suggestion that one individual is more or less anything than anyone else is deemed politically incorrect. While it may be the case that everyone is born with exactly the same creative potential (‘nature’), it is surely also true that the manner in which we are raised (‘nurture’) plays a significant role in whether someone is viewed as actually ‘creative’. This article is about the fight between nature and nurture, but also, more importantly about the need not just for ‘creativity’ in the classic interpretation of the word, but rather for ‘effective creativity’ – creativity that delivers a new and demonstrably *useful* outcome rather than merely a *new* outcome.

Our fifteen year programme of research into ‘effective creativity’ (also known as ‘innovation’) has revealed a number of critical insights into the creative process. From that research we see a need to separate two important aspects of intelligence: firstly there is what we might think of as our ‘creative intelligence’; second is the more traditional interpretation of the word, which we might define as ‘knowledge intelligence’. In simple terms, ‘knowledge intelligence’ is how much stuff we know, and thus how well we perform in school exams and general knowledge quizzes.

Our hypothesis is that, as we all live our lives there is an innate transfer of intelligence from one of these types to the other:

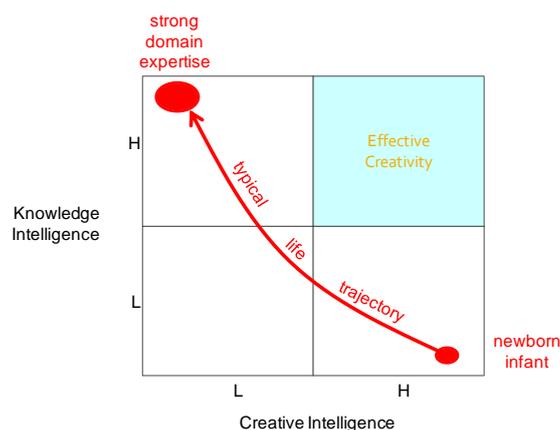
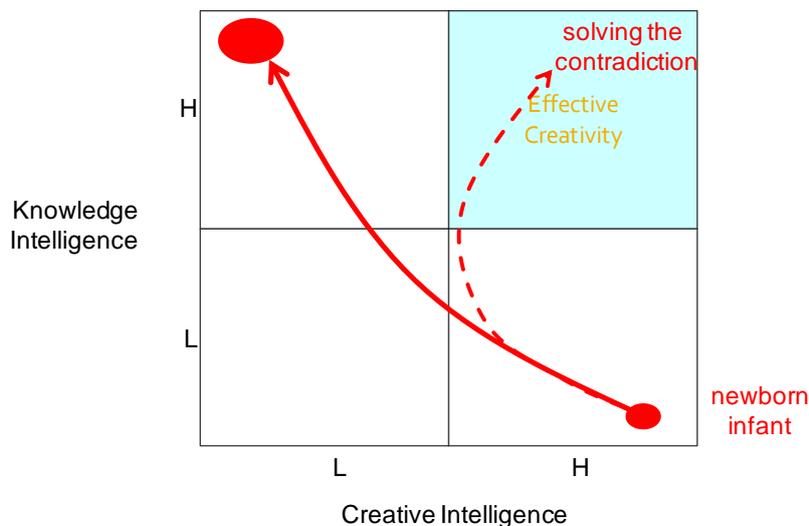


Figure 1: ‘Creative’ Versus ‘Knowledge’ Intelligence

Thus, when we are born, we are all fundamentally born with lots of unconnected neurons inside our brain. Because they are un-connected, we have many, many ways in which they can be connected. Our creative potential – and therefore, we propose, our creative intelligence – is, in this state, at its peak. Never again will we experience such plasticity and flexibility. And a good thing too, since, as we quickly learn, having a certain amount of knowledge about the world is useful for our survival ('don't put your hand in the fire'). Certain neurons get connected to others, and get reinforced into immovable, concrete pathways as our knowledge increases. But there is a definite trade-off occurring when this essential advance happens: the more knowledge we acquire, the more neural pathways we make rigid, and hence the less creative potential we have...

...until, ultimately, after, say, finishing a PhD in 'high Nusselt Number, particle-laden supersonic aerodynamics' (insert image of one of my best friends here) we have an awful lot of really useful specialized knowledge and very little potential to create new supersonic aerodynamic solutions.

The knowledge-versus-creative-potential trade-off is inherent. Inherent, but, fortunately, not unsolvable. 'Effective Creativity', then, is about solving the contradiction:



**Figure 2: Solving The Creative-Knowledge Intelligence Contradiction**

And it is a contradiction that really has to be resolved: the designers of Concorde, for example, were stuck when it came to reducing noise because their excess of domain knowledge prevented them from seeing out of the box. Conversely, while I'm pretty confident my niece would be great at generating brand spanking new ideas for a supersonic aeroplane, I don't think any of us will be setting foot inside one of them anytime soon. What is needed here and everywhere else are ways and means of thinking that successfully combine the best attributes of both high knowledge *and* high creative intelligence.

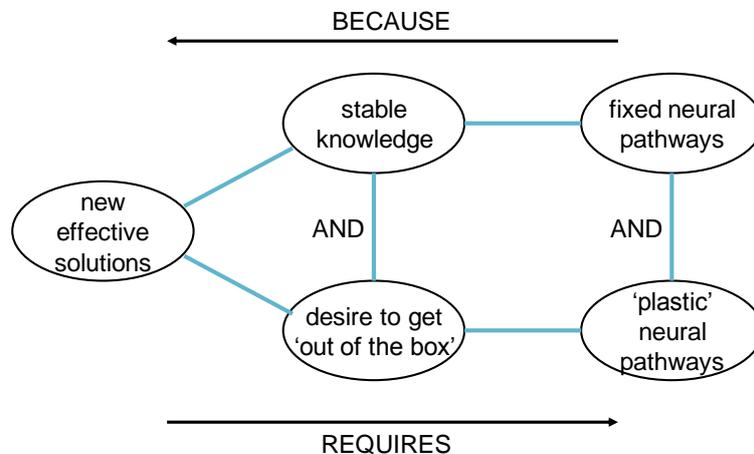
This article is first and foremost about identifying a good contradiction to solve. Being aware of the (inherent, remember) trade-off between creative and knowledge intelligences represents a solid step towards generating viable – 'effective'! – solutions. But then again, articles that don't offer any kind of solution are often criticized for leaving people hanging in a don't-know-what-to-do-next no-man's land.

The central problem that now leaves us with is that an actual answer to the problem depends on the actual context present. For a start, we know from our research that it is

highly connected to Spiral Dynamics and the Level at which a person is thinking (see 'Some People Are More Creative Than Others' in Issue 64 (July 2007) of the ezine).

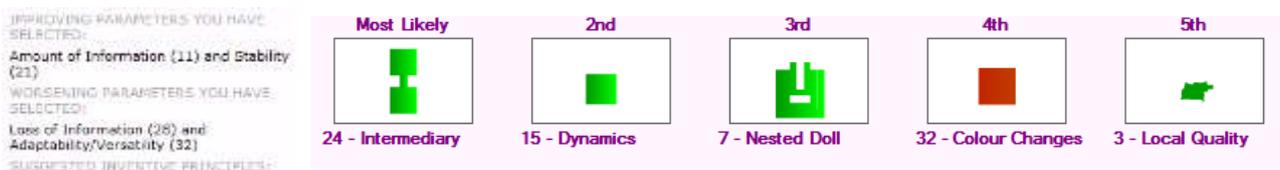
That issue aside (!), let's have a quick look at what the Contradiction Matrix has to say on the subject, and let me take the example of a project I worked on with a group this month on stacking and un-stacking sheets of paper.

Here was my attempt to get to the root contradiction, which for me gets us right into a neuron-level look at the brain:



**Figure 3: Mapping The Knowledge-v-Creative Intelligence Contradiction**

And here's how I mapped the problem onto the Contradiction Matrix (small aside: I used the technical version of the Matrix simply because this was the Matrix the group was familiar with, and also due to the fact that, because I was looking at the problem from a neurological perspective – i.e. a physical connection between different neurons, it is a technical problem):



**Figure 4: The Knowledge-v-Creative Intelligence Contradiction On The Matrix**

Available time in the session was limited (we were there to generate answers to the actual problem not indulge Darrell in his desire to solve a creativity contradiction!), the search for solutions was limited to the 'most likely' suggested Principles. As it happens, the very first one performed the trick we were looking for...

...a trick that represents a subtle variation on what SI is trying to do all the time. My 'Intermediary' in this case was asking the team with all of their collective knowledge about stacking and un-stacking paper (which, across the groups totaled around 100 person-years) to help me with the problem of picking up single sheets of aluminium in an automotive body-panel press shop. All I had done here was give the group an analogous problem ('separate sheet'), but one that deliberately forced them to think out of their usual box, because all of the solutions they had traditionally used to solve the paper version of the problem no longer worked. At the precise same time, the team were now both domain experts and domain newcomers. And within thirty minutes we had a host of previously un-

imagined of solutions to the aluminium problem, several of which, later on had an awful lot to tell us about solving our actual paper problem. And, hey presto, a definite step towards 'effective' creativity. At least for this group.

The – your – real challenge now is to solve the same (inherent, remember) conflict in your next problem solving context.

## Not So Funny – Not-So International Branding

My recent trip to Mexico unusually found me with a free day. Excuse enough to go and walk around the local supermarkets and stores in search of the strange, bizarre and potentially exportable. Being a big fan of chocolate, it didn't take too long to sniff out this little beauty:



Now I know that chocolate has certain addictive properties, but this seemed to go a tad too far to me. Especially marketing it at teens. Needless to say, I managed to squeeze several kilograms of the stuff into my luggage for the trip home. And got it through Customs.

Along the same lines, comes Blow. This time the branding 'error' is perhaps a little more deliberate. This product is aimed directly at the lucrative energy boost market. Blow comes in a vial full of white powder, which bears an uncanny resemblance (so we're told by, ahem, 'friends') to the real thing. Aimed at the twenty-something market. According to the instructions, the contents should be dissolved in a handy drink. Careful with that rolled up dollar-bill, Eugene.



Slightly less controversial, although I'm still not sure I'm going to be doing my laundry with it any time soon, comes, best-selling Iranian detergent, Barf. In Farsi, "barf" means "snow." Looking across the whole product range, it seems like you can also wash your dishes and your hair with Barf. Tempting.



We travel to Australia next, in search of something to clear the palate. Enter Golden Circle, local producer of a longstanding favourite caramel-flavored Sarsaparilla drink, the abbreviated product name of which is “Sars.”



Somehow, when the SARS outbreak of 2003 hit, sales of Sars went up: its value as a novelty item apparently outweighing the negative associations (good old Generation X no doubt!). Quite possibly a good illustration of Inventive Principle 22 in action. For a short while at least. Not sure the idea would travel well to places that didn't already know what the product was, but you never know until you try.

Ditto this Ghanaian soda drink:



I've heard of water shortages in a lot of African countries, but this really isn't going to solve the problem for most visitors.... Likewise another Ghanaian best seller...



Shitto is 'a gravy made from dried pepper, smoked dried fish, dried shrimp powder, a variety of spices, ginger, onion, garlic, tomatoes and seasoning.' Since English is the official language of Ghana, it doesn't seem like this can be chalked up to unfortunate happenstance. In other words, to paraphrase another well known UK range of DIY product adverts, 'it does exactly what it says on the tin'. Gulp.

And gulp again at this handy solution to the problem (spot the cunning link?):



According to the website, this brand name is currently for sale. Form an orderly queue now.

## Patent of the Month - Preserving privacy of data streams

Patent of the month this month is US7,853,545, awarded to a group of IBM inventors on 14 December. The background description section of their invention disclosure makes a succinct job of summarizing the problem being addressed by the invention:

*Recently, there has been an increasing concern regarding privacy breaches, especially those involving sensitive personal data of individuals... As a result, restrictions and regulations in publishing sensitive personal data have been tightened... these address data owned by government organizations as well as corporations. It is therefore not surprising that the data management community has become increasingly focused on ways to guarantee the privacy of sensitive data.*

*Meanwhile, unprecedented massive data from various sources provide a great opportunity for data mining and information integration. Unfortunately, the privacy requirement and data mining applications pose exactly opposite expectations from data publishing... The utility of the published data with respect to the mining application decreases with increasing levels of privacy guarantees... Previous work has noticed this important tradeoff between privacy and utility and various techniques have been proposed to achieve a desired balance between the two...*

*...Prior related work... includes additive random perturbation for the offline, conventional relational data model, where the noise is distributed along the principal components of the original data in order to achieve maximum privacy, given a fixed utility. These offline algorithms are not optimal when applied to numerical, non-stationary (or, time-evolving) data streams. The dynamic correlations and autocorrelations, if not carefully considered, may allow for the reconstruction of the original streams. Other problems are that in random perturbation systems, analysis of the data has to be performed incrementally, using limited processing time and buffer space, making batch approaches unsuitable. Second, the characteristics of streams evolve over time. Consequently, approaches based on global analysis of the data are not adequate.*

The conflict here is clear: we want a high degree of data security, but it is difficult to achieve due to a combination of enormous data flows and the speed at which they require to be transmitted. Here's what the problem looks like on the IT version of the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE  
SELECTED:  
Security (16)  
WORSENING PARAMETERS YOU HAVE  
SELECTED:  
Size (Dynamic) (2) and Speed (5)  
SUGGESTED INVENTIVE PRINCIPLES:  
4, 37, 35, 28, 3, 1, 15, 19, 24, 2

And here is the solution adopted by the inventors:

*Briefly, in accordance with the present invention, disclosed are a method, information processing system, and a computer readable medium for preserving privacy of nonstationary data streams. The method comprises receiving at least one nonstationary data stream with time dependent data. Calculating, for a given instant of sub-space of time, A set of first-moment statistical values is calculated, for a given instant of sub-space of time, for the data. The first moment statistical values include a principal component for the sub-space of time. The data is perturbed with noise along the principal component in proportion to the first-moment of statistical values so that at least part of a set of second-moment statistical values for the data is perturbed by the noise only within a predetermined variance.*

Which, trying to break down the convoluted rats nest contained in the text, is all about, firstly calculating a set of 'first moment statistical values (i.e. rate of change information – Principle 37, Relative Change), then using these values to perturb the data (Principle 3, Local Quality and/or Principle 19, Periodic Action) with noise (Principle 22, Blessing In Disguise) to in turn perturb a set of second-moment (i.e. rate of rate of change – Principle 37 squared!) values.

What we like most about this solution is how it makes use of resources already present in the data being transmitted. As such it reminds us that rate of change and rate of rate of change are free resources that are present in any dynamic system. It also gets us to contemplate that noise – traditionally viewed as a harmful thing – is also a potentially terrific free resource.

We also like the fact that the Matrix has done a pretty good job of matching the strategies used by the inventors. Only Principle 22 is not in the list in fact. Most likely because, although this is a Principle that often gives very good solutions, it tends not to be found very frequently as a design strategy.

The fact that the Matrix points us – after the fact, obviously – to strategies used by the inventors should be taken as encouraging. But that is not to say it would have been easy – or maybe even 'possible' to generate this particular solution having seen the Principle suggestions before the problem was solved. Any solution that ultimately exhibits multiple Inventive Principles, all of our research tells us, is going to be difficult to create a priori unless a sophisticated strategy for using the Inventive Principles is in operation.

We ultimately have no idea how these IBM inventors found their Eureka moment. We can thus only look with nodding admiration at the solution they have found, and hope that, knowing that it came from what we can see in retrospect to be a smart combination of known (Inventive Principle) strategies, our faith in the ability of both Matrix and Principles to point us in the right direction is for the large part justified.

$$a = [1 \ 2 \ 3 \ 4 \ 5 \ 6]^T$$

$$W = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}$$

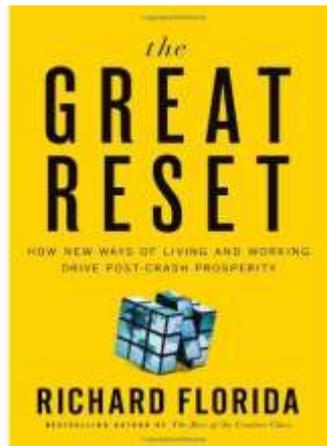
$$E = \begin{bmatrix} .1 & -.1 & .2 \\ -.1 & .2 & .3 \\ .2 & .3 & .1 \\ .3 & .1 & -.2^* \end{bmatrix}$$

$$W^* = W + E$$

$$a^* = [1.1 \ 1.9 \ 3.2 \ 4.3 \ 5.1 \ 5.8^*]^T$$

Obvious when you think about it!

## Best of the Month – The Great Reset



I have to admit I've had problems with Richard Florida in the past. His 'classic' *Rise of the Creative Class* tome is one of those Boomer books guaranteed to send even the calmest Generation X'er running for the hills, waving the book aloft and screaming 'this is why we hate you, you overbearing, puffed-up, hypocrites'. Ahem.

The *Great Reset* is, fortunately, another story altogether. Undoubtedly opportunistic in that the double-dip recession (can we call it a depression yet?) has caused many in the US at least to contemplate the unthinkable possibility that the current system might be broken.

At its heart, the *Great Reset* is all about S-curves, and in particular the jumps ('resets') between one curve and the next. Despite never using the expression, Florida very appropriately identifies the fact that society as a whole is represented by an S-curve, and that, over time, we eventually hit the limits of one and jump to another. He also rightly observes that the last two societal-level s-curve jumps occurred through the Great Depression of the 1930s and the 'Long Depression' that, in the US, followed the Civil War during the second half of the nineteenth century. For this connection alone, this short (180 pages) book is worth getting down to your local library (does anyone do that anymore?) to request they get hold of a copy for you.

The real meat of the book, however, and the thing that might encourage you to actually spend money to acquire a copy, are the host of insights about how the previous two resets help us to understand how best to manage our way – individually and as a society – through the ongoing one. The book is divided into three main sections; the first reviews the previous resets in order to highlight certain common characteristics (my favourite one: the thought that each reset involves a 'spatial' shift in the way and physical locations people choose to live – so that, in the last reset, there was a mass migration from city centre living to the suburbs). The second section takes this foundation and uses it to help 'redraw the economic map' for the period between today and the point where the reset has happened. The third section, 'a new way of life', speculates about life in the post-reset world. Of the three it is probably the weakest, since – inevitably? – like most other futurologist authors, Florida fails to grasp the importance of contradictions and their resolution, and therefore fails to capture the fact that certain things cannot simply be extrapolated from patterns we can observe today.

Still, let's not blame Florida for that mistake though. Rather, readers are encouraged to take some of his insights as start points to trigger what we think are some terrifically impactful contradiction-solving opportunities.

## Conference Report – 5<sup>th</sup> Iberoamerican TRIZ Congress



Well, how's this for a first, I've never been to a conference before where I haven't been able to work out how many people attended. Not, alas, because the numbers present in Puebla, Mexico at the beginning of December were un-fathomably high, but rather because the organization was, how can I say this politely, shambolic... but in a good way, if such a concept is imaginable.

Due to commitments elsewhere, I missed the first day. According to those that did arrive into Puebla on time, though, I think a fair number also missed it. In their case, because there were no signs pointing people towards the venue. Or did the signs just point people to the wrong part of the venue? No, that's what happened on the second day. Picture a slow, random chain of people gradually meandering from one corner of the university campus to the other in the vague hope that one of them might luck upon the room where the next presentation was possibly going to take place and that about sums up the level of organisation. The third – the day I presented a two-hour session on 'Business TRIZ' – that problem seemed to have disappeared. Along with a substantial number of delegates. Whether they gave up or got sent to a different part of the city, we will never know. Fortunately, the 40 or so people who did show up for the session seemed to enjoy it. (You can too (possibly!) if you care to download the slides from our 'Free Downloads' page or from the conference website... don't hold your breath on that front though, if the organization continues its organizational prowess beyond the conference.)

Gripes about lack of organization aside, when we did get some content, the atmosphere was about as friendly and refreshingly open-minded as a TRIZ conference is ever going to get. And of course there was the usual TRIZ-conference mix of the good, bad and ugly being presented. The very best place to go and see which paper fell into which category, check out Ellen Domb's excellent (as ever) play-by-play account at TRIZ Journal.

From my perspective, what was good was the absence of the usual 'wouldn't it be nice if we could do this?' type papers, where someone presents a hypothesis they would like someone else to fund some work to see whether it was valid or not (hello, ETRIA!). Also good was the fact that there is a diverse range of academic research actually taking place in (particularly) Mexico, Chile and Brazil. Less good was that I came away from the conference with less than half a page of notes indicating that I might have heard or registered something 'new'. And less good still, the over-arching impression that I was attending yet another TRIZ conference with no real (tangible benefit delivering) stuff happening, and not much sign that it was going to start any time soon. Standing on my usual hobby-horse, TRIZ continues to give the impression of being massively disconnected from any kind of real world reality. New faces were the exception rather than the rule, and anyone that was attending for the first time, I strongly suspect, will only be back next year if their PhD supervisor demands it.

That aside, it is difficult – churlish even – to criticize an event that I was paid to attend. My sincere thanks, therefore, go to the organizing committee. Gentlemen, all in all, it was an often surreal but always genuine pleasure.

## Investments – Modern Water



As the world faces the incontrovertible truth of climate change, so politicians search for ways of protecting sources of potable water. Indeed, President Kennedy was once quoted as saying: "If we could ever competitively, at a cheap rate, get fresh water from salt water, this would be in the long-range interests of humanity and would dwarf any other scientific accomplishment."

So, step up UK-based, Modern Water, our investment of the month suggestion for December. The company has commercialised what it calls "manipulated osmosis technology", a useful bit of science developed by the University of Surrey, which, they say, will make the desalination process considerably cheaper, more efficient and more environmentally palatable. Manipulated osmosis technology works by sucking salt water through a membrane at low pressure, cutting the costs of the process compared with more traditional methods, which involve very high pressured treatment.

Commercially, Modern Water already looks like it is on to a winner. When the group came to AIM in 2008, it said it would take two years to get its first project off the ground, and sure enough its first venture, in Gibraltar, has been producing water since the end of 2008, and a facility in Oman (pictured above) was likewise handed over to commercial operators in November.

Some of the statistics on global water usage are startling. Since 1950, the world's population has increased by 200 per cent, but water consumption is up 600 per cent, meaning that a massive 1.1 billion people do not have access to safe drinking water. Modern Water says global spending on securing water sources in the next 10 years will reach \$57bn and while the group has only just started producing revenues, it is certainly hoping to get its hands on a slice of that particular pie.

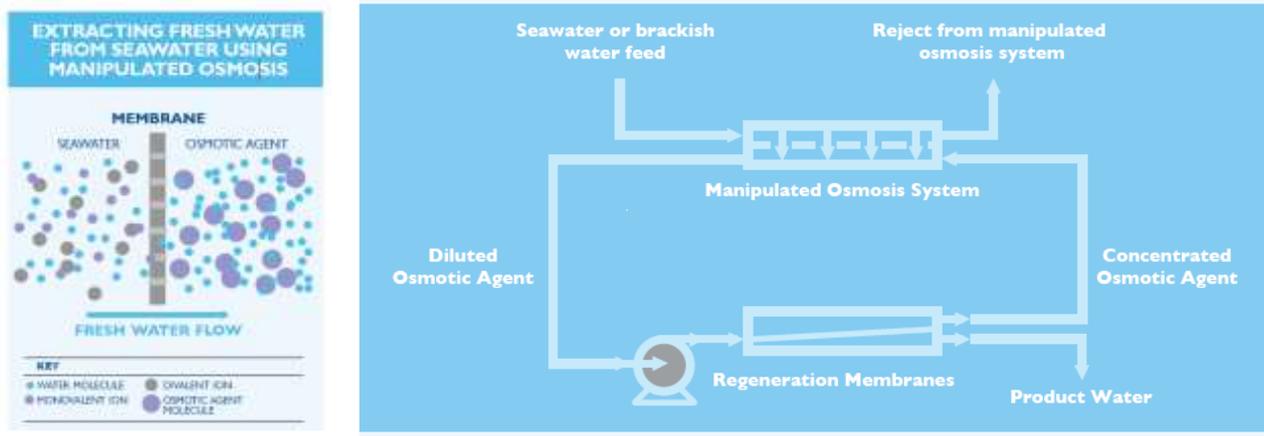
Since successfully deployed and operated internationally their patented desalination process, operating with real seawaters in challenging environments, Modern Water has established itself as the world leader in this technology. Since commissioning the Gibraltar plant, the facility has been used for development work, and is where a number of manipulated osmosis membranes have been tested, evaluated and proven in real-world conditions. The plant has been supplying water for public consumption since 1st May 2009 and now, over 18 months later, has never required membrane cleaning.

The second plant is located in the Sultanate of Oman, at an existing Public Authority for Electricity and Water seawater desalination site. Modern Water's facility shares a common

pre-treatment system with the existing conventional reverse osmosis plant, which allows the two processes to be compared using identical feed-water. The plant was fully commissioned in November 2009 and has been exporting water for public consumption since that time. As of November 2010 the membranes have never been cleaned despite the very challenging feed water conditions (an open, shallow seawater intake), whereas the conventional plant has required cleaning multiple times over the same period.

At the heart of the Modern Water process is a recirculating “osmotic agent” system that transfers pure water from the feed-water (e.g. seawater) to the regeneration (permeate extraction) system. By linking two highly optimised systems, the manipulated osmosis system and the regeneration system, significant benefits are achieved. In the first stage, feed-water is fed under low pressure to the manipulated (forward) osmosis membranes, which are highly resistant to fouling and are resistant to oxidising agents. The osmotic agent, on the other side of the membrane, draws fresh water from the seawater due to a difference in osmotic pressure. This fresh water dilutes the osmotic agent. In the second stage, permeate is extracted from the system. The pure water is removed from the dilute osmotic agent which is regenerated (or concentrated) for reuse in the first stage. This can be achieved in a number of ways depending on the proprietary osmotic agent selected.

Modern Water currently uses a membrane separation process, similar to reverse osmosis, to extract the fresh water. The manipulated osmosis membranes are inherently less prone to fouling because only low pressures (2bar) are applied to the membranes. This compares to conventional reverse osmosis systems, where very high pressures (82bar) compress the foulants in the feedwater onto the membrane surface. Less pre-treatment of the feedwater is required.

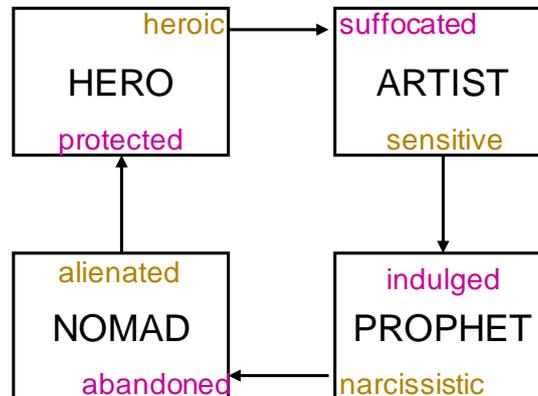


A highly optimised regeneration (permeate extraction) system is possible, because the normal limitations in the process are removed by careful selection of the chemistry and operating parameters of the osmotic agent. This leads to a lower energy consumption compared to conventional reverse osmosis, and a saving of up to 30% is possible. A lower boron content in the product water is achieved compared to a conventional plant, due to the membranes and control of the osmotic agent. This inherent capability may eliminate the need for post-treatment designed to remove problematic boron, which would otherwise increase the cost of the water produced.

Considering the untapped evolution potential still available to be captured from the system (hopefully with our help!), the substantial 30% energy saving looks like it will just be the tip of the iceberg. Remember, you heard it here first.

## Generational Cycles – Maturity

Since all generational characteristics arise from the manner in which offspring are raised by their parents, we need only look at the biggest changes in parenting behavior to gain a good insight into which generations are likely to have the biggest contrasts between them. Examining the core parent-child archetype data of Strauss and Howe



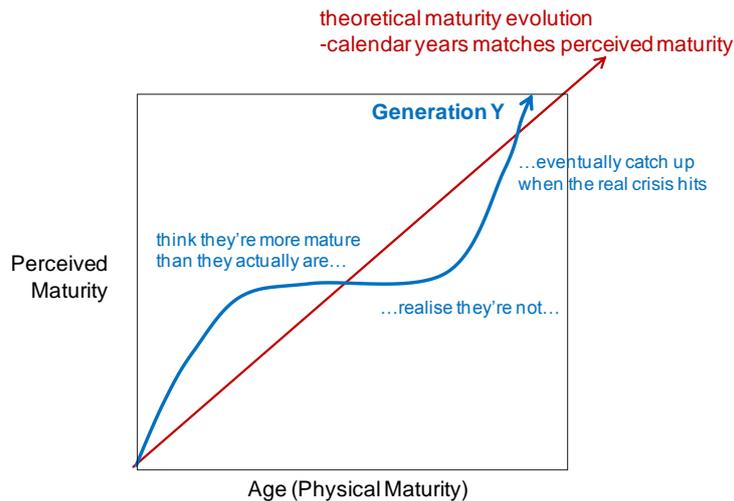
Looking at the passage from one archetype to the next, the two biggest differences are the ones between Nomads (Generation X) and Heroes (Generation Y), and between Artists and Prophets: Nomads, having been ‘abandoned’ by their parents, when they grow up and start families adopt an attitude along the lines, ‘I’m not going to let that happen to my children’ and consequently, have a polar opposite way of raising their children – they basically raised themselves and were never praised; their children have pretty much everything done for them, and are praised for even the smallest positive act.

Little surprise then that some of the biggest societal tensions arise from the resulting differences between Generations X and Y. Not, please note, between parents and their offspring – where, unlike other generations, the offspring grow up to have a very good relationship with their parents (they were protected after all!) – but rather between people in the workplace and in society at large.

At root of this difference, we think, are differences in maturation rates of the two generation archetypes. Or rather the *perceived* maturation rate. A quote that struck us as particularly apt in relation to Generation Y talked about ‘12 is the new 19; 30 is the new 20’. Because they’ve been largely protected from anything bad (a range that spans doing the laundry to being supervised 24/7 to make sure no kidnapping incidents (!)), and told throughout their lives how good they are, by the time they enter their teens, they pretty much think they know everything. Then, at the end of their teens, finding themselves out of work (over 30% of under 25s are currently un-employed in the UK), having little prospect of a future (enter the return of student protests!), and starting to have to fend for themselves and struggling, begins the realisation that, ‘hey, perhaps I’m not so smart after all’. According to the ‘30 is the new 20’ quote, they finally ‘get it’ when they leave their 20s and finally learn the lessons that their parents had so diligently protected them against.

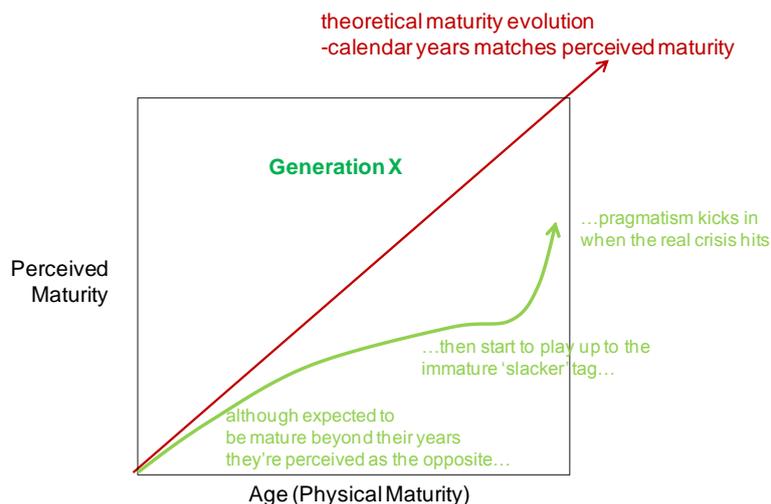
It is too early to tell what happens beyond that point, since 30 represents the age of the oldest GenY’er right now. What we do know from previous cycles of the Strauss & Howe generation characteristics, is that – like the ‘Greatest Generation’ that fought the Second World War, Heroes are a generation that have to do some pretty swift growing up when

times get really tough. Here's how we might plot that archetypal Hero maturity journey on a map plotting actual versus perceived measures of maturity:

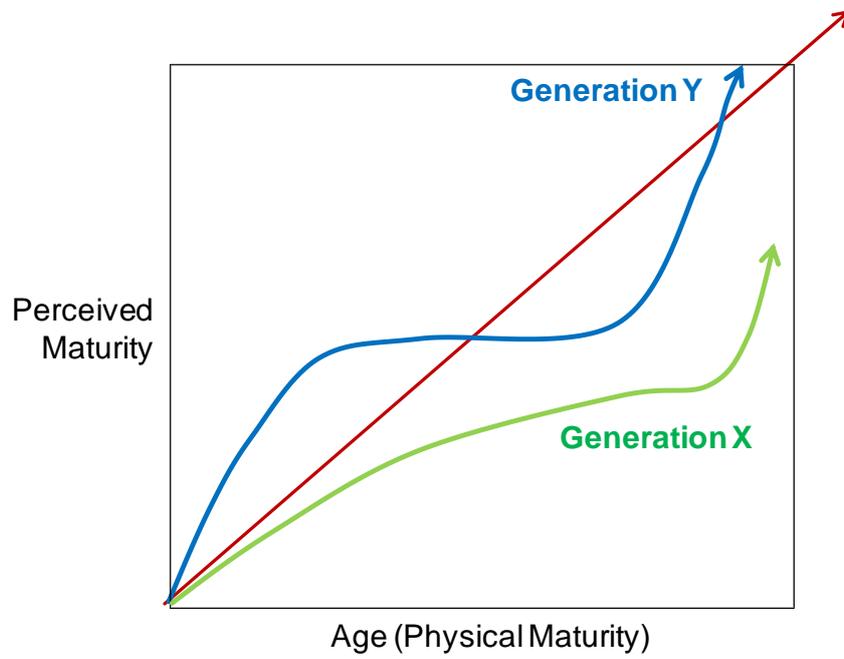


Contrast this profile with the life experience of Generation X. Here is a cohort that in essence raised themselves, and consequently had to solve a lot of life's little problems at an early point in their lives ('mum and dad are at work; I'm hungry; guess I'd better learn to use the cooker'). Contrast this with the perception of their parents that here is a generation that is a 'disappointment', a generation of slackers and good-for-nothings. Here is a generation, in other words, that although they were thrown in at the deep end and had to 'sink or swim' from an early age, so had no choice but to 'grow-up', they were perceived as quite the opposite.

Then, as is so often the case, perception becomes reality. The 'alienated' Generation X slacker starts to say, 'well, if that's what everyone thinks, that's the person I'll become. Typical again of the generation, whatever mum and dad want, I'll do the opposite: they want me to be mature, I'll become immature. Now, even though the youngest GenX'er is in their early thirties and most (that are going to be) are already parents, they are predominantly nervous and uncertain when raising their children (they weren't 'parented' as such when they grew up, so who knows what the right way to do the job is – enter TV programs like Supernanny), so have had to learn on-the-job. Part of which has been to develop a relationship with their children that is more like as peers rather than little people who needed to be navigated through life's trials and tribulations. Here's what the typical Generation X, Nomad maturity profile looks like:



Plot the two profiles on top of each other, and we start to see where the tensions between the two generations come. In theory, awareness of the problem is half the solution. Here's hoping everyone grows up in time to do something with the knowledge.



## Biology – Stoat



The stoat is one of the world's smaller predatory mammals. Being small, it has a higher surface area to volume ratio than many other mammals. Which in turn means it has to eat relatively more than its larger relations in order to compensate for a higher relative level of heat loss. Energy management is a crucial factor in ensuring survival. One of the biggest survival drivers is how much energy is expended catching prey. The big trade-off here is the one involving the desire to catch sufficient prey ('productivity') versus the amount of energy expended in catching said prey. The trade-off looks something like this when mapped onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE SELECTED:

Energy used by Moving Object (16)

SUGGESTED INVENTIVE PRINCIPLES:

19, 5, 35, 38, 9, 13, 3

The actual strategy used by the stoat is involves 'transfixing' prey by exhibiting a gentle head bobbing routine akin to a dance. Rabbits in particular appear hypnotised by this activity and fail to notice the stoat gradually getting closer until it is eventually within striking distance. Once close enough, the rabbit falls easy prey. Now it has to be said that using hypnosis is an inventive strategy which is not so easy to map onto any of the 40 Principles, never mind the ones recommended for the particular problem being solved. On one hand, Principle 35, Parameter Change is probably the easiest connection to make. But then again, Principle 19, Periodic Action seems to fit with the oscillatory motion that creates the effect. Overall though, although it might not seem so obvious, our vote goes with Principle 38 in its business and management version: 'replace a normal atmosphere with an enriched one'. Or maybe its analogue, Principle 39, would be better? Either way, its hats off to the stoat for evolving such an amazing solution to a tough challenge. One might even be tempted to say s'toatally awesome! Or then again... let's move swiftly on..



## Short Thort

*'A dreamer is one who can only find his way by moonlight;  
his punishment is that he sees the dawn before the rest of the world.'*

Oscar Wilde



## News

### UK TRIZ Forum#3

The third UK TRIZ forum event will take place in either Clevedon or Melton Mowbray on 11 and 12 May. Fingers-crossed, this year we will be including a special half day focusing on real life case studies from industry. Anyone interested in presenting is invited to submit a title and brief outline to Darrell. Ideally before the end of January.

### Graves Future

One of the things that has become glowingly apparent during 2010 is a very clear parallel between the (lack of) evolution of classical TRIZ and the (lack of) evolution of Spiral Dynamics. Along with a cluster of other frustrated SD users, we are convening a working session to begin the process of doing for SD what SI has tried to do for TRIZ. i.e. drag it kicking and screaming into the 21<sup>st</sup> Century. The session will be held in Clevedon on 16 June. Details, for anyone interested in either participating or submitting their thoughts, on the website.

### ECCI XII

2011 will see our return to the European Conference on Creativity and Innovation to deliver a keynote address. We last attended this conference series almost a decade ago. Now in its twelfth year, it represents one of the most successful creativity conferences anywhere. In a no-doubt fit of folly, we're going to present something on Gravesian

psychology rather than TRIZ/SI. Everything ultimately points in the same direction though, right? The event will take place in Faro, Portugal from 14 to 17 September. Details on the website.

### **DSM XIII**

Not quite sure how we're going to make the diary fit, but in theory at least, we're also due to present a paper at the 2011 Design Structure Matrix conference. The event is scheduled to take place in Japan on 15 and 16 September... the week immediately following the 2011 Japan TRIZ conference (8-10<sup>th</sup> if anyone is thinking of going). Readers with a very good memory may recall we've written one or two bits and pieces on the links between DSM and SI for highly complex problems. Our paper will represent an attempt to take the story to its next logical level. More crossed fingers.

### **FDM Workshop**

We will be holding a 1-day introduction to Edward Matchett's Fundamental Design Method on 31 March at the Clevedon ChangeHub. The theme of this hands-on event will be Matchett's role in helping individuals to solve problems better in a world transitioning from specialists to generalists. Details, as ever, on the Experiences page of the website. Limited to 15 places, anyone interested in attending is requested to let Hannah know as soon as possible via the usual communication channels.

### **Systematic Innovation Network**

Given that the ETRIA TRIZ conference for 2011 will be held in Dublin, it looks like we will be convening another pre-conference get-together for members of the (loose-knit!) Systematic Innovation Network. The precise date of the conference hasn't been set yet. As soon as it is, our event will either be the day before or after. The last time we all (or rather, 'most') got together was at the event in Amsterdam in late 2008. Funny how time flies.

### **EU Projects**

It looks like our partners in Austria are busy assembling two bids for EU money to conduct more research into advancement of the SI story. The first of the bids is focusing on innovation in healthcare, the 'new' element being the intention to bring a 'science of intangibles' into the healthcare story. i.e. perhaps healthcare would be cheaper and more effective if we thought about the intangible as well as the tangible drivers. The second bid takes a similar theme, but this time applied to marketing of innovations. The aim in this proposal is to address the problem that most innovation attempt failures have got nothing to do with the technical solution. Anyone interested in participating in either programme should initially contact Darrell. Proposals are due for submission in late February.

### **New Projects**

This month's new projects from around the Network:

- FMCG – shipping/logistics system Sweat
- Medical devices – IP benchmark study
- Chemical – workshop series
- Pharma – medication delivery innovation study
- Entertainment – new product design project
- Automotive – innovation culture benchmark analysis

