Systematic Innovation

e-zine

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In this month's issue:

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

Big Data Quintessence: Measuring Equality

The state of the art when it comes to measuring things like gender equality is that the powers that be conduct ethnographic research and identify simple correlating factors. Hence we will typically find things like the number of female judges and politicians within a country being used as measures of equality. While such measures certainly satisfy the criterion of being easy to measure, their relevance in terms of either the population at large or their susceptibility to corruption makes them effectively meaningless.

The other end of the measurement spectrum can be seen in the world of Big Data Analytics. Big Data sacrifices the depth of ethnographic research and replaces it with computer algorithms that sift through potentially enormous amounts of narrative data in order to extract correlations based on, usually, word counts or, at best, some kind of crude sentiment analysis. But the knowledge that words like ‘sexist’, ‘feminist’ or ‘positive discrimination’ are in regular usage in a country, or that women are on average more frustrated than men actually tells us very little about the prevailing inequality.

What we see when we think of this kind of spectrum is actually two sides of a contradiction: data is either BIG or THICK: lots of superficial thin data, or very small amounts of deeply thought through data that might actually contain some modicum of insight. Most organisations assume they have to choose a Big Data solution that sits somewhere along that spectrum. Here in the TRIZ/SI world, we know that the best thing to do is solve the contradiction. The ideal solution would be both BIG *and* THICK. It would, in other words, be both wide-reaching and capable of picking out real insight. It’s what we’re coming to think of as the ‘quintessential’ or quintessence solution – Figure 1.

So, when it comes to measuring equality, the trick is to be able to search through large quantities of narrative and other content and to be able to look beyond the mere words that are being used to see a deeper picture. Look at different parts of the world today, or look at how equality issues and awareness have evolved over time and we can quickly begin to see the subject has very little to do with counting the number of times words like ‘feminist’ appear. In the UK right now, for example, 20% of Generation Y women believe that being called a ‘feminist’ is an insult. Go back ten or so years before Generation Y came along and comedians were making jokes about the subject. Go back ten years further still and women were burning their bras. As context changes, the language of

equality – or its opposite – changes. The question, if we're ever to meaningfully measure things like equality is 'does it change in a repeatable manner?'

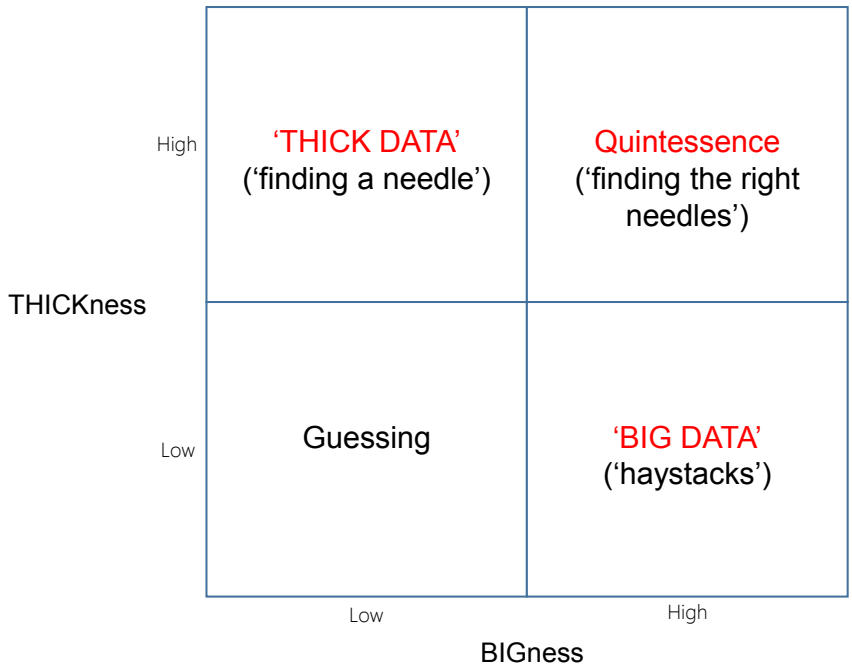


Figure 1: The BIG versus THICK Data Contradiction

Our investigation to answer the question harnessed the 15-year development pedigree underpinning our suite of proprietary PanSensic narrative analysis tools. Initiated originally following large pieces of consumer anthropology research with some of the world's foremost multi-national corporations, the heart of PanSensic is to get beyond what people say to reveal what they actually mean. We've all been in a restaurant and been accosted by waiting staff apparently keen to know how much we're enjoying our meal. And we all know that what we've told that person has very little to do with our reality. Our job is to get rid of the person as quickly as possible without causing offence. PanSensic is all about capturing the so-called 'unspoken' sentiment. Over the years we have developed a number of strategies for achieving this goal by analysing unstructured narrative data in novel ways. We now know, for example, that the rationalising part of our brain (the prefrontal cortex) is very good at rationalising a situation in order to construct the gentlest possible lie, but it isn't good enough to reframe the metaphors we use. Analyse the metaphors and we have a much greater insight into what people actually think. Are they sexist? Racist? The metaphors they use will tell us.

Hence the heart of a possible equality measurement tool answer is about evolving the core PanSensic 'read between the lines' capability and deploy it to help measure inequalities. The current suite of PanSensic tools all work in the same basic manner: We work out an ontology defining what to measure; we define a series of keywords that define whether and where a piece of data fits within that ontology; we use a semantic-engine to establish whether the found keyword is being used within the context of the desired ontology; and then we interpret what the analysis tells us. These capabilities already exist within the PanSensic tools. They've been designed primarily to analyse a given situation in a single time-slice context. Being able to detect inequality – whether it be gender, race, religion or any other form of discrimination – requires a somewhat more sophisticated set of detection algorithms. The first phase of solving the overall puzzle, therefore, needs to establish how the language of equality – or any other subject for that matter – changes as a function of time. We have found ourselves focusing on 3 areas:

The first, and most important builds from the recognition that the journey from 'unconscious incompetence' about an inequality issue (i.e. the problem exists but isn't recognised as such), through to 'unconscious competence' (when the solution is so engrained across a population that it no longer forms a topic of conversation) involves a number of inevitable stages, and that depending on where along this journey a population is, the inequality agenda will shift. Thus, to take the example of gender equality, there will be a period of anger (e.g. Suffragette movement), there will be a period of 'positive discrimination', there will be a period when society can joke about the subject, and there will be a period when the 'victims' desire to dis-associate themselves from the protest, and then, finally, a time when people no longer see what the protests were all about and the whole topic becomes a historical curiosity. This generic evolution path from unconscious competence through conscious competence, to conscious competence, and finally to unconscious competence thus forms the core of a timescale-dependent equality model:

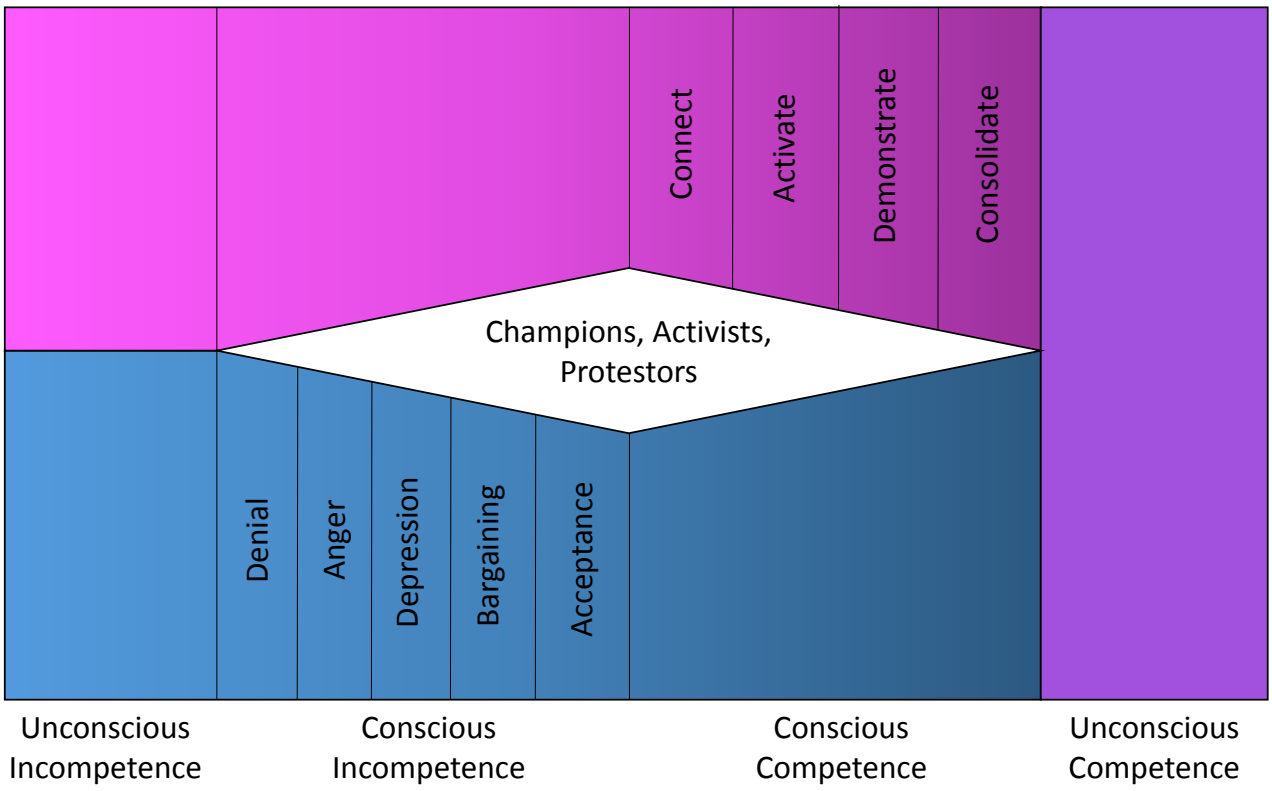


Figure 2: The Journey From Unconscious Incompetence To Unconscious Competence

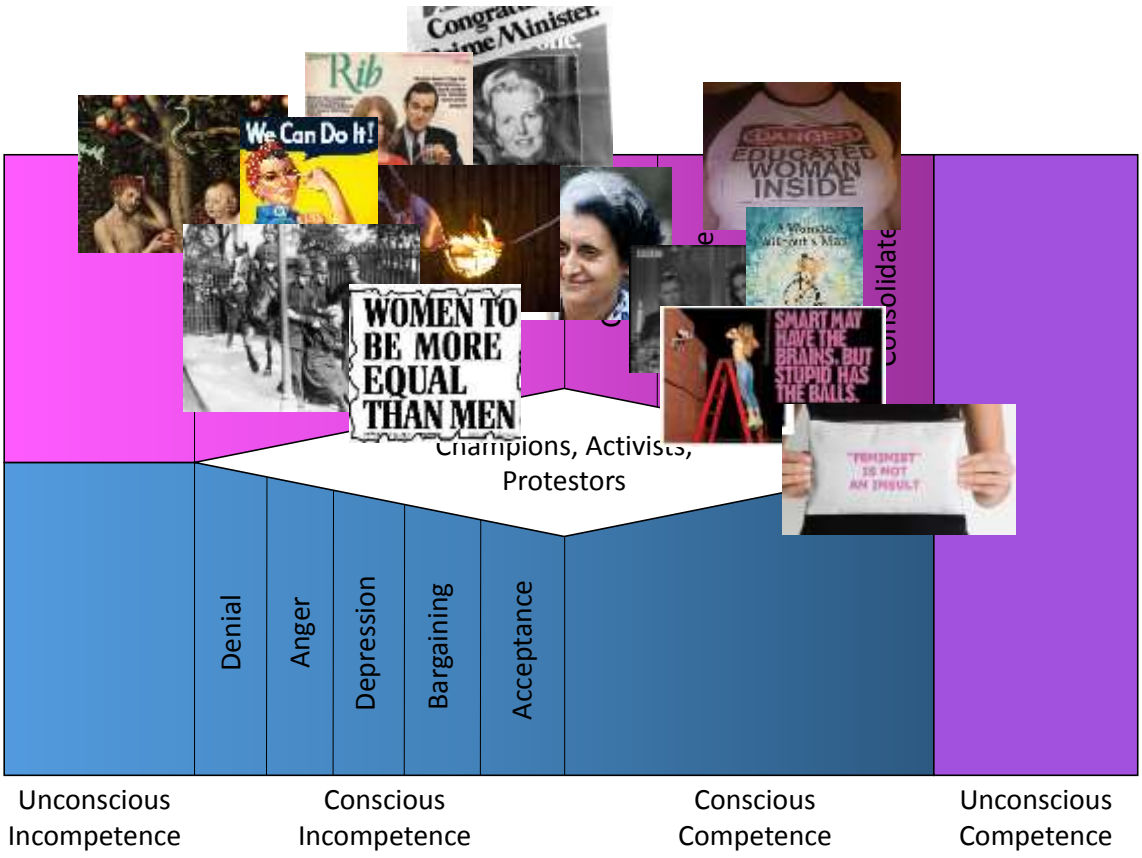
The second stage then took a more detailed look at each of the four phases of the competence journey. Two of the four stages in particular quickly emerged as the subject of much prior research by others. The Conscious Incompetence stage, for example, is all about realizing we're wrong about something, and that the human brain effectively passes through a Grief Cycle (Reference 1) every time we realise we're wrong about an issue, no matter how trivial it might be. As shown in Figure 2, the basic stages of the Grief Cycle are the same irrespective of whether we're grieving for a lost relative or whether a friend just asked us a Trivial Pursuit question and we got that wrong. Only the duration of the cycle differs: getting over the lost relation might take years; getting over failing to remember the capital city of Uruguay might take a few minutes. Either way, getting something wrong – like assuming men are somehow superior to women, a trait that seems to have affected the male population from around 200,000BC through to around the 1928 (or 1971 if you happen to live in Switzerland), involves a period of Denial, then Anger, then Depression, then Bargaining, and finally Acceptance. The language used and emotions expressed by

both sides of the equality issue vary in each of these phases, and thus any analysis tool needs to be able to recognize each of them separately.

The same sort of thing happens during the next stage of the Competence journey. Conscious Competence is all about learning cycles, of which, again, in classic 'someone, somewhere already solved your problem' fashion, there are multiple different models to play with. The one we ended up using is also shown in Figure 2 – Connect-Activate-Demonstrate-Consolidate.

The third piece of the jigsaw, finally (so far at least), is to recognize the importance of tracking the language being used not only by those on either side of the particular equality issue (i.e. men and women when we're thinking about gender equality), but also those that effectively take up an active role at the boundaries between the two. We've tried to represent this third faction by the white diamond-shaped region in the Figure 2 plot. It is diamond shaped because during the conscious incompetence and conscious competence stages of the overall evolution journey, there is an increasing followed by decreasing need for activists, champions and protestors. The third aspect to an equality measure, therefore is working out what proportion of a population falls into this diamond-shaped category. And the best way to do that is to, again, look across as wide a span of the population and, these days, social media in order to establish how many people are using which sorts of language.

Bolt all that together and, so we're beginning to be able to demonstrate to ourselves and our pioneering equality-measuring clients, the mess of apparently conflicting messages and narrative begins to become clear:



Work out when comedians are making jokes about an equality issue and you know where in the journey you are (conscious competence, activate). Work out when expressions like 'positive discrimination' are being used and you know where you are in the journey

(conscious incompetence, bargaining). Work out when those on the 'oppressed' side of the inequality story are seeking to distance themselves from it, and you know where you are in the journey (conscious competence, consolidate). It's not a perfect science yet, but it's getting there, and, we already know it's a far more effective way of measuring reality than counting the number of judges of a particular gender, race or creed. And, thanks to PanSensic, it's also, now everything is set up, an awful lot easier to do.

Reference

1) Kubler-Ross, E., Kessler, D., 'On Grief And Grieving: Finding The Meaning Of Grief Through The Five Stages Of Loss', Simon & Schuster Re-issue Edition, 2014.

A Crash Course In Complexity

"If a factory is torn down, but the rationality which produced it is left standing, then that rationality will simply produce another factory. If a revolution destroys a government, but the systematic patterns of thought that produced that government are left intact, then those patterns will repeat themselves… there's so much talk about the system. And so little understanding."
Robert Pirsig, Zen & The Art Of Motorcycle Maintenance

"Some problems are so complex that you have to be highly intelligent and well-informed just to be undecided about them."
Laurence J Peter

One of my favourite experiences in the whole world is watching a murmuration of starlings. Half a million small birds flying in spectacular close formation before they roost for the night, creating an ever changing pattern in the sky. Not only is it beautiful to watch, it's also a terrific example of a complex system in action. No-one can (including the starlings themselves) predict what the shape of the murmuration will look from one moment to the next. The overall shape of the murmuration is what complexity scientists would describe as 'emergent'.

Emergence is a key property of any complex system. Here's a list of some of the other important characteristics of complex adaptive systems, as may be relevant to the context of problem solving and innovation :

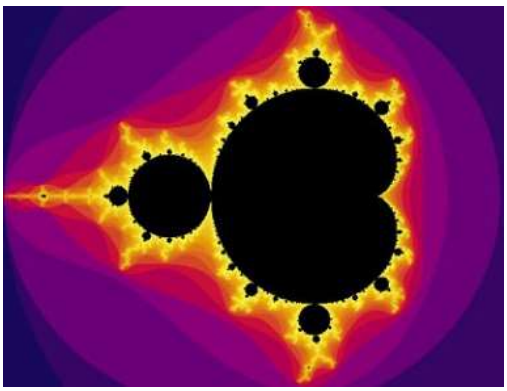
1) There is no definitive formulation of 'the problem'… you don't understand it till you solve it
2) There is no end to the problem
3) Solutions are not true-or-false, but merely 'good'-or-'bad'

SYSTEM·ATIC INNOVAT·ION

4) There is no immediate and no ultimate test of a solution to the problem. Every instant of the problem is essentially unique ('you can never step in the same river twice')
5) Every solution to the problem is a 'one-shot operation'; because there is no opportunity to learn by trial-and-error, every attempt counts significantly
6) There is not an enumerable set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into a plan
7) The problem is a symptom of another problem.
8) The existence of discrepancies when representing the problem can be explained in numerous ways – there is no such thing as 'the root cause'
9) Small discrepancies in understanding or modelling of the system can quickly get magnified into extreme differences in outcome (the apochrypal butterfly flapping it's wings and causing a hurricane, and pretty much any attempt to predict weather)
10) The choice of explanation determines the nature of the problem's resolution
11) Every complex system 'emerges' from the interaction of one or more basic underlying principles ('levers of influence'/'DNA'). The more complex the problem, the more hierarchical levels of these underlying principles there are likely to be.
12) The quality of the solution is determined by the proportion of 'all' the underlying principles that are understood and have been incorporated into the solution model ('Only variety can absorb variety')
13) The connections between the things in the system are more important than the things.
14) The 'best' way to solve a complex problem is to make modification at the principle level.

In the case of the starling murmuration the underlying principles from which the overall shape and pattern emerges is quite simple. There is no controlling starling with a master plan, there is simply a heuristic 'fly as close to your neighbours as possible' being enacted by each and every starling. Watch a murmuration for a while and you notice that there are never any impacts. Try and focus on one single starling and you'll start to see how it applies the simple 'stay as close as possible' 'rule' and how tiny variations in their distance serves to trigger enormous changes in the shape of the overall murmuration.

If murmurating starlings illustrate emergence in action from a relatively simple heuristic, mathematician Benoit Mandelbrot went a whole world further when he first published pictures of what we now know as the Mandelbrot Set. Amazing levels of complexity all arising from some apparently benign and extremely simple mathematics – $f(z) = Z^2 + C$. How could it possibly be that such simplicity could produce such hypnotic beauty?



The Mandelbrot Set kind of looks like nature, but actual nature is where we need to head in order to find the most amazing illustrations of emergent behaviour. One of the most

remarkable nature-made structures is the termite mound. Amazing structures, sometimes several metres high, built by hundreds of thousands of termites, with, again, no master plan.

Termites are small and their brains even smaller, so the instructions they are able to follow are relatively simple. Not quite so simple as ‘fly as close to your neighbour as possible’, but not by much. Termite mounds emerge from a set of ‘rules’ that look something like this:

If Queen pheromone level exceeds threshold, go collect material
Walk around randomly; if you find useful material pick it up; if you find other useful material, put what you have down.
If temperature or oxygen level inside the mound drops below a comfortable level, block exit and entrance holes; if temperature or oxygen level exceeds a comfortable level, clear the exits and entrances.
If unexpected holes appear; fill them

And that’s pretty much it.
Every termite mound emerges to be completely unique, but at the same time, they’re all pretty much the same. And they will be continue to be so as long as termites keep applying the same basic principles.

If we wished to encourage termites to make a ‘better’ mound, the way to do it would be to change those principles. Any other means of altering the design of a mound wouldn’t work – the termites would simply keep applying their already established rules and the mound as we know it today would consistently ‘re-emerge’. Take a chainsaw and lop the top off a mound, and within a very short while it will magically re-appear.

The ultimate point here is that whenever we (humans) attempt to change a complex system by any other means that changes to the underlying ‘’DNA’ principles, the system will always naturally return to its original state. We see this in action with the large majority of change initiatives inside organisations: a willful manager decides they want to (say) create an ‘innovation culture’ across the business and then try and bludgeon everyone into complying with their desire. If they’re lucky, they might get some actual useful innovative

output for a while, but if they haven't understood or made the change happen at the 'DNA' level, very soon after they depart for pastures new, the system will revert to its previous un-innovative state.

Even when we try and change a system at the principle level, in the majority of cases, we end up with a mutated system that is worse than it was before. We can observe a very simple example of a 'principle-level' change in a starling murmuration if a hungry falcon happens to turn up. Add a falcon to the murmuration and the 'fly as close to your neighbor as possible' heuristic very quickly gets replaced by another rule: 'get away from the falcon'. Add the falcon to the system and the beautiful display of mass aerobatics quickly turns into a chaotic mess of starlings flying into one another.

A big part of the SI research is trying to get to an understanding of how complex systems – like 'society' – work at this 'principle' level. TrenDNA, for example, has DNA in its title because our aim was to uncover the underlying principles that influence and drive why systems emerge in the way they do. The Strauss and Howe 'generation cycle' theory and the underpinning 'DNA' idea that society emerges from the way in which parents raise their children and how, for each generation, the choices a parent makes are in turn influenced by how they were raised by their parents. There is no absolute rule that says society has to go through a crisis period every four generations, but merely that, so long as this parental influence 'DNA' remains present in the way it is, it's very likely we'll keeping seeing the same four generation archetype picture emerging and re-emerging.

Trying to innovate in this kind of complex environment, we propose, fundamentally means altering the system at this principle level, and, moreover, doing it in such a way that, unlike what happens when we add a falcon to a murmuration, we find a change or combination of changes that somehow cause the system to emerge in a manner that is fundamentally better. There's no rule that says society 'has to' enter a crisis period every four generations, but we'll only ever successfully avoid periodic crises if we manage to somehow alter the parent-child influence model in some way. And, moreover, to do it in such a manner that we avoid the human equivalent of falconry.

We might go so far as to say that innovation only really has the chance to happen when we are able to make changes at the core principle level. Put another way, if we don't understand what the principles from which our current system has emerged, our chances of innovation success are diminishingly small. Which means, we think, that the key

question for any prospective innovation team, when they're thinking about 'what don't we know yet?' is how well we do or don't know what the underlying principles – the $f(z) = Z^2 + C$ – of our system are.

Spend a few moments thinking about whether you think you might know what they are for a system you're currently responsible for improving, and we suspect you'll quickly begin to see why such a large proportion of innovation attempts end in failure. It's not supposed to be a scary thought, but it probably is anyway. Call that an underlying principle.

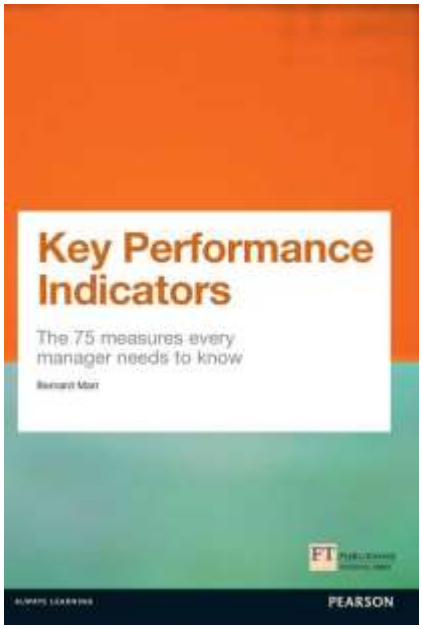
Worst Of 2015 Awards

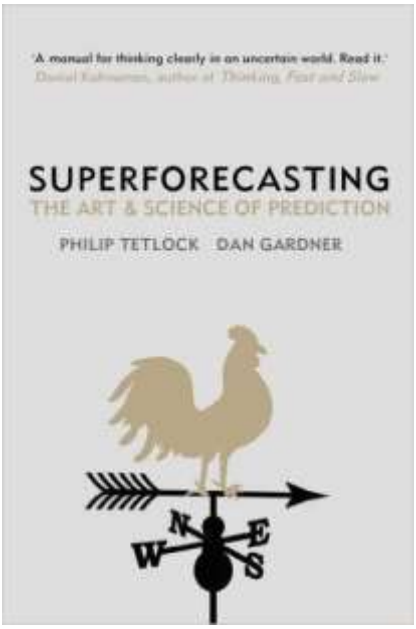
Yet another red-letter year of First World problems, prancing jobs-worth's and race-to-the-bottom trivia…

Joint 'It-Can't-Be-KLM-Again Suck'y-Airline Of The Year' and 'All-Conversations-May-Be-Recorded-For-Training-Purposes Customer Service' Awards – 2015 was great. No Wizzair flights. No KLM. No Air France. No Delta. It was like I was living the dream. True, I never had a British Airways flight that arrived on time, and EasyJet continued their gentle tailspin towards an entire fleet of cabin attendants with the social skills of a bear with four sore paws, but previous year's had told me to grit my teeth and take lots of calming drugs on my walk up the aeroplane steps. EasyDrugs. So, for the first time in a long while, we've had to look more broadly to find a worthy winner of the 2105 Service Award. In the end, however, there was only going to be one winner. Congratulations, India Tax System officials, the prize is yours. A body of people whose collective job seems to be to make sure nothing productive ever happens. The SI Accounts team spent six months of 2015 failing to get our Tax Exemption certificate sorted. Every time the forms came back there was a different problem. This doesn't tally with that. You haven't filled this box in correctly… yes, we have… oh, well, in that case, you haven't filled this one in correctly. Individuals need to get an apostled signature at the India High Commission… but we're a company… oh, so you need to fill this form in… we filled that form in two iterations ago. In the end, we were left convinced that the Tax Office rules were being re-written right in front of our application. The moment we looked like being somewhere close to the final iteration, was the exact same moment a new rule was going to appear to make sure another iteration was going to be needed. At the end of the six months, we'd spent more in administration than we were going to retrieve in the withheld taxes owed to us. Which was probably the point. Hands-up, we submit.

The Depeche Mode Everything-Counts-In-Large-Amounts Literature Award – with close to 6000 management text books published during 2015, there was certainly no shortage of candidates for our Literature Award this year. Although, assuming you discard all of the random self-published, 27p on kindle efforts produced by the 200,000 authors that existing in various states of self-delusion and/or low-IQ, it seems the established publishers have upped their game when it comes to filtering out the outliers. Sadly, they seem to have filtered out the Five-Star efforts as well as the One and Two Star dross. Or at least that's what I think is happening, in which case, I wonder where the Five Star books end up? Either way, what their absence leaves us with is an ocean of Three and Four Star tomes. Not such a bad thing, you might say, except for the fact that there's now so much average-ness to choose from, it can become quite bewildering. My fervent wish for 2016 is that the world acquires a smart critic capable of calling a spade a spade again. Average-ness and not-rocking-the-boat might be good when I'm looking for a book to read sitting in my padded cell, but not so great when it comes to shaking an ever-dwindling supply of management bravery out of its malaise of Valium-torpidity. I won't be holding my breath. Far easier to keep our eagle-like eyes open for the occasional publisher faux-pas. The books that superficially look like they're Three Star review material (especially if we can get the author's best friend to write a good Amazon review for us the week before the book is published), but quickly turns out, after the obligatory Chapter One scene-setting, to be a steaming pile of mis-direction and ill-conceived theory. Enter our joint winners, Superforecasting and Key Performance Indicators. The latter of which perhaps offers up

an early clue as to its overall stupidity in its sub-title, ‘the 75 measures every manager needs to know’. 75? Really?



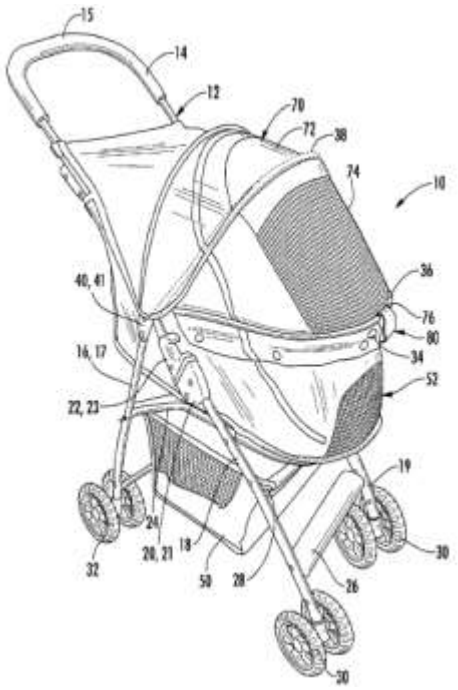


One argument here – I’m sure Pearson would make if I was motivated enough to go ask them – might well go something along the lines, ‘aah, yes, of course the business world is increasingly complex and so maybe it is actually necessary to be measuring these 75 key performance indicators’. The book’s back cover tries to explain further: *Key Performance Indicators (KPIs) should be the vital navigation instruments used by managers and leaders to understand whether they are on course to success or not. The right set of KPIs will shine light on performance and highlight areas that need attention. Without the right KPIs managers are flying blind, a bit like a pilot without instruments. The problem is that most companies collect and report a vast amount of everything that is easy to measure and as a consequence their managers end up drowning in data while thirsting for insights.*
I like the part that talks about the easy-to-measure trap. For a second it made me optimistic that the 75 essential KPIs were going to be in some way useful. Things like how engaged are your employees, how much do your customers trust you, how many and who are the ‘go-to’ people in the organisation. Unfortunately, what we end up with is a monotonous list of the usual (tangible) suspects. Bernard Marr, sir, with all due respect, it is people like you that is slowly killing every organisation on the planet by encouraging them to measure stuff that sounds sensible but turns out to be what-gets-measured-gets done-poison. The book you should have written was the book about measures that the organisation should try and work out how to measure, not a list of clichéd stupid things to measure. If I may make a suggestion, the 76th KPI on Mr Marr’s list out to be a ‘Marr Index’ – which I imagine as something like the irretrievable damage caused to an organisation that introduces any of his recommendations.

If Bernard Marr is blind, that still leaves him at an advantage over our second winners, Tetlock and Gardner for their Superforecasting idiocy. Some readers may remember Philip Tetlock as the researcher who was able to demonstrate that a troop of monkeys throwing darts were as good as the best stock-market trader when it came to picking market winners. That was a meaningful research finding, in so much as the financial institutions of the planet would like to dig a 20m deep hole and bury the finding lest society demand they take a 95% pay cut to join the rest of us.
This time around, Tetlock, no doubt still feeling the ire of the banks, chose to flip the story around 180 degrees. Some people, his new research informs us, are actually ‘super-

forecasters', their predictions come true much more often than the average chimpanzee. Hmm, interesting. Maybe there are people who just manage to be born with uncanny powers of prophecy. Like a cross between Warren Buffet, Jesus and David Icke. It might happen. Sadly – again – what the actual research results show is that some people are slightly less shit at predicting the future than others. Like the people at the ends of an everyday normal curve. People that actually study the way the world works and think about the anomalies and how they might be used to enhance theory. People that do some real thinking in other words. Not that this makes them in to 'super-forecasters' in anybody but Tetlock and Gardner's minds, but then again calling the book 'work really hard and be slightly less bad at predicting the future' doesn't sound like nearly such a great proposition in the airport bookshop. Just to be clear here, I have nothing against people that work really hard to try and predict the future, but when I find myself ploughing through 352 pages and don't see any mention of discontinuity or s-curve or step-change and you know something's gone massively astray in the brain department. The reason predicting the future is really, really difficult has got nothing to do with the mathematics of rising and falling markets, and everything to do with the complete absence of any meaningful mathematics when we see a system jump from one way of doing things to another.

The Necessity-Is-Not-Always-The-Mother Invention Award – the only sure-fire bet in the SI patent research team is that when it comes to tracking down the worst inventions of the year, the most fruitful place to go and look is pet-care. People love their pets. Some people love them so much they invent solutions for problems the pet themselves never knew they had. Like having to walk. It can be such hard work. But, thankfully, now we have US9,215,859, it doesn't need to be any more. Here it is:

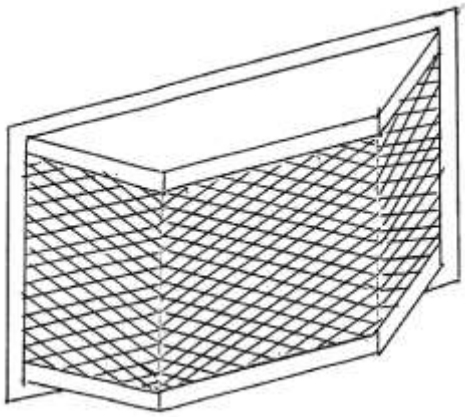


Does it look familiar in any way? Like a pram, perhaps? US9,215,859 is basically a pram for pets. Here's what the invention disclosure has to tell us about poor tired-of-walking kitty and the miraculous solution they can now expect to live the rest of their life enjoying. The trick is trying to spot the inventive step:

It would be desirable to provide such a pet stroller with a platform seating area having a sidewall which is defined and usable when the canopy is opened. Further, it would be desirable to provide for a more secure assembly of the platform to the frame in the open, use position of the stroller.

Yup, that's right, there isn't one. So not only congratulations to inventor Chris Jakubowski in Vermont for his inspiration in 'inventing' the pet-pram, but also to the patent examiner that allowed it through the system. I bet you went home feeling proud the night you decided to grant that one.

Probably almost as much as the brain-dead clot that granted US9,072,275:



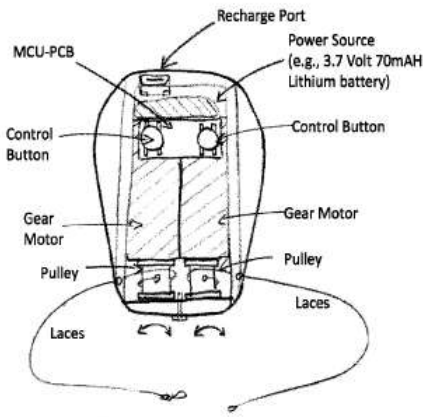
The 'Panoramic Pet View' is a new approach to allowing pets to look through a wall or a fence. It provides a 180 degree view for the pet, and the pet can turn its head inside of the Panoramic Pet View. The design of this device allows the pet to hear sound as well as seeing in all directions including up and down.

Let's play 'spot the inventive step' again:

1. A panoramic pet view device comprising: an enclosure protruding through a hole in a fence; said enclosure comprising a first side, a second side, and a back edge parallel to a front side; said first side, said second side and said front side comprise a reticulate material; said enclosure further comprising a top imperforate surface and a bottom imperforate surface; and said enclosure being contained such that a pet cannot fit through said reticulate material or said enclosure.

Nope, nothing.
I wonder, though, if I make the top or bottom perforate rather than imperforate whether I get to design around the patent? I think the pet would appreciate the gesture – now all the drool drips through onto the neighbour's garden rather than mine.

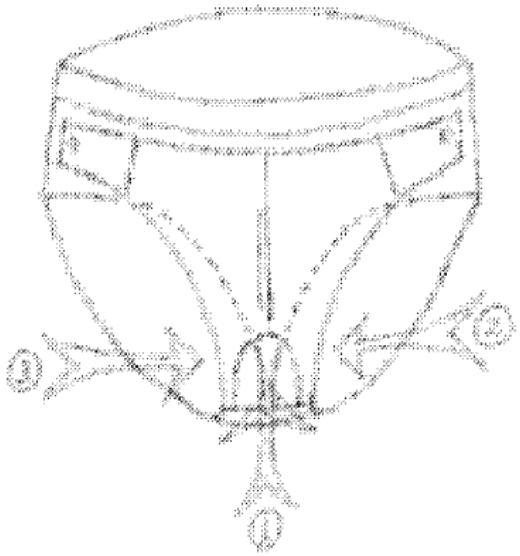
Enough of pets already, what the world really needs is another 'Device for automatically tightening and loosening shoe laces'. A pair of inventors this time, from Utah no less. US9,204,690 was granted on 8 December.



You had me at 'gearbox'.

A good attempt, but not our winner. The eventual award just had to go to US9,173,434, ‘21 century underwear for men’. Not only is the ‘invention’ quite delusional, the rationale (and Engrish translation of the original Korean) behind it is indubitably why this one got through the US Patent Office. How the examiner kept a straight face I will never know. Here’s the Abstract to give you a taster of what’s to come:

The present invention relates to underwear for men. Information that it is good to maintain the underbody (genital organs) of men cool have been already been attested in scientific theses of foreign universities. It has been proved that the spermatogenic ability of men (genital organs) is further higher in an environment lower by 2 to 4 Celsius than body temperature. However, despite the above-mentioned scientific evidence, underwear for men up to now has been produced in the same simple shape for protection against the outside without distinction from underwear for women. The present invention relates to 21 century underwear for men which is different from conventional underwear for men and which causes improvement in skin health and reproductive ability in a sanitary and health manner. The 21 century underwear for men of the present invention was invented to accomplish the following two purposes: first, separating the genital organ area (testicles) of men from the groin area (thigh) so as to keep skin healthy from eczema and avoid the influence of body temperature, and second, forming ventilation openings at least in three directions under the genital organ (testicles) of men so as to keep the genital organ area further cool and to thus healthily and naturally (without chemicals) improve the reproductive ability of men. That is, the present invention is novel 21 century underwear for men which 1) prevents skin disease such as eczema which may be commonly caused between the groin and scrotum of men and separates the genital organ and the body (thigh) area so as to separate the genital organ from the body heat, and 2) forms ventilating openings in three or more directions to enable constant ventilation in the genital organ area and to maintain a more sanitary and cool environment, thus providing further good influences to the reproductive ability of men.



And here’s the main claim:

1. A men's undergarment comprising: a first fabric section, the first fabric section defining a waist aperture, a left leg aperture, and a right leg aperture; and a second fabric section attached over the first fabric section, the second fabric section defining a first ventilation aperture that overlaps the left leg aperture and overlaps the right leg aperture, the first and second fabric sections being configured to situate male genitals between the first and second fabric sections, thereby isolating the male genitals from a body of a wearer, the first and second fabric sections together defining a second ventilation aperture, the second ventilation aperture being situated between the left leg aperture and the second fabric section, and the first and second fabric sections together defining a third ventilation aperture, the third ventilation aperture being situated between the right leg aperture and the second fabric section.

Which, if my thinking is correct, effectively means ‘boxer shorts with a hole in them’. I am currently checking CCTV footage to see if the inventors have been rummaging through my underwear drawer for their inspiration. Most people throw their boxers in the trash when they wear out. Now it’s called a patentable invention. I’m in the wrong business.

The Slow-Fast-Moving-Consumer-Goods Design Excellence Award – back to pets for a second or two, this time for an idea that seems to have actually made it all the way to being an actual product that some people might contemplate spending actual money on. Enter ‘Twinkle Tush’:

For all those people that don’t like looking at their cat’s arse. Given the choice of the arse-view or cleaning my spangly new Twinkle Tush, I think I’d rather sell the cat.

Time for a shower I think. Now, where did I put the soap? Ah, here it is…

Sometimes I wonder how I’ve managed to live so long without smearing fake-snot over myself in the morning. They say innovation is all about spotting hidden consumer needs. Someone has spent too long in regression therapy methinks.

Probably listening to this:

I don't know which is worse, forcing a newborn baby to listen to Nirvana, Red Hot Chili Peppers and Metallica, or listening to xylophone cover versions. Still, I can vouch for the efficacy of playing Rockabye Baby in the office: guaranteed to ensure meetings are finished in less than ten minutes….

…which then leaves plenty of time to re-convene in the local restaurant for a good-old British fry-up. Served on…err, a shovel….

I think it's called a metaphor. Just not the right one.

Perhaps it's better for people to bring their own lunch. Enter our Bad-Design runner-up winner for 2015, the Donald Trump lunchbox:

What schoolchild wouldn't want to go to school carrying one of these? Short of tattooing the child's forehead with the words 'my parents have a collective IQ of 55', I can't imagine a better way to get poor little Johnny beaten up in the playground. Unless he has time to open the box up and share its contents. Kraft cheese slices, SunnyD, candy cigarettes and a Glock 19 anyone? All hail the American Silent Majority, your time is nigh.

Time to move on before that image has time to stick in my head long enough to know I'll be laughing on the other side of my face come the US election later this year. Time for our real winner. Hello Apple!

Now, I imagine you're expecting us to give the Award to Apple for the truly dire Watch monstrosity, but, no, you're wrong. The winner is far more subtle. Congratulations instead

go to the iPhone 6s ‘smart’ battery case. A mere $99 to turn your expensive design statement into a clunking hunchbacked monstrosity…

...it’s almost like the Apple design team have forgotten what ‘insanely great’ was supposed to be about. It’s about not compromising you dummy. I know the iPhone battery life is measurable in minutes, but the way to solve the problem is not to bolt a brick on the back of the phone. Shoddy. Utterly shoddy….

Let’s All Jump Off A Cliff Advertising Suicide Award: ..a bit like Apple’s ‘only thing that’s changed is everything’ advertising claim for the 6s. Perhaps they were thinking about the $99 ‘smart’ battery case?

Sadly for the Apple Marketing Department, they were no match for the UK Labour Party in 2015. Admittedly, in leader Ed Miliband they had slightly less to work with than Apple had with the $99 ‘smart’ battery case, but surely someone in the Party machinery was still compos mentis enough to veto the ‘tablet of stone’ marketing idea? Nope:

SYSTEM ·ATIC INNOVAT· ION

If only more political parties had the gumption to spend £10,000 writing trite motherhood statements onto marble headstones… hey, Donald, I think I have an idea for you…

Meanwhile, back in the world of budget accommodation, it feels like I've spent the year dodging creepy adverts from the two main UK 'bring your own anti-bacterial-wipes' hotel chains. For a reason known only to themselves, Permier Inn have adopted comedian Lenny Henry as their go-to-guy when it comes to encouraging the weary traveler into their purple hostelry. Nothing against Lenny Henry – he was funny once (23 August, 1987) – but, frankly, I don't ever want to sleep at night with this image as the last thing I see before I turn out the light:

Trust me when I say that this was not guaranteed to give me a good night's sleep. Unfortunately, when I went to the reception desk the following morning, my compensation claim was not received well. Never mind, I'll go to Travelodge instead….

…hmm. Maybe I should just stay home? Whatever possessed the Travelodge Marketers to think that a creepy puppet version of me sitting next to me on my bed was better than thinking about Lenny Henry, my psychiatrist will happily confirm, you were wrong. Very wrong indeed.

Patent of the Month – Water-Driven Polymer Composite Actuator

Here's another one we've been watching for a couple of years. The first paper was published in 2013, now – 12 January 2016 – the patent has finally been granted. Congratulations to the MIT team of inventors for US9,236,556, our patent of the month this month.

Here's what the invention disclosure abstract tells us:

Water-responsive composite materials are provided containing a polymeric matrix and a water-responsive gel integrated into the polymeric matrix. The water-responsive gel can include a polyol or an alkoxylated polyol crosslinked by reversibly hydrolysable bonds, such as borate ester bonds. The polymeric matrix can include conjugated polymers such as poly(pyrrole) containing polymers. The composite material is capable of rapid actuation in the presence of a water gradient and can exhibit power densities greater than 1 W/kg. Methods of making water-responsive composite materials are provided, including by electropolymerization. Devices containing water-responsive composite materials are provided for sensing, locomotion, and power generation.

A bit of a mouthful, granted (the whole invention disclosure, unfortunately, follows the same tone), but look past the chemical detail, and something important is happening. The 2013 paper does the best job of explaining what's going on:

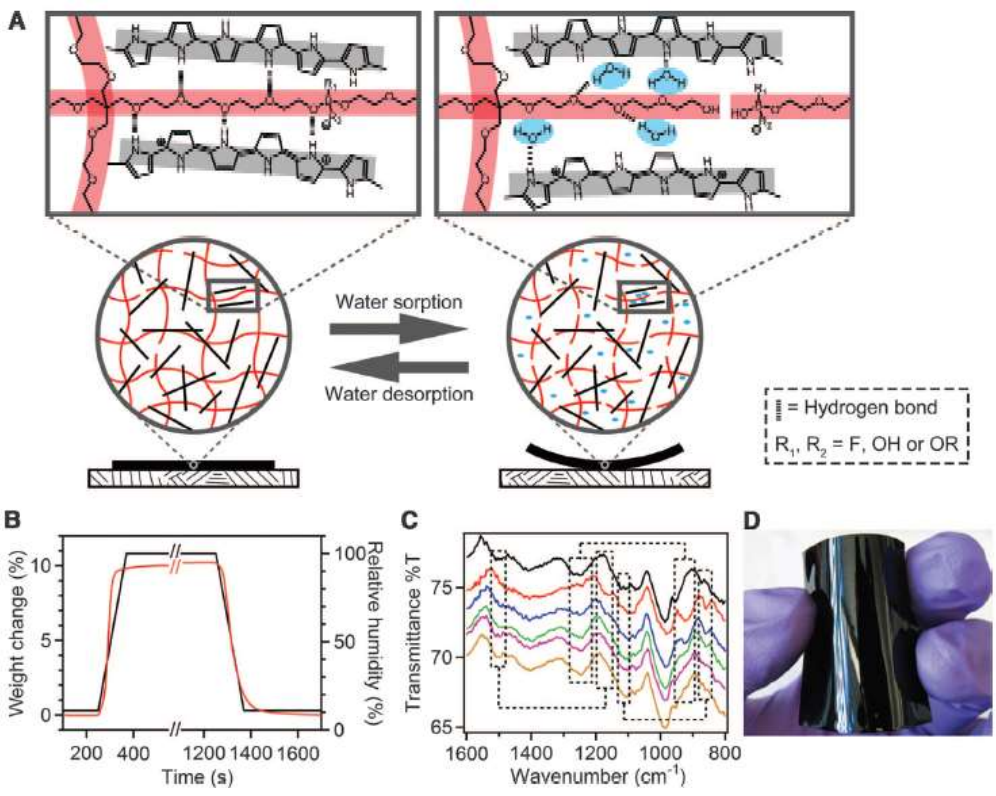


Fig. 1. Characterization of PEE-PPy composite films. **(A)** A PEE-PPy composite film (black) is composed of PPy polymer chains (gray lines) and a PEE-borate network (red lines). The structure changes (involving H bonds and borate ester bonds) in response to water (blue dots) sorption and desorption. **(B)** PEE-PPy weight change (red) synchronizes with air humidity change (black). **(C)** ATR-IR spectra showing H/D exchange between the PEE-PPy film and water vapor. Top to bottom: before D_2O exposure and 0, 1, 2, 3, and 4 min after D_2O exposure. Dashed lines indicate the three pairs of shifting peaks. **(D)** A PEE-PPy film maintains its flexibility and mirrorlike surface after 6 months of open storage.

Being able to generate power from a water gradient sounds like a good thing to be able to do. In that regard the patent could be seen as a rare 'new function' entry onto our Function Database. On the other hand, things are rarely that simple. Here's what the inventors tell us about the prior art problems they've had to overcome:

Polymeric materials that reversibly change shape, size, and/or mechanical properties in response to external stimuli have attracted considerable interest due to their potential applications as actuators for biomedical and mechanical purposes. Responsive polymeric materials can be divided into three classes: (1) electro-active polymers; (2) light or thermal responsive elastomers; and (3) pH or solvent responsive gels. Many organisms use water-sorption-induced swelling for actuation. Several types of water-responsive hydrogels have been developed for actuator fabrication, but they exhibit slower response, lower stress generation and marginal stability in comparison to animal muscle fibers.

Polypyrrole (PPy) is an electro-active polymer with many desirable properties that could allow it to act as an artificial muscle. PPy can also absorb water and change its shape, which is the basis for driving motion in a rotary actuator. However, the PPy rotary actuator outputs little mechanical force or power, in contrast to PPy-based electro-actuators. Okuzaki's actuator, based on a small anion-doped polypyrrole (PPy/ClO.sub.4), responds due to the polypyrrole's water-sensitivity, which is mainly a physical sorption/desorption process and has a weak impact on the polymer's mechanical properties. The weak physical sorption/desorption process in Okuzaki's actuator leads to weak force generation and low water-induced stress. The maximum water-induced bending force in Okuzaki's actuator is only 4.5 times its own weight. The maximum water-induced strain of Okuzaki's actuator is 0.36%. Water sorption/desorption induced bending is slow. Therefore, the low stress generation of Okuzaki's actuator limits its potential for commercial applications.
There is a need for a water-based actuator capable of generating suitable levels of mechanical force or power for commercial applications.

Which, translated into TRIZ-English means that there is a contradiction between the desire to generate force and power and the inability to get the sorption/desorption process working better. Here's how we might best map that onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Force/Torque (15) and Power (18)

WORSENING PARAMETERS YOU HAVE SELECTED:

Speed (14) and Stability (21) and Adaptability/Versatility (32)

SUGGESTED INVENTIVE PRINCIPLES:

15, 35, 19, 3, 13, 1, 28, 24, 2, 10, 17, 12, 37, 31, 9, 21, 29, 40, 32, 34, 4, 18, 14

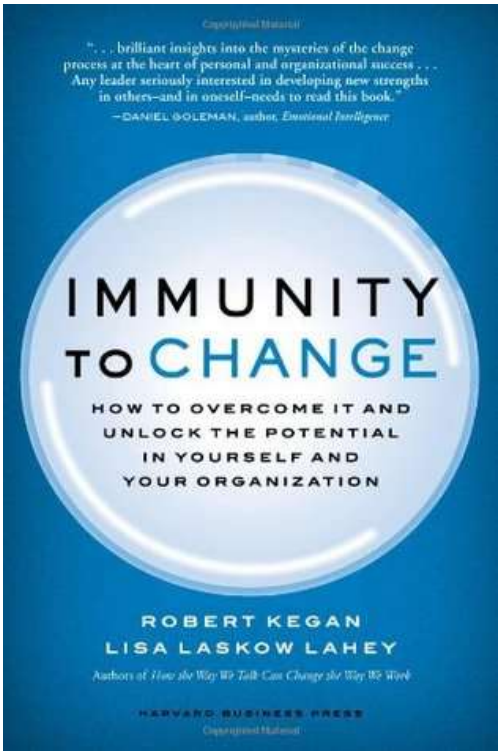
And here's what the inventors have discovered to be the solution:

A composite material comprising a rigid polymeric matrix comprising a pyrrole-containing polymer, where the monomer can be pyrrole or substituted pyrrole molecules or a mixture thereof, a water-responsive gel integrated into the polymeric matrix, wherein the water-responsive gel comprises reversibly hydrolyzable bonds; wherein the reversible hydrolysis of the reversibly hydrolyzable bond alters the structure, mechanical properties, or both of the composite material.

Which is basically a Principle 35, Parameter (material) Change, Principle 13/15 ('reversible'). With perhaps a shade of Principle 19, Periodic Action, thrown in for good measure. Simple when you know how.

Read the paper here: http://gong.ustc.edu.cn/news/Science-2013-Ma-186-9.pdf

Best of the Month – Immunity To Change



A recent study showed that when doctors tell heart patients they will die if they don't change their habits, only one in seven will be able to follow through successfully. Desire and motivation aren't enough: even when it's literally a matter of life or death, the ability to change remains maddeningly elusive. Given that the status quo is so potent, how can we change ourselves and our organizations?

Whenever a scholar like Peter Senge recommends a book with words like "*(…) I know of no book that does a better job of helping leaders understand the commitment to change and how to put it into practice (…)*", it seems worthwhile to take a closer look.

With 'Immunity to Change' Kegan and Lahey address the mystery of personal and organizational change in an original way. Their main message is that individuals, groups and organizations are not blocked by fears for change—as many claim—but more by existing, hidden mindsets. And, that most have not, yet, found ways to understand these mindsets and, therefore, have not learned to overcome them. Their approach boils down to the development of new learning; to paraphrase the authors, "*(…) what people genuinely intend to do and what they are actually able to bring about*" differs and makes most immune for change (i.e. 'can't get there from here'). Instead of focusing on simply technical learning, i.e. developing new skills, they claim that the development of adaptive learning should be mastered too, i.e. human capacity to learn and grow which requires rationality and emotion.

In an easy to understand way, the book takes us through three parts. Part one provides a new way to understand change. Change and be able to deal with it, becomes utterly important not from a coping but from a developing perspective. It requires more than learning new skills; it requires the ability to grow and reach new levels of mental complexity: the development from a '*socialized mind*' via a '*self-authoring mind*' to a '*self-transforming mind*'. These minds differ in the way they understand, process and give

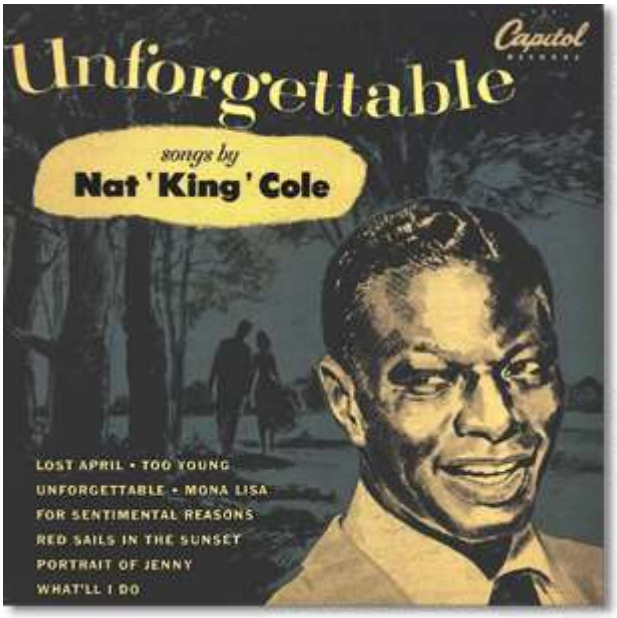
meaning to external information impulses. The socialized mind follows socially shaped routines, the self-authoring mind can step back from these routines and make self-judgments on underlying principles and beliefs and decide on it to come to new routines, and the self-transforming mind, finally, can go further by stepping back from and reflecting on the limits of existing routines, principles and beliefs (RPBs) and can create actions based on new RPBs. Part two of the book shows Kegan and Lahey's approach to overcome immunity to change for individuals as well as for collectives. Immunity maps are used to explore immunities in order to unlock by investigating underlying competing commitments and even deeper rooted assumptions. It shows how individuals and groups 'fool' themselves by unknowingly protect themselves from making the very changes they most desire. Finally, part three of the book invites us to try the approach ourselves. It deals with unlocking our potentials to shift to self-transforming minds by diagnosing and overcoming our immunities in order to prevail in personal and collective growth.

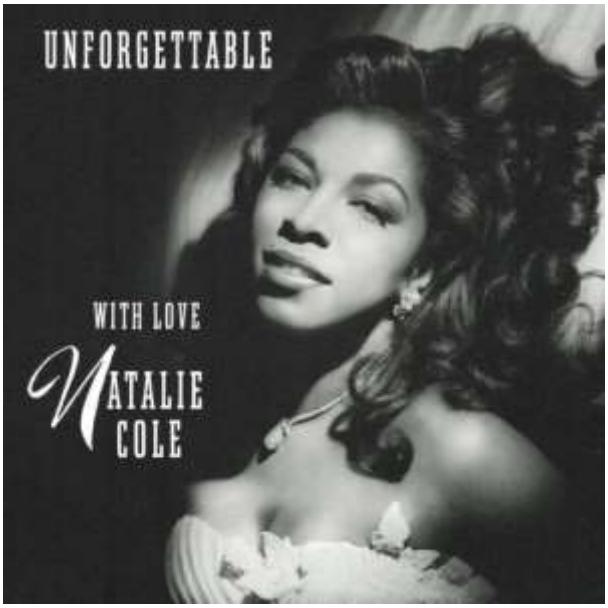
This persuasive and practical book, filled with hands-on diagnostics and compelling case studies, delivers the tools you need to overcome the forces of inertia and transform your life and your work. Inspired by Wittgenstein, the true value of Immunity to Change comes down to "*what is not understood cannot be changed*". What Lahey and Kegan vividly demonstrate for us is that our immunity to change ultimately distils down to 'one foot on the gas, one foot on the brake' contradictions:

1. Commitment (improvement goal)	**2. Doing/not doing instead**	**3. Hidden competing commitments**	**3. Big assumptions**
Learn to be a better delegator	I pass off tasks to X, but micro-manage how they approach it	I am committed to not being administrative dead weight and thus I will work to be directly involved with all work that I am responsible for	To accept a less direct mode of work is to betray my blue-collar roots
The Gas		**The Brake**	

The 'Immunity Map' offered up as a thinking template thus becomes a very nice contradiction formulation tool. All we need to do then is apply a bit of TRIZ to solve what we find. The book doesn't offer much in that regard, but then, hopefully, that's the part we already knew.

Wow In Music - Unforgettable





Irving Gordon's song 'Unforgettable' is one of the most covered songs of all time, and still, over 60 years after it was first recorded, is a classic wedding song. Dozens of artists have recorded it, but only one has become the default choice. Interestingly, it's not the original…

It was in 1991 when recording engineer and producer Al Schmitt was called to turn Nat "King' Cole classic Unforgettable into a (Principle 5) duet with his daughter, recently deceased, Natalie Cole. The disc "Unforgettable: with Love" sold more than seven million copies winning Natalie numerous Grammy Awards. I am sure that was a wow moment for many of us and is certainly a moment to remember. Schmitt work was decisive for that huge success, as recounted Richard Buskin, from Sound On Sound magazine:

""Natalie's very easy to record," says Schmitt. "At one point, instead of being in a vocal booth, she came out and stood right there with the orchestra, à la Frank Sinatra." "Creating the illusion of a duet between Nat 'King' Cole and his daughter was made much easier than expected by the fact that Cole Sr's original performance of 'Unforgettable' had been recorded on three-track tape.

"In the case of 'Unforgettable', Al Schmitt was relieved to discover that, unlike the three-track projects with which he had been involved, Nat King Cole's vocal was alone on the centre track. "We never kept the lead vocal separated in that way," he says. "Sometimes, I would place the rhythm section and the vocal in the centre, whereas when we went to four-track I'd place them alone on their own tracks and split the orchestra across the outside tracks. So, I was very surprised to hear Nat's vocal by itself in the centre, and that was a blessing."

""When Natalie performed in Vegas, she would sing along to a video of Nat singing 'Unforgettable' - that's where the idea came from - so when we got the tape we knew what we were going to do. We knew there might be some problems, but we'd figure out a way to overcome them. Having Nat in the centre by himself on the three-track tape was totally unexpected, however - had that not been the case, we would have had to do a lot more

filtering, and Johnny Mandel would have had to do a much, much more similar arrangement to the original."

""As it happens, by the time I heard the tape, Johnny already knew that Nat's vocal was alone in the centre, and he knew the spots where we wouldn't be able to remove stuff and where he'd therefore have to cover things up. Back in the early '50s the studios didn't have isolation booths. Nat was in the room with the orchestra, so there was some bleeding from the orchestra into his mic, and we therefore tried to filter out as much of that as we could. Still, there were spots where we just couldn't filter out the leakage, and so when Johnny Mandel did the arrangement for the new recording he compensated by way of writing similar instrumental parts to cover up the leakage in those particular areas."

""After the filtering process, we transferred the results over to 24-track analogue tape, and a famous old drummer named Sol Gubin, who'd played a lot of Sinatra dates, put a human click (Principle 16) on it for the orchestral musicians to work to - as the Nat Cole recording had been made without a click, the tempos obviously varied quite a bit. Nat's vocal covered the entire song, and so we had the full orchestra play - and Natalie sing - to that, as well as to Sol's human click.""

"The interim result was a spine-tingling duet featuring Nat Cole and his daughter, backed by an orchestra playing Johnny Mandel's adaption of Nelson Riddle's original arrangement. Several of the musicians, who had played on the original recording, were moved to tears, as was the lead singer, for as she would comment in the album's liner notes, the project was "a labour of love for myself and everyone that has worked on it"."

""Natalie's an amazing singer, and she completed her vocal in three or four takes," Schmitt recalls. "We didn't need to do any punching in. David Foster produced this particular cut, and when we got into the mixing process he figured out where Nat and Natalie were each going to sing. This was helped by the fact that it was easier to mute Nat in certain spots and Natalie in others. However, while it was easy for her to sing answers to him, it wasn't quite so straightforward getting him to sing answers to her, and so what we had to do was put him in the sampler and move his vocal around" (Principle 10).

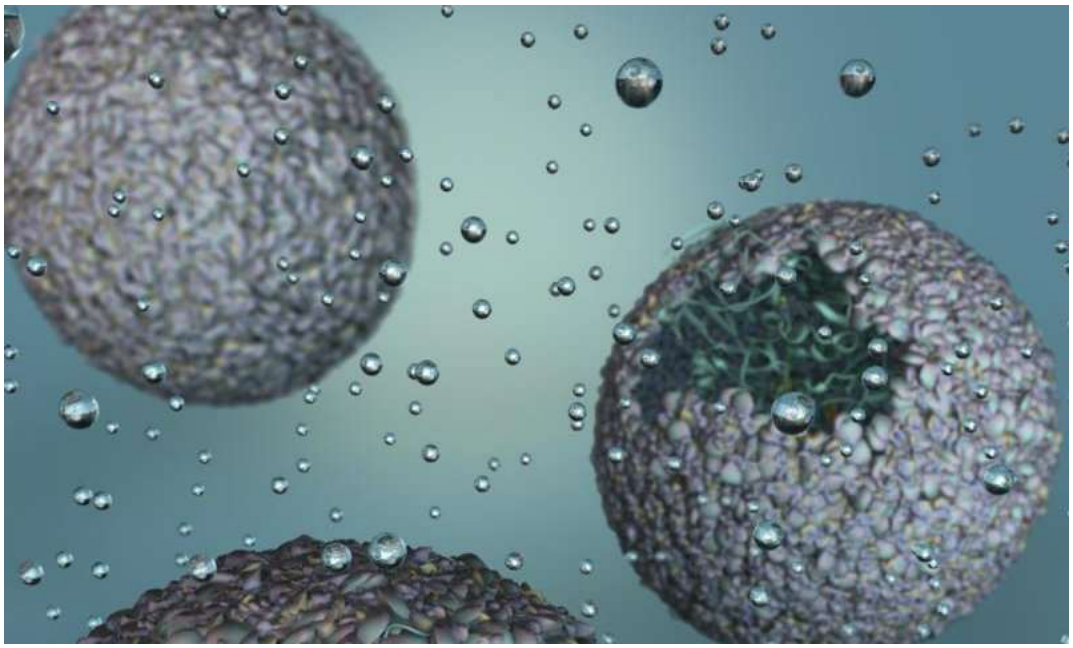
""In terms of matching room sound (Principle 6), I changed the echo around a little bit - with Nat, the echo was on his voice, but I also added to it so that it matched up with Natalie's sound. In fact, in a couple of spots we did the unforgivable; we actually tuned Nat's voice. However, that was minor stuff. Overall his vocal was incredible. The consoles back in those days had very little; they didn't have the compressors or gates that we're now used to, so what you hear is his natural voice, and on 'Unforgettable' it sounded absolutely huge. As a result, one of the problems we had was trying to get Natalie to match that, and that took a lot of work, trying to duplicate the echoes and levels and so forth."

""Afterwards, when the album won a Grammy for Best Engineering, everybody said, 'Oh my God, the title track's incredible! How did you do that?'

"All in all, Al Schmitt confirms that the Unforgettable project was just that for everybody involved: a memorable experience that pertained especially to the title track. "David Foster certainly knows what he is doing," he says, "so he had his job down, Johnny Mandel had his job down, I had my job down, the musicians had their jobs down, and between us we made it work."

Here is the link, if you want to check the rest of the article:
http://www.soundonsound.com/sos/jan04/articles/classictracks.htm

Investments – Hydrogen Biofuel Nano-Reactor



Scientists at Indiana University have created a highly efficient biomaterial that catalyzes the formation of hydrogen -- one half of the "holy grail" of splitting H2O to make hydrogen and oxygen for fueling cheap and efficient cars that run on water.

A modified enzyme that gains strength from being protected within the protein shell -- or "capsid" -- of a bacterial virus, this new material is 150 times more efficient than the unaltered form of the enzyme.

The process of creating the material was recently reported in "Self-assembling biomolecular catalysts for hydrogen production" in the journal *Nature Chemistry*. "Essentially, we've taken a virus's ability to self-assemble myriad genetic building blocks and incorporated a very fragile and sensitive enzyme with the remarkable property of taking in protons and spitting out hydrogen gas," said Trevor Douglas, the Earl Blough Professor of Chemistry in the IU Bloomington College of Arts and Sciences' Department of Chemistry, who led the study. "The end result is a virus-like particle that behaves the same as a highly sophisticated material that catalyzes the production of hydrogen." Other IU scientists who contributed to the research were Megan C. Thielges, an assistant professor of chemistry; Ethan J. Edwards, a Ph.D. student; and Paul C. Jordan, a postdoctoral researcher at Alios BioPharma, who was an IU Ph.D. student at the time of the study.

The genetic material used to create the enzyme, hydrogenase, is produced by two genes from the common bacteria Escherichia coli, inserted inside the protective capsid using methods previously developed by these IU scientists. The genes, hyaA and hyaB, are two genes in E. coli that encode key subunits of the hydrogenase enzyme. The capsid comes from the bacterial virus known as bacteriophage P22.

The resulting biomaterial, called "P22-Hyd," is not only more efficient than the unaltered enzyme but also is produced through a simple fermentation process at room temperature. The material is potentially far less expensive and more environmentally friendly to produce than other materials currently used to create fuel cells. The costly and rare metal platinum,

for example, is commonly used to catalyze hydrogen as fuel in products such as high-end concept cars.

"This material is comparable to platinum, except it's truly renewable," Douglas said. "You don't need to mine it; you can create it at room temperature on a massive scale using fermentation technology; it's biodegradable. It's a very green process to make a very high-end sustainable material."

In addition, P22-Hyd both breaks the chemical bonds of water to create hydrogen and also works in reverse to recombine hydrogen and oxygen to generate power. "The reaction runs both ways -- it can be used either as a hydrogen production catalyst or as a fuel cell catalyst," Douglas said.

The form of hydrogenase is one of three occurring in nature: di-iron (FeFe)-, iron-only (Fe-only)- and nickel-iron (NiFe)-hydrogenase. The third form was selected for the new material due to its ability to easily integrate into biomaterials and tolerate exposure to oxygen.
NiFe-hydrogenase also gains significantly greater resistance upon encapsulation to breakdown from chemicals in the environment, and it retains the ability to catalyze at room temperature. Unaltered NiFe-hydrogenase, by contrast, is highly susceptible to destruction from chemicals in the environment and breaks down at temperatures above room temperature -- both of which make the unprotected enzyme a poor choice for use in manufacturing and commercial products such as cars.

These sensitivities are "some of the key reasons enzymes haven't previously lived up to their promise in technology," Douglas said. Another is their difficulty to produce.

"No one's ever had a way to create a large enough amount of this hydrogenase despite its incredible potential for biofuel production. But now we've got a method to stabilize and produce high quantities of the material -- and enormous increases in efficiency," he said.
The development is highly significant according to Seung-Wuk Lee, professor of bioengineering at the University of California-Berkeley, who was not a part of the study.
"Douglas' group has been leading protein- or virus-based nanomaterial development for the last two decades. This is a new pioneering work to produce green and clean fuels to tackle the real-world energy problem that we face today and make an immediate impact in our life in the near future," said Lee, whose work has been cited in a U.S. Congressional report on the use of viruses in manufacturing.

Beyond the new study, Douglas and his colleagues continue to craft P22-Hyd into an ideal ingredient for hydrogen power by investigating ways to activate a catalytic reaction with sunlight, as opposed to introducing elections using laboratory methods.

"Incorporating this material into a solar-powered system is the next step," Douglas said.

Read more at:
Paul C. Jordan, Dustin P. Patterson, Kendall N. Saboda, Ethan J. Edwards, Heini M. Miettinen, Gautam Basu, Megan C. Thielges, Trevor Douglas. **Self-assembling biomolecular catalysts for hydrogen production**. *Nature Chemistry*, 2015; DOI: 10.1038/nchem.2416

Strangely, no published patent applications as yet. Keep your eyes peeled!

Generational Cycles – Wise Boomers II - The Wrong Side Of The Tracks

According to the Strauss&Howe Generation Cycles model, the 'Prophet' Baby Boomer generation is characterized by being 'Moralistic' in their 40s and 50s, and then 'Wise' in their 60s. For most Boomers, the transition between the two phases can be summarized as 'learning when to shut-up'. A Moralistic Boomer will tell you what they think you need to know; the Wise Boomer has learned to keep quiet until they're asked.

If that's the most common transition mechanism, it's by no means the only one. It's the one we will expect to see most frequently coming from what we might think of as the 'successful' members of the cohort, the ones that have 'done well' with their life. And, especially those living in the affluent West, it is a clear majority. But not everyone in the generation has done quite so well financially. Step on board any of the major US airlines and notice the age of the cabin attendants and you'll quickly see that a lot of retirement-age Boomers have reached a point in their lives where they can't afford to retire. A switch from Moralistic to Wise looks a bit different for these people.

Let's take a couple of extreme examples to explore what the 'other' transition might look like. Lucinda Williams and Michael Gira, both musicians, both Americans.

Lucinda Williams was born in 1953, meaning that she crossed the Moralistic-to-Wise age threshold a few years ago. Ms Williams released her debut album in 1979 and over the course of the next 32 years, up to her sixtieth birthday, she managed another ten albums. Not exactly prolific. None of the albums made a serious dent on the music charts, although the music press gave her a big push around the time of her 45th birthday with one of her albums, Car Wheels On A Gravel Road. She was what might be thought of as a 'musicians musician'. Or a cult. Which basically meant, given the way the record industry works (or rather doesn't), she found herself $2M in debt around the time of her 60th birthday. Now some people might at this stage of their life decide it was easier to declare bankruptcy and give-up. Lucinda Williams on the other hand, sold her back catalogue to pay off most of her debts and set about recording two double-album's worth of new material in a two year period, both of which saw her receiving the best reviews of her career and a substantial swelling of her fan-base. Both albums are truly inspirational albums. Lucinda Williams debt proved to be just the crisis she needed to knuckle-down, get organized (she started collating all of her random notes for songs into a folder – see photo) and 'do the work'.

If Lucinda Williams counts as a ‘cult’ artist, Michael Gira – born 1954, so he hit his sixtieth birthday two years ago – is several furlongs behind making it as far as a cult. His band Swans, first formed in the early 1980s quickly gained a reputation for being ‘difficult’ to listen to. Gira actively courted the obscure and confrontational. Being at a Swans gig was not going to be an easy listening evening. Swans, too, found themselves in a lot of debt and dwindling fanbase. Then, along comes a career-high triple album, The Seer, quickly followed by another triple album that by all accounts beats it, To Be Kind. The music is still difficult to listen to – getting the band to play a 34 minute song based around essentially one chord is never going to be ‘easy’ – but even if you don’t like it, you’d have to admit that it is astonishing. Something changed. Gira knuckled down and decided to make the best music of his life. Almost as if he looked back and saw a potential legacy that wasn’t good enough, and so he realized that if Swans were going to be remembered for all the right reasons, he would have to do the work.

Two extreme examples make the rule I think: no-one likes to look back on their life and think they’ve got it wrong, but for the Prophet generation potentially reaching this conclusion is absolutely un-acceptable. Prophets leave legacies. If the legacy isn’t there by the time they reach 60, there’s still work to be done, and, boy, are they going to give it all they’ve got to make the difference they said they’d make back in their Narcissistic 20s.

Biology – Chameleon Foot

The chameleon's exceptional tree-climbing ability is dependent on vital ball-and-socket joints in its wrists and ankles, according to research published in the open access journal *BMC Evolutionary Biology*. The study also finds that chameleons have twice the number of wrist and ankle skeletal elements than previously thought, and explains how they evolved to live in the trees.

No other living reptile is as well adapted to a tree-climbing lifestyle as the chameleon. One of the animal's most distinctive traits is its 'two-toed' feet, which are actually bundles of digits bound together by connected tissue, similar to duck feet and bat wings. This hand and foot shape aids in precision, security and mobility in the tree environment, relying on gripping branches rather than the use of claws and specialized skin as in other lizards.

To find out more about these unique adaptations and how they develop, researchers studied embryos of the Veiled Chameleon (*Chamaeleo calyptratus*) collected at various time points.

The species has a particularly slow rate of embryo development (around 200 days – another potential SI ezine story for the future!) allowing the team to gain detailed insights into the development of its hands, feet and limbs, and compare them with eight other chameleon species and two non-chameleon lizards.

Lead author Raul Diaz from La Sierra University, USA, said: "Most of what we know about vertebrate development comes from zebrafish, frogs, chickens, mice and humans.

Looking at atypical species, such as the Veiled Chameleon, forces us to begin to think within an evolutionary framework to try and figure out how a unique chameleon body was made. This provides us with a deeper appreciation for the evolution of the animal biodiversity we see today."

The study showed that to develop the chameleon's unique hands and feet, the most important aspect is the remodeling of the wrist and ankle skeleton in order to make a ball-and-socket joint. This allows for greater rotation of the wrist and ankle, which is important while climbing.

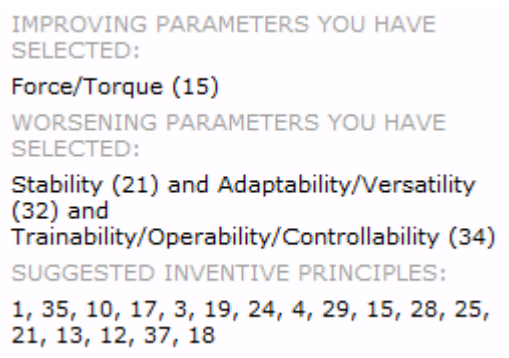
The larger, more recently evolved, tree-climbing chameleons were also found to have more individual skeletal elements in their wrists and ankles (up to eight) than the smaller, earlier diverged species that are generally ground and bush climbers (four skeletal elements).

The authors explain that more wrist and ankle components may have facilitated greater wrist flexion and provided a biomechanical advantage which allowed later species to leave the ground cover and occupy the trees.

The chameleons with reduced numbers of wrist and ankle skeletal elements had a larger angle between their two bundles of digits. They appeared to move slower while climbing and take more careful steps in their environment of grasses and bushes, rather than living up in the trees.

The authors say that studying organisms in the lab with unique developmental characteristics complements biomedical studies of development and malformations in humans and other more broadly studied species.

The contradiction solved by the chameleon is all about the need to be able to grip sufficiently well to be able to lift its own weight, and the difficulty coming from the fact that trees come in all different shapes and size and present all kinds of geometric variation in terms of where and how to grip. Here's how we might best map that problem onto the Contradiction Matrix:



Great to see that the most frequently used strategy, Principle 1, Segmentation, sits at the core of the Chameleon's evolved capability, but it's also worth noting the deployment of Principles 17, Another Dimension, Principle 15, Dynamics and Principle 4, Asymmetry. Clever Chameleon.

Read the full story here:

Raul E. Diaz, Paul A. Trainor. **Hand/foot splitting and the 're-evolution' of mesopodial skeletal elements during the evolution and radiation of chameleons**. *BMC Evolutionary Biology*, 2015; 15 (1) DOI: 10.1186/s12862-015-0464-4

Short Thort

'The world breaks everyone and afterward many are strong in the broken places.'
Ernest Hemingway

Kintsugi: ‘to join with gold’. In Zen aesthetics, the broken pieces of an accidentally-smashed pot should be carefully picked up, reassembled and then glued together with lacquer inflected with a very luxuriant gold powder. There should be no attempt to disguise the damage, the point is to render the fault-lines beautiful and strong. The precious veins of gold are there to emphasise that breaks have a philosophically-rich merit all of their own.The *kintsugi* method conveys a philosophy not of replacement, but of awe, reverence, and restoration. The gold-filled cracks of a once-broken item are a testament to its history. “The importance in *kintsugi* is not the physical appearance, it is… the beauty and the importance [that] stays in the one who is looking at the dish.”

News

InnoMeto
For a variety of reasons, largely out of our control, the InnoMeto conference scheduled to take place in Byron Bay, Australia, has had to be cancelled for the foreseeable future. Sincere apologies to all those people that had already cleared a space in their diary so they could attend. More news, hopefully, later in the year when the dust has settled on the incompetence that seems to be endemic in any conference venue we tried to work with.

India
The good side of the InnoMeto postponement is that Darrell’s trip to India in March gets to be longer. He will be in-country from 6-16 March. Most of the days are already booked, but there are one or two spare slots if anyone is interested in taking them…

PanSensic Workshop
Not sure if it will be the next trip to India, but if not in March, it will definietle be during the next trip in April. We are very happy to be able to present the workshop in conjunction with our good friends at BMGI India. Whenever it is, the venue will definitely be Mumbai. More details and event flyer on the SI and BMGI websites shortly.

University Of Buckingham
We're also hoping to run a version of the workshop – in more general 'Big Data Analytics: Measuring What's Important' form – at the University. Current planned date is 21 June. Again, more details as soon as the logistics are worked out.

University of Buckingham II
We are very happy to announce that Darrell has recently been made a Visiting Professor at the University.

TRIZ Journal
Speaking of BMGI – the new sponsors of the TRIZ Journal – we are happy to announce that we will be writing more articles for the monthly magazine again. The January issue sees the re-printing of an old e-zine article, 'Does The TRIZ Community Use TRIZ'. We thought we'd test the hypothesis that they don't to a wider audience. www.triz-journal.com is the place to visit to read the article and leave your comments and reactions.

DTU Technology Festival
Darrell will be participating in the very exciting festival in Copenhagen. The idea is to have participating companies design and curate their own individual streams to consist of a 15 minute crisp keynote, 45 minute Core Conversation and a 90 minute experimental session. The event takes place 23-25 August. Check out the DTU Business School website for more details of how to get your company along to the event.

New Projects
This month's new projects from around the Network:

Pharma – Innovation Strategy Study & workshop
Automotive – Innovation strategy project
FMCG – TrenDNA study
FMCG – Voice of the System technology evolution study
Entertainment – PanSensic study
FMCG – GenerationDNA analysis
Hotel – PanSensic dashboards
Conglomerate – bespoke, internal 'Innovation 101' book
Education – SI Certification workshop
Automotive – SI Certification workshops
Aerospace – SI Certification workshops
Energy – SI Certification workshops
Aerospace – SI for Business workshops
Manufacture – SI Certification workshop