Systematic Innovation

e-zine

Issue 170, May 2016

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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

The Right Leader?

A story should have a beginning, a middle and an end… but not necessarily in that order.
- Jean-Luc Godard (Film Director)

Who makes the best leader?
If you had to choose between JFK, Jack Welch, Sir Richard Branson or Woody Allen, which one would be the best leader for your organisation? Your latest innovation project?

It depends, right?
There is no such thing as 'the best' leader. Ask Jack Welch to run Virgin, or Woody Allen to run the United States, or Sir Richard to make a movie, and I don't think it would take too long to work out that things wouldn't go well. Leadership, in other words, is context specific.

The question is how does context affect the choice of the right leader?
What is it about Woody Allen that makes every actor on the planet want to feature in one of his films… for almost no fee? What is it about Sir Richard Branson that makes him the most likely person to make 'space tourism' a reality?

The dependency seems to distill down to two critical factors: do we know *what* we're doing? And do we know *how* we're going to do it?

Which sounds like an invitation to construct another 2x2 matrix. Maybe one that looks something like this:

Figure 1: The Leadership How/What Matrix

Regarding the 'how' dimension, the two main scenarios are we either know how we're going to do what we're about to do, or we don't. Woody Allen, or any film director with any experience, knows precisely the mechanics of how to make a film, whereas, when President Kennedy announced the intention to 'put a man on the moon before the end of the decade', he had absolutely no idea how to do it.

From the 'what' perspective, however, he knew exactly what he was asking for. Again there are two basic 'what' scenarios: we either, like Kennedy, know precisely what we're trying to achieve, or we don't. Putting Neil Armstrong on the Moon is a very clear goal. Whereas, 'make an interesting film', or, to take a classic Branson example, 'space tourism', is anything but precise or clear.

Brought together the two 'how' possibilities and the two 'what' possibilities give us four different types of leadership context:

'Paint By Numbers' – we know what needs to be achieved, and how we're going to do it. This is Jack Welch territory. It takes us to the heart of 'Operational Excellence' and optimization of existing systems and protocols. It is, in so many words, the world of SixSigma and clear goals and objectives ('the lowest rank 10% of managers will be fired').

'Movie Director' – we know how to get things done, but we don't know what we're going to do yet. Which in turn means a need to recruit the right people at the right time ('casting is 65% of directing' – John Frankenheimer), creating the right atmosphere and then letting people get on with things in their own way. Woody Allen is (was?) particularly good, for example, at having his actors improvise a large proportion of their lines, but also knows that everything has to be in the can by a certain date and within a clear budget.

‘Quest’ – the ‘Man on the Moon’ scenario in which we know what needs to be achieved, but don’t yet know how it will be done. Which requires a charismatic leader with sabre-rattling, ‘follow-me, follow-me’ traits. Think JFK. Think Steve Jobs and ‘a thousand songs in my pocket’.

‘Fog’ – the ‘we don’t know what we’re doing, and we don’t know how to do it either’ scenario. The pioneering innovation project in which the only ‘knowns’ are a vague sense of overall direction… that, in all likelihood, will evolve into something quite different later on as the exploration of possibilities meanders around, often apparently without aim. The archetypal ‘fuzzy-front-end’ project in which leaders have to possess an extraordinary capacity to hold as many contradicting ideas and directions as possible, incubate them, and have the patience to know that the ‘right’ directions will eventually emerge, until, ‘space tourism’ evolves into Virgin Galactic.

So much for the four different leadership scenarios. What kinds of leader does each one require? An undoubtedly tricky (‘fog’-like?) question to try and answer, but one that eventually condenses down to another 2x2 matrix-worth of characteristics: starters and finishers; dominators and collaborators:

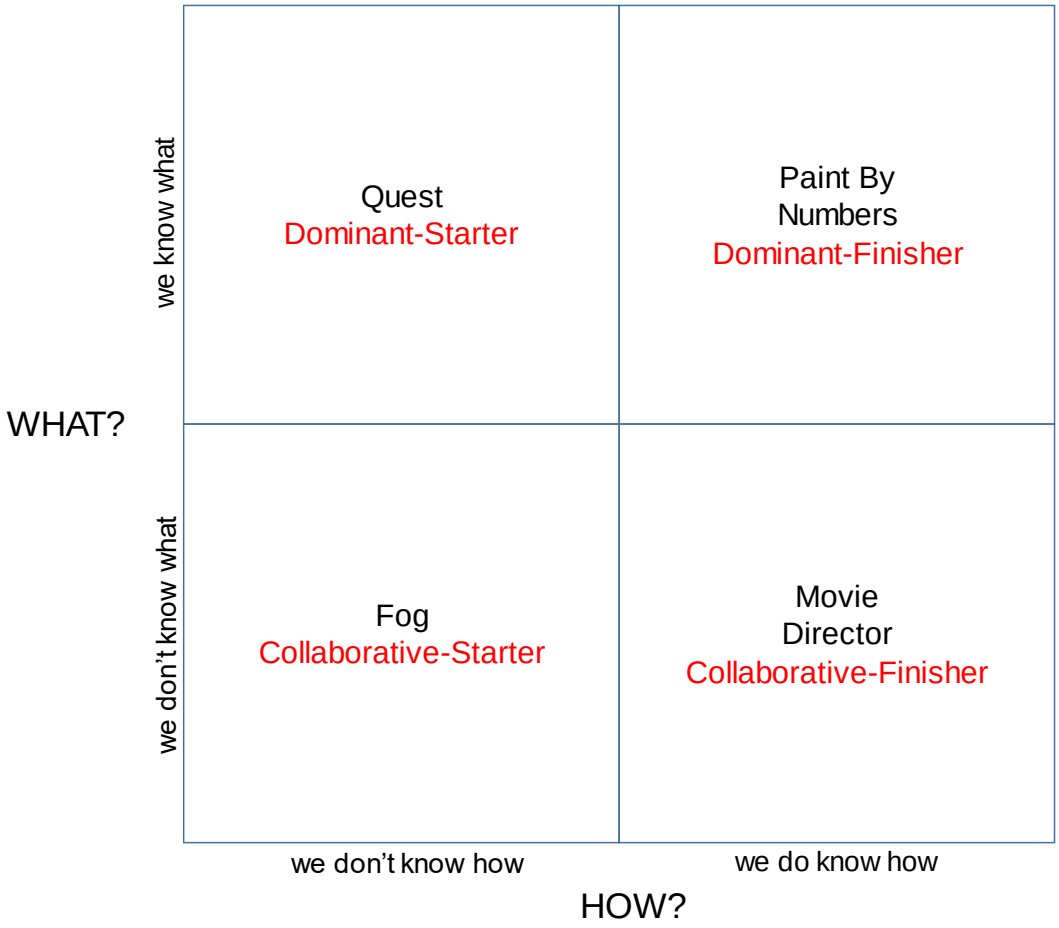
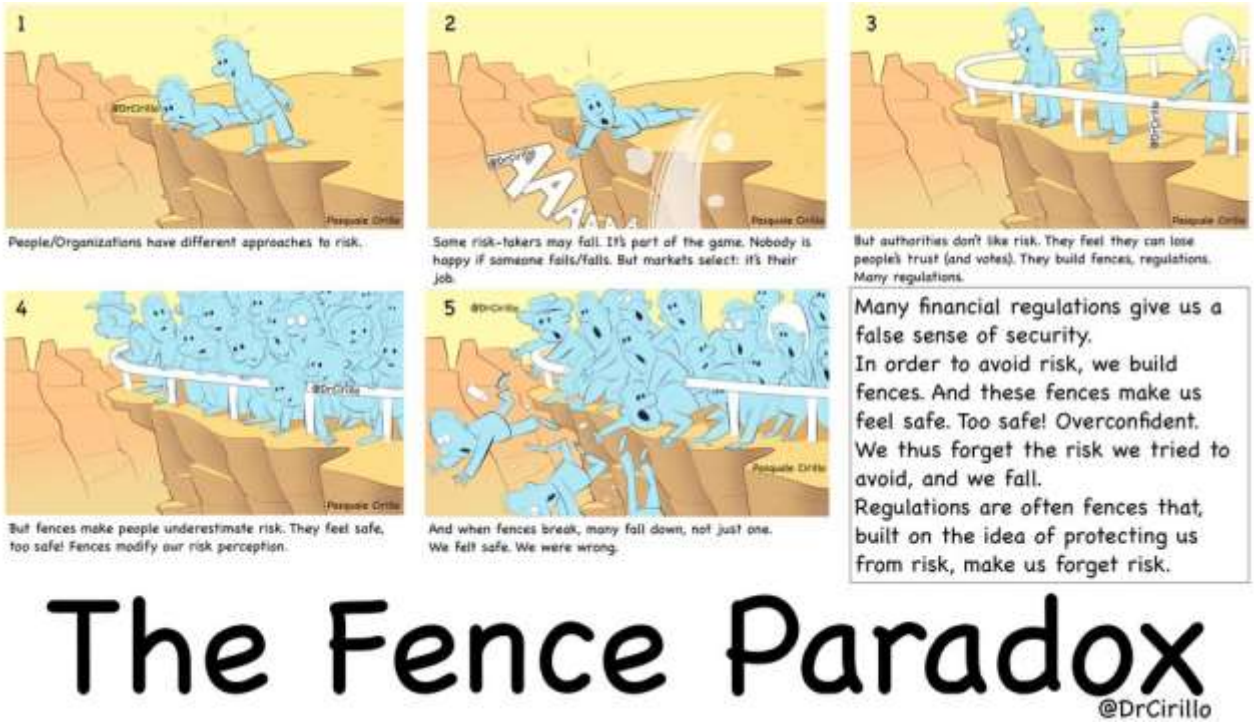


Figure 2: The Leadership How/What Matrix & Critical Leadership Characteristics

Hmm. I think I can feel a new PanSensic tool coming along…

The Fence Paradox



The Fence Paradox: the safer the (human-built) world tries to make itself, the more dangerous it becomes. It's a tough problem that seems to be getting tougher. It's a problem that, when mapped into Systematic Innovation terms, looks something like this:

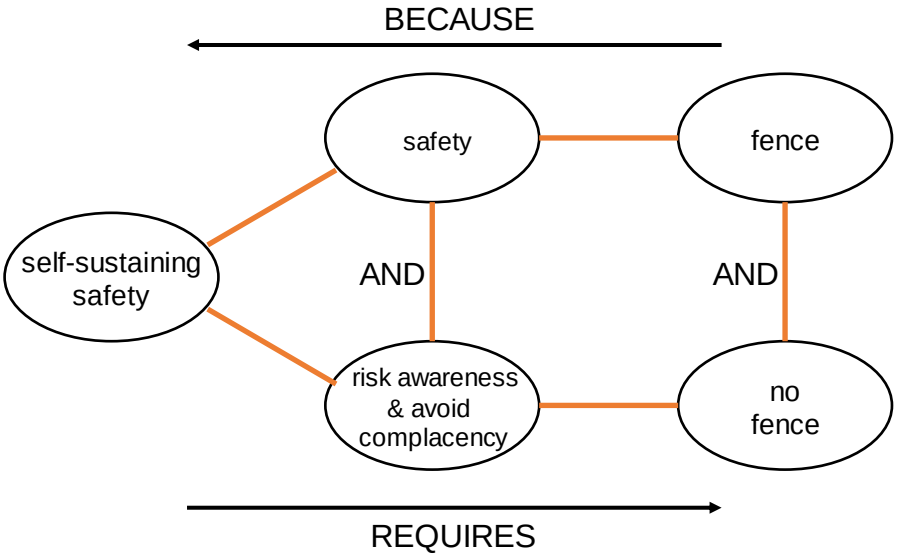


Figure 1: The Fence Paradox

We need fences and we don't need fences.
A classic physical contradiction. And also an intriguing set of conflict pairs and underlying assumptions. The picture might, for example, cause us to question the assumption that fences *ever* make us safe.
Here's what comes out when we map the Figure 1 story into the Matrix+ software:

Figure 2: How Others Have Resolved The Fence Paradox

In many ways, the main job of the Matrix is to provide some re-assurance that someone, somewhere already solved our problem. According to the picture, the most frequently used strategy is to provide people with feedback: tell me when the fence is safe and when it isn't. Tell me when I've become too complacent about the risks that surround me.

Better still, looking at the second recommendation on the Figure 2 list, put in place fences that encourage me to take responsibility for my own safety. We can see an elegant example of this kind of strategy in action in an oft-told Edward deBono story about legislation to reduce river pollution. When the legislation was proving ineffective, Edward de Bono was approached. He suggested a new piece of legislation: that a factory's outlet pipe must be upstream from its inlet pipe. Monitoring factory output became less important, because the factories *themselves* now had a vested interest in reducing pollution.

And if that doesn't work, looking at the third recommendation on the list, why not scare people into being aware of the risks they face by deliberately exposing them to at least the perception of that risk upfront. We've seen examples of this one being solved in problems like railway level-crossings, where – it seems – the only way to stop drivers and pedestrians from trying to use the crossing even though the gates are closed and the lights are telling them there's a train coming is to basically tricking them into thinking they're in danger, even though in reality they're not.

So much for the fence problem.
Maybe in reality the fence problem isn't the real problem at all?
Maybe the bigger problem is the legislators that design the fences. Or rather the systems they have to operate within, which increasingly make it 'impossible' to allow falure. Their contradiction story, I think, looks more like this:

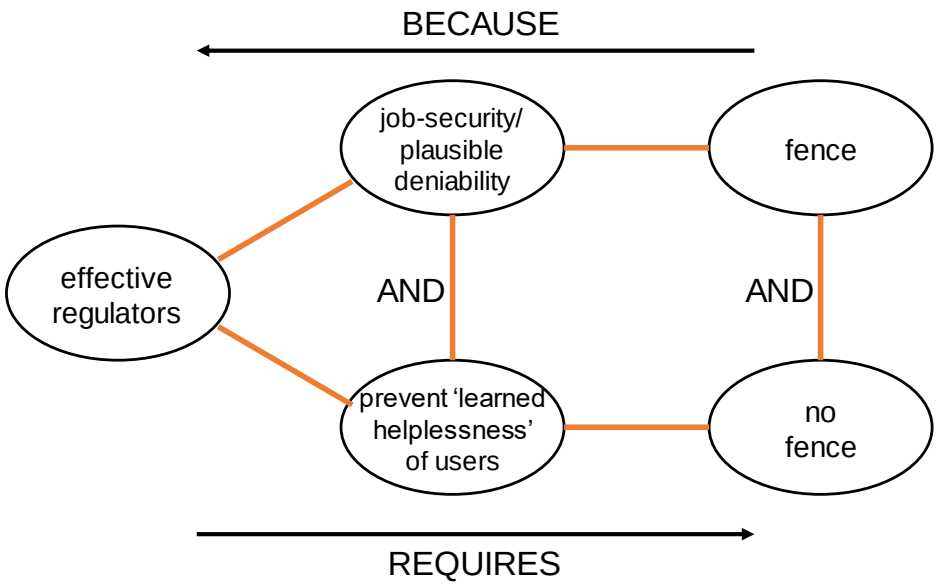


Figure 3: Legislators Perspective On The Fence Paradox

This gives us a contradiction story much more dominated by 'intangible' factors relating to human emotion. Right at its heart, Figure 3 tells us we have a plausible-deniability-versus-learned-helplessness conflict. A tricky one to solve if only because it's a difficult pair of parameters to map onto any of the Contradiction Matrix tools. Fortunately (☺), the imminent new version of the Business Matrix has accumulated a large enough mass of intangible-contradiction-solving case success stories that we can do a much better job of mapping the problem. In terms of the 14 added parameters in the new Matrix, the problem is an 'Inhibitors' versus 'Competence' conflict. And what the new Matrix tells us about how others have solved this type of problem, is that they've used the following Inventive Principles:

2, 34, 24, 31, 7, 13, 12

These solution clues I think, help point us towards a universal human failing and how to turn it into a resource rather than a problem. The failing is that we are creative animals. Which means that no sooner does someone put up a fence, the person who the fence is designed to protect, finds ways to work around the new problems it inevitably creates. People learn to game the system. The only uncertainty is how quickly will they work out how to game it. Let's call it the Fence Paradox Half-Life – the time taken for a critical mass of the people the fence is designed to protect work out how to work around the inconveniences that come with it.

The Cobra Effect offers up an intriguing illustration of what this 'half-life' might look like. The Cobra Effect stems from an anecdote set at the time of British rule of colonial India. The British government was concerned about the number of venomous cobra snakes in Delhi. The government therefore offered a bounty for every dead cobra ('the fence'). Initially this was a successful strategy as large numbers of snakes were killed for the reward. Eventually, however, enterprising people began to breed cobras for the income. When the government became aware of this, the reward program was scrapped, causing the cobra breeders to set the now-worthless snakes free. As a result, the wild cobra population further increased. The apparent solution for the problem made the situation even worse.

In effect the half-life in this Cobra story could be thought of as the gestation period of pregnant cobras. Which turns out to be about 60 days.

Which in turn suggests that a far better legislator strategy might well have been to announce a bounty on dead cobras *for the next two-months only*….

After which, the half-life now being expired, there would be a need for the design and implementation of the next fence. And then the next one.

In other words, the legislator fallacy here is the erroneous belief that there will ever be such a thing as 'the' answer.

Even Edward deBono's beautiful 'put the inlet downstream of the outlet' self-correcting solution will eventually be gamed.

What Inventive Principles 34 ('Discard & Recover') and 24 (24B – 'introduce an intermediary that may be temporary') are trying to tell us is that the there is no such thing as 'the' fence. Merely *the next fence*… that will be valid only so long as a critical mass of creative humans work out how to break it.

Not So Funny – Domestic Bliss

Spot the design flaw…

#1: ‘The (Principle 5) Plate’:

#2: The (Principle 14) Yin-Yang Bunk-Bed:
(avoid use on sloping surfaces)

#3: The (Principle 5 (?)) Bed:
(avoid use in the presence of hungry, short-sighted giants)

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#4: The (Principle 17) Bed.

#5: The (Principle 5) Bathroom. Be afraid.

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#6: The (Principle 31 (13?) (22??) (err, I give up)) Playroom accessory du jour:
Is it any wonder Generation Z are growing up so wrong?

#7 & #8: Joint winners for cunning (Principle 4 (and 5)) safety designs:

Dazzle camouflage *and* stair-carpetting, together at last. It's genius I tell you.
Pity they didn't paint the hand-rails magnolia though.

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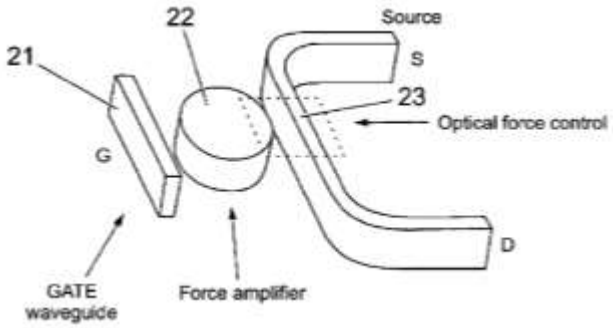
Patent of the Month – Nanomechanical Photonic Devices



Patent of the month this month takes us to a quartet of inventors at Yale. US9,341,779 was granted on 17 May. Their invention allows us to take a journey into the small-scale world of photonics, and, ultimately the prospect for a radical re-invention of the semi-conductor industry. Here's what the inventors have to say about both the opportunity and the problem:

The optical force is one of the most fundamental properties carried by light. This force is generally considered too small for macroscopic practical use. Yet in the microscopic world, optical tweezers have been widely used to manipulate atoms and micron-sized dielectric particles in free space.

One natural step forward would be exploiting this principle as a driving force in solid state devices such as electromechanical systems. Indeed, recent experiments have elucidated the radiation force of light in high finesse optical micro-cavities. However, the large footprints involved in these optical micro-cavities fundamentally limit the scaling of devices down to nanoscale dimensions where exciting quantum phenomena such as macroscopic quantum coherence, generation of squeezed states and optical entanglement start to manifest.

Harnessing optical forces on chip would bring transformational advances in electromechanical systems by offering efficient and ultrahigh bandwidth optical coupling to the sub-micron scale devices. This new transduction is fundamentally distinctive from conventional charge based schemes predominately employed in today's solid state devices. The forces of light stem from two major mechanisms, namely radiation pressure and transverse gradient force.

Radiation pressure induced forces have been extensively studied in the high finesse optical cavities, where light field is confined inside the cavity and the moment of light is transferred to the mirror forming the cavity and applies a perpendicular force to the mirror. Analogously, radiation pressure is also detected in the high finesse microspheres or disk resonators.sup.6. The transverse gradient force, on the other hand, results from the lateral gradient of propagating light field and therefore applies a transverse force to a dielectric body. Recently it was theoretically predicted that this seemingly small force could be significant in photonic structures due to enhanced light density in submicron scale photonic waveguides.

Recent theories predicted that the optical force can be enhanced in a photonic waveguide without the aid of a cavity and can be directly used for electromechanical actuation; however, on-chip detection of the force has been a significant challenge, primarily owing to the lack of efficient nanoscale mechanical transducers in the photonics domain.

From a contradiction-solving perspective, this background description allows us to interpret the key technical challenge as the fight between 'force' and 'footprint'. Here's how we might best map that conflict pair onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Force/Torque (15)

WORSENING PARAMETERS YOU HAVE SELECTED:

Area of Stationary Object (6)

SUGGESTED INVENTIVE PRINCIPLES:

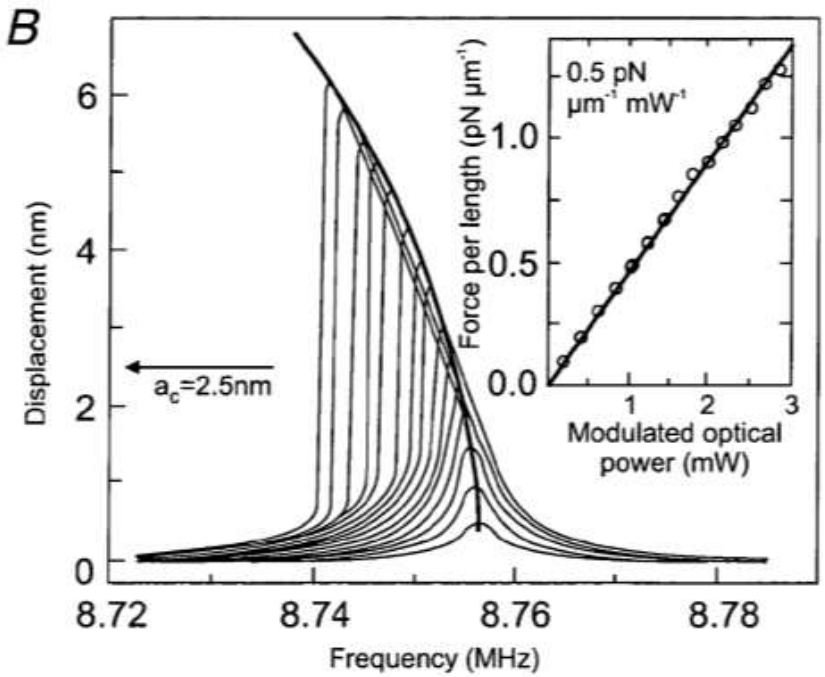
1, 3, 17, 40, 37, 18, 9, 35

And here's how the invention makes it's contradiction-challenging jump as described in the main Claim of the disclosure:

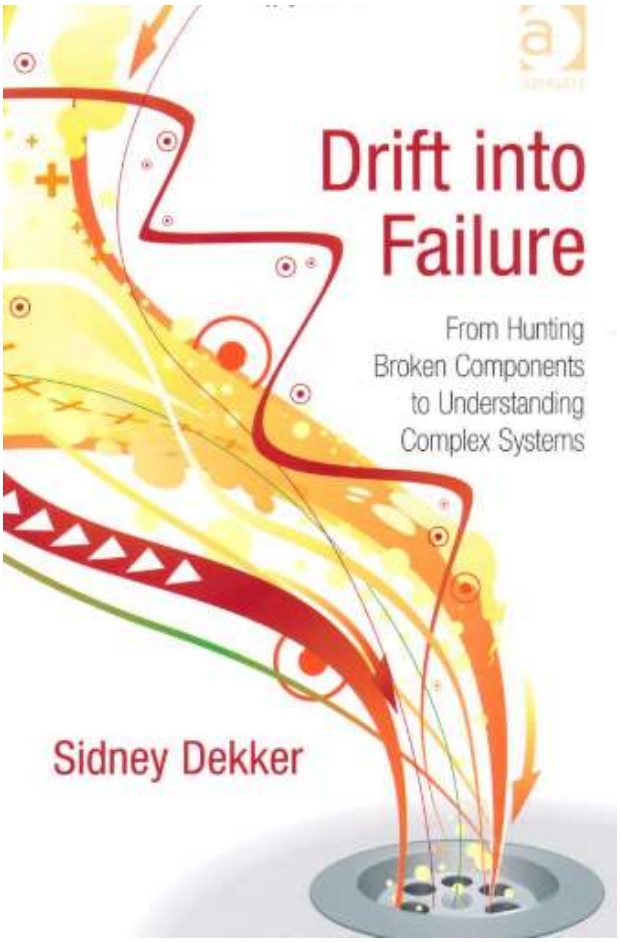
1. An optomechanical device comprising: a nanophotonic circuit comprising an optical transducer, wherein the optical transducer comprises a nanomechanical resonator; wherein the nanomechanical resonator is configured to actuate in response to a gradient optical force; and wherein the nanophotonic circuit is integrated in a semiconductor chip and generates the gradient optical force.

There seem to be two primary inventive leaps here; firstly the creation of the 'gradient optical force' (= Inventive Principles 37, Relative Change), and, perhaps more importantly, the 'nanomechanical resonator' (= :Inventive Principle 18, Vibration).

Good to know that the Matrix is still capable of making relevant suggestions at this almost-atomic size scale. In the meantime it will be interesting to see if and how the Yale team is able to take this solution beyond the laboratory – a somewhat bigger 'business' contradiction one suspects' – and how the solution itself will likely evolve. I'm putting my money on Inventive Principles 3 and 17 in the near term.



Best of the Month – Drift Into Failure



Organisations fail because they are successful. This will remain the essential paradox for managers and leaders to grapple with: Organisations incubate accidents not because they are doing all kinds of things wrong, but because they are doing most things right. And what they measure, count, record, tabulate and learn, even inside of their own safety management system, regulatory approval, auditing systems or loss prevention systems, might suggest nothing to the contrary.

Drift. The processes that normally help assure safety and generate organisational success (risk assessments, operational trade-offs) can also be responsible for organisational demise: failure incubates non-randomly, opportunistically alongside or on the back of the very structures and processes that are supposed to prevent it. Drift happens through normal processes of reconciling differential pressures on an organisation (efficiency, capacity utilisation, safety) against a background of uncertain technology and imperfect knowledge. Drift is about incremental, or small, seemingly insignificant steps eventually contributing to extraordinary unforeseen events. It is about the transformation of pressures of scarcity and competition into organisational and personal mandates, and about the normalisation of signals of danger so that organisational goals and supposedly normal assessments and decisions become aligned. Drift is about the strengthening of the parts at the ultimate expense of the whole.

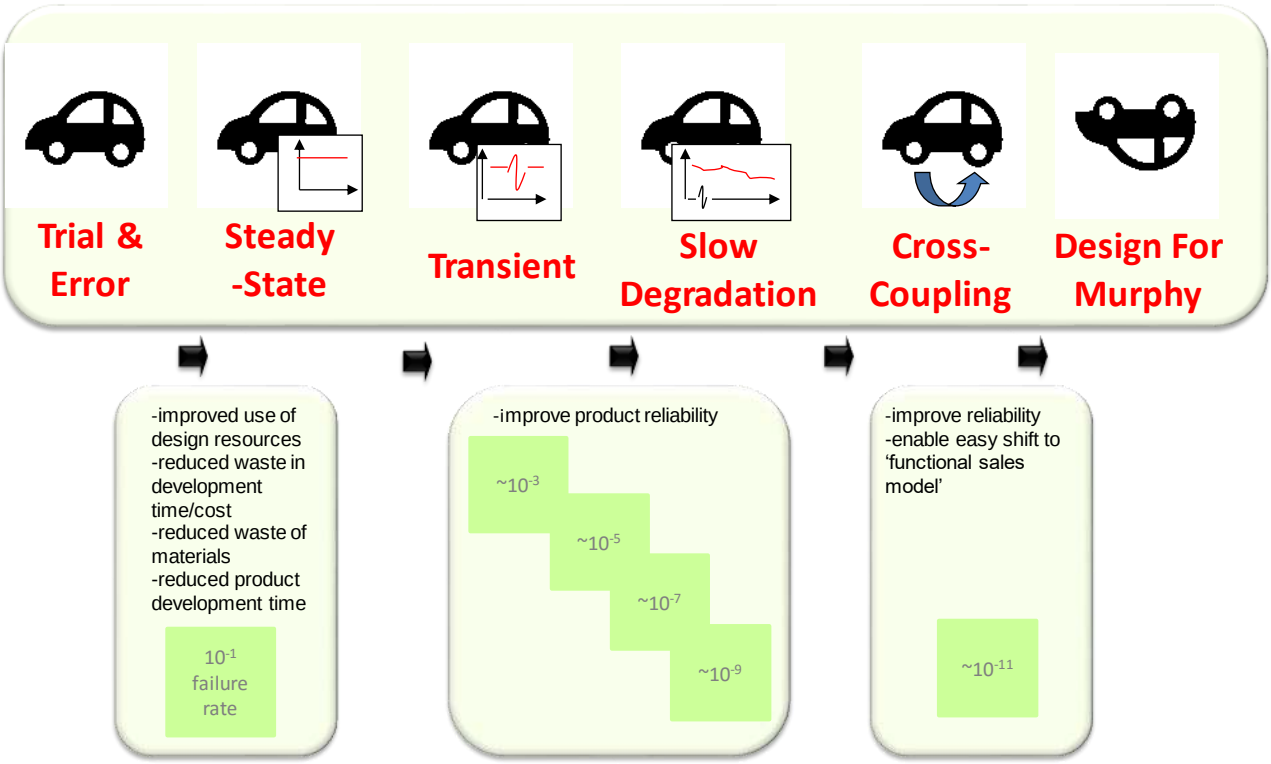
The main idea the book has is that there are five concepts that characterize drift
* Scarcity and competition

* Decrementalism or small steps
* Sensitivity to initial conditions
* Unruly technology
* Contribution of the protective structure

Being aware of these factors and what they do is a important way to avoid the "drift into failure". To summarise some of the ideas to help mitigate these things
* don't optimise 100% or make performance the goal
* have diverse opinions on the correctness of the system
* see failure as an opportunity to learn
* monitor the interconnections within the system rather than parts

(note how they are all pretty much the opposite of 'traditional' Operational Excellence thinking… it's almost like Operation Excellence is the root contradiction of business failure…)

For a long time now, we've had 'TRIZ for AntiFragile Systems Design' as a title in our books-we-will-one-day-write catalogue. The basic premise is the 'Design For Resilience' Trend:

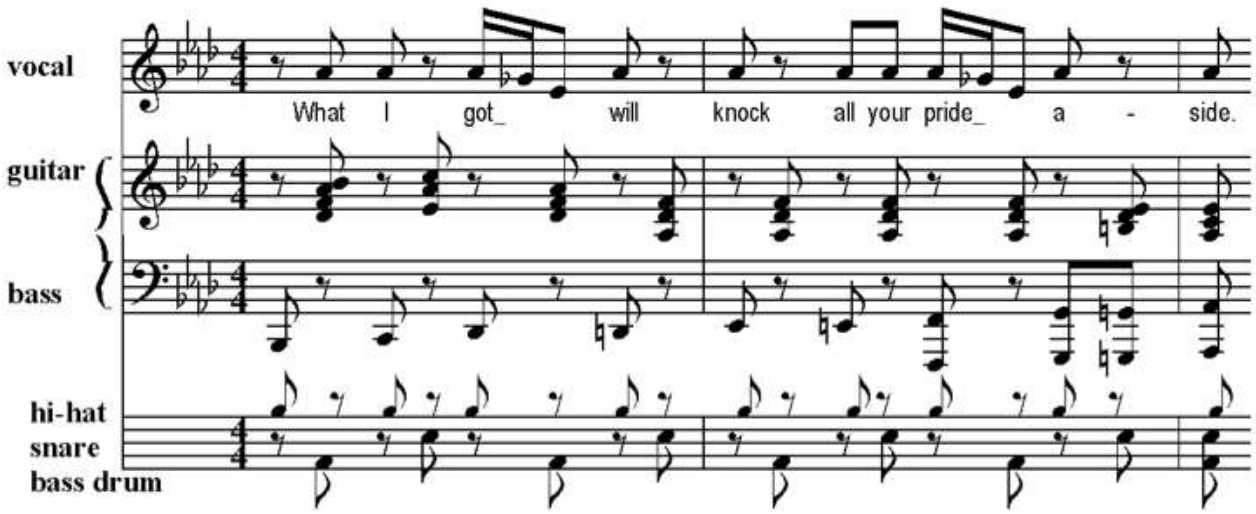


While we don't agree 100% with Sidney Dekker (if only he knew TRIZ…), this is as good a foundation to the twin subjects of complex systems and design-for-reliability as has ever been assembled. It's not the easiest read in the world. But sometimes important things aren't easy. Essential reading for managers, leaders and observers of managers and leaders.

Wow In Music – Tell Me Something Good

Aah, 1974. Aah, metric dissonance. Actually, indirect displacement dissonance at both the rhythmic and metric levels. Our listening recommendation this month comes in the form of the sly piece of rhythmic genius that is “Tell Me Something Good” by Rufus with Chaka Khan. A Stevie Wonder written song in which Rufus manage to out-bamboozle the rhythm-bamboozle master. And, at the same time, win themselves a US Number One single and a Grammy.

In the verse, the bass and vocals are aligned, and the guitar answers with a mid-range chord on alternating beats, which sound like off-beats but which align with the drum part. The prominence of the vocals and bass in combination with the accented words in the text (“got,” “knock,” “pride,” “-side”) create perceptual strong beats, as shown…



…but this puts the hi-hat on the beat and the bass and snare off the beat, in sharp contradiction to the normative pattern. Listen carefully to the song and you’ll notice there is an extra half-beat at the end of the verse, which reassigns the downbeat when all the

parts line up at the beginning of the chorus. The chorus begins on a downbeat 8½ quarter notes after the last bar-line of the example, and ends with a “missing” half-beat when it moves back to the verse. An alternative but more counterintuitive hearing puts the bass drum, snare drum and guitar on the beat and the bass guitar and accented vocals off the beat, requiring no metric adjustment between sections.

As such it makes for a frequently copied instance of the “loose verse/tight chorus” (LVTC) form, in which choruses are rhythmically, texturally, and tonally more unified than verses. The displacement in Tell Me Something Good is rhythmic because the shift by an eighth note occurs below the tactus level, but it is also metric because the downbeat is reassigned and the 4/4 pattern cannot be maintained uninterrupted. What this means in practical terms is the song can be difficult to count as there is an off-count into the verse. The first note in effect coming on the "and of four."

It’s all about Principles 2, 3 and 16. Not necessarily in that order.

Listen to a key clip of the verse-chorus transition here:
http://www.mtosmt.org/issues/mto.14.20.2/biamonte_examples.php?id=7
Extra bonus marks if you manage to sit still while you’re listening.

And double them if you’re feeling particularly metric-dissonance-centric, and you decide to spend an hour or so reading this little beauty:
http://www.mtosmt.org/issues/mto.14.20.2/mto.14.20.2.biamonte.html

Investments – Good Biofilms

In a classic TRIZ-like instance of (Principle 22) turning bad stuff into good stuff, a team of chemical engineers at Penn State has developed a beneficial biofilm with the ability to prevent the biofouling of reverse osmosis (RO) membranes.

The biofilm allows membranes to limit their own thickness via a quorum-sensing circuit, and ultimately to reduce the occurrence of biofouling in membrane-based water treatment systems by releasing chemicals that repel undesirable bacteria.

"We realized that the accumulation of microbial films in water treatment membranes is unavoidable," said Manish Kumar, assistant professor of chemical engineering and the principal investigator on the project. "But just like good bacteria exists in your gut to keep you healthy, we predicted that helpful bacteria in RO may be able to prevent the unchecked reproduction of harmful biofilms. Essentially, our method is a 'probiotic-approach' to combat biofouling."

With the demand for access to safe and clean water escalating globally, membrane filtration technologies are quickly becoming popular ways to utilize low quality and readily abundant water sources such as seawater, brackish water and recycled wastewater. Complications with these systems arise frequently, however, most often in the form of biofouling -- a buildup of microbes and bacteria on membrane surfaces that causes clogging and leads to decreased membrane permeability and an overall increase in energy consumption.

What the researchers discovered is that the introduction of "good bacteria" in RO can limit the growth of harmful bacteria, ultimately inhibiting the formation of biofilms that cause biofouling. "What we created is the first cell that is able to talk to itself to control biofilm formation," lead researcher, Thomas Wood explained. "Through genetic engineering, we have developed a cell that is able to recognize when it has reached a certain density, and in turn, sends a response to stop making biofilms. We call it a 'living reverse osmosis

membrane' or 'LROM.' The cell's ability to limit its own thickness assures that the good biofilm itself does not cause fouling."

The self-controlled biofilms grow much more slowly than uncontrolled biofilms and are activated by the introduction of genetically engineered elements into *E. coli.* In trial experiments, these engineered *E. coli* successfully slowed the production of Pseudomonas and Sphingomonas strains, two of the most prevalent bacteria in RO, while simultaneously protecting the membrane.

The proposed approach of using engineered biofilms in membrane processes may also provide benefits for sustainability. Current methods to combat biofouling involve adding propriety chemicals called biocides, which can be damaging to the environment and create a large expense. The LROM approach may potentially provide a safer and greener alternative.

Researchers have tested the viability of their system in both long and short-term experiments under varying flux conditions. Their next challenge is to perform larger-scale testing and target new opportunities for the technology -- conceivably within the realm of biomedical devices.

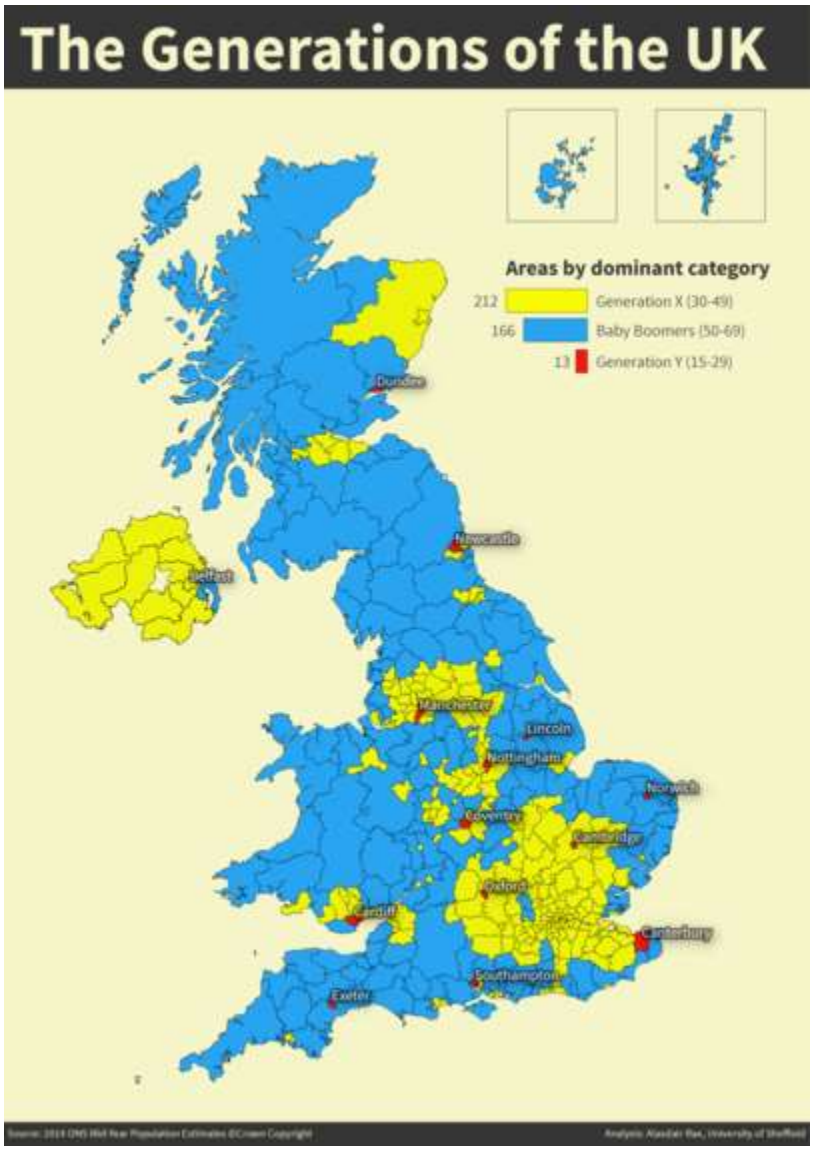
"Eventually we plan to test more than just our two reference bacteria and expand the potential applications for this technology," said Kumar. "Theoretically, this method could be applied to biomedical devices and implants to decrease the likelihood of failure due to biofilm infections."

In November 2015, Penn State filed a provisional patent on the technology and is actively seeking industrial partners to commercialize this idea.

Read more here:
Thammajun L. Wood, Rajarshi Guha, Li Tang, Michael Geitner, Manish Kumar, Thomas K. Wood. **Living biofouling-resistant membranes as a model for the beneficial use of engineered biofilms**. *Proceedings of the National Academy of Sciences*, 2016; 201521731 DOI: 10.1073/pnas.1521731113

Generational Cycles – Generations & (UK) Geography

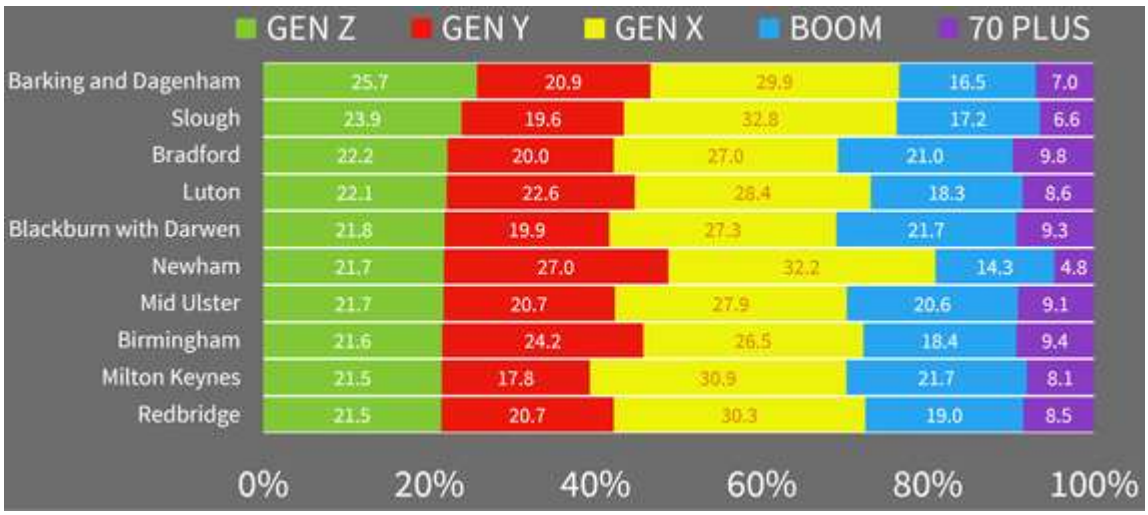
Well, the precise generational boundaries don't quite fit with our preferred Strauss & Howe generation cycles model, but they're close enough (being one of the few other authors that seem to understand the start of Generation Z in 2001) for the UK generation map they produced to be interesting:



There are also 13 areas across the UK where Generation Y is currently the (red areas) dominant category. These tend to be towns and cities with high student populations, like Manchester, Cardiff and Southampton, and they are distributed quite widely across Great Britain, from Dundee in the north, to Exeter in the South.

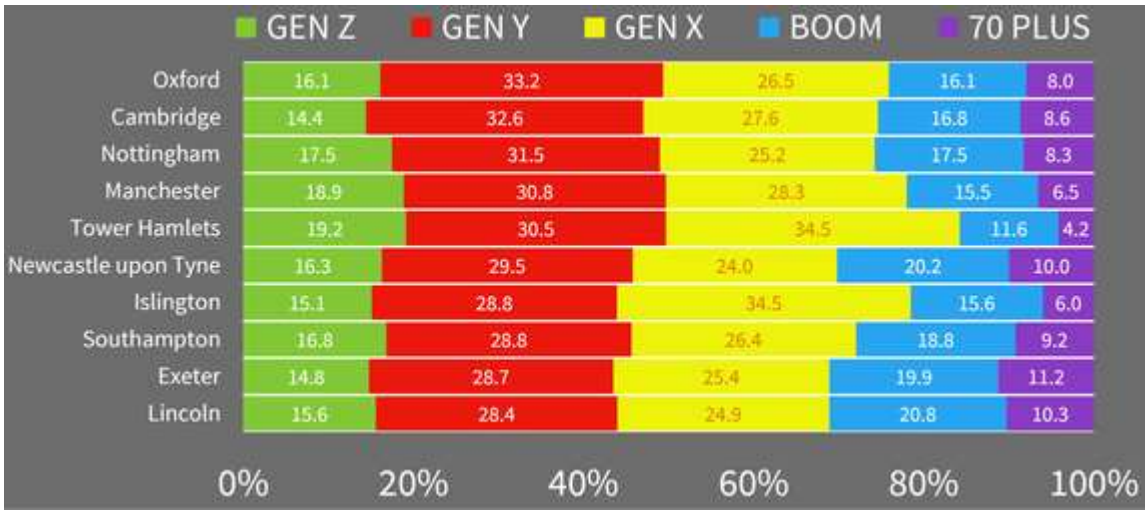
In case you're thinking of moving to a part of the UK where your Generation dominates, here's what the data tells us as far as Top 10 locations for each of the main generation cohorts:

Top 10 Generation Z (New Artist) areas:

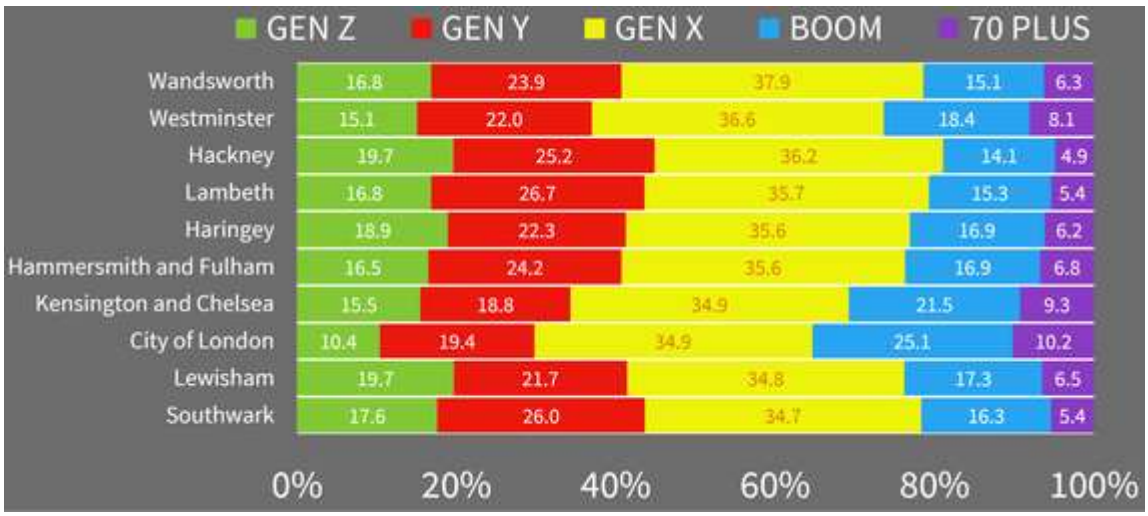


(Hmm. Bradford is my home town)

Top 10 Generation Y (Hero) locations:



Top 10 Generation X (Nomad) locations:



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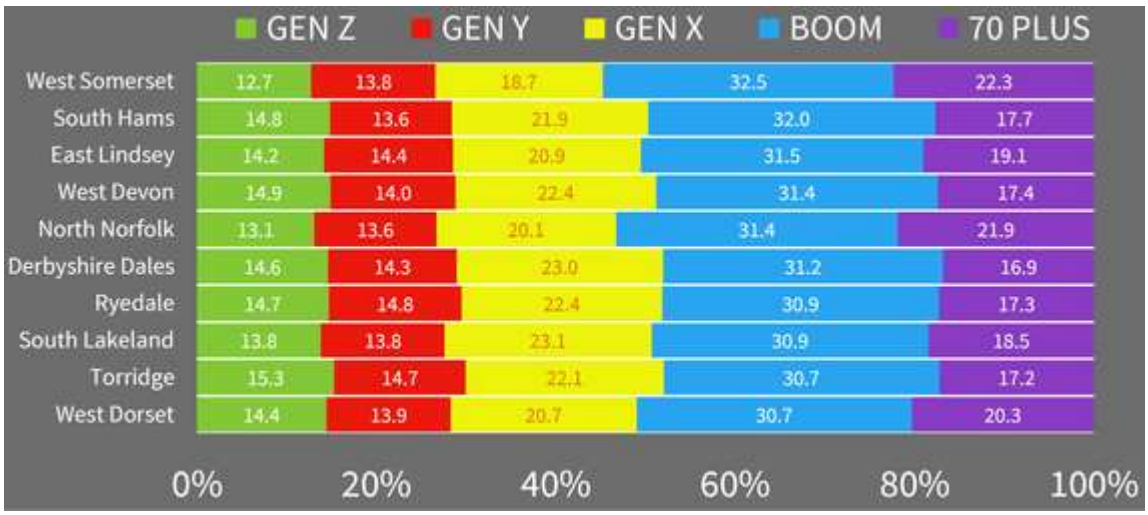
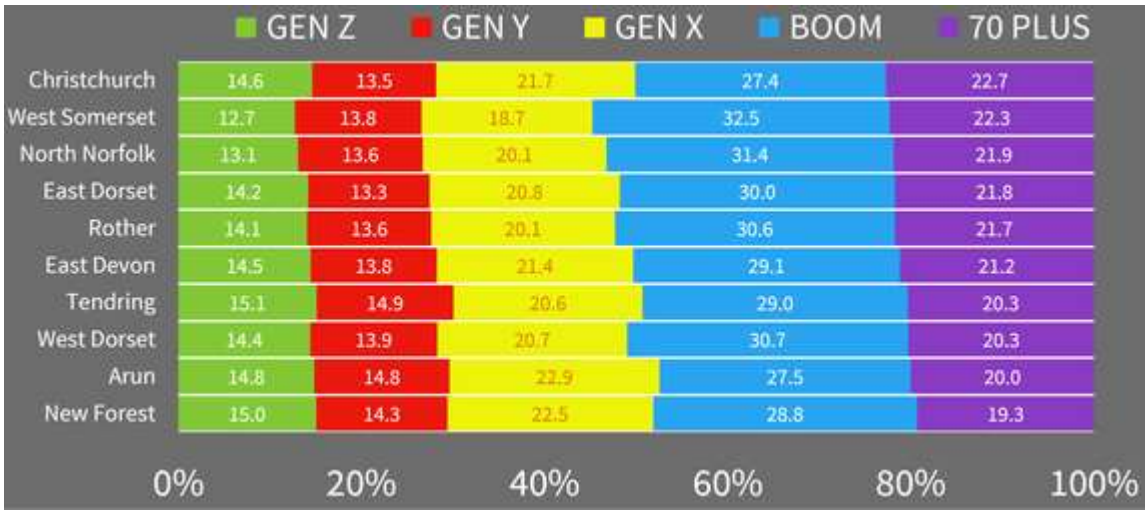
Top 10 Baby Boomer (Prophet) locations:



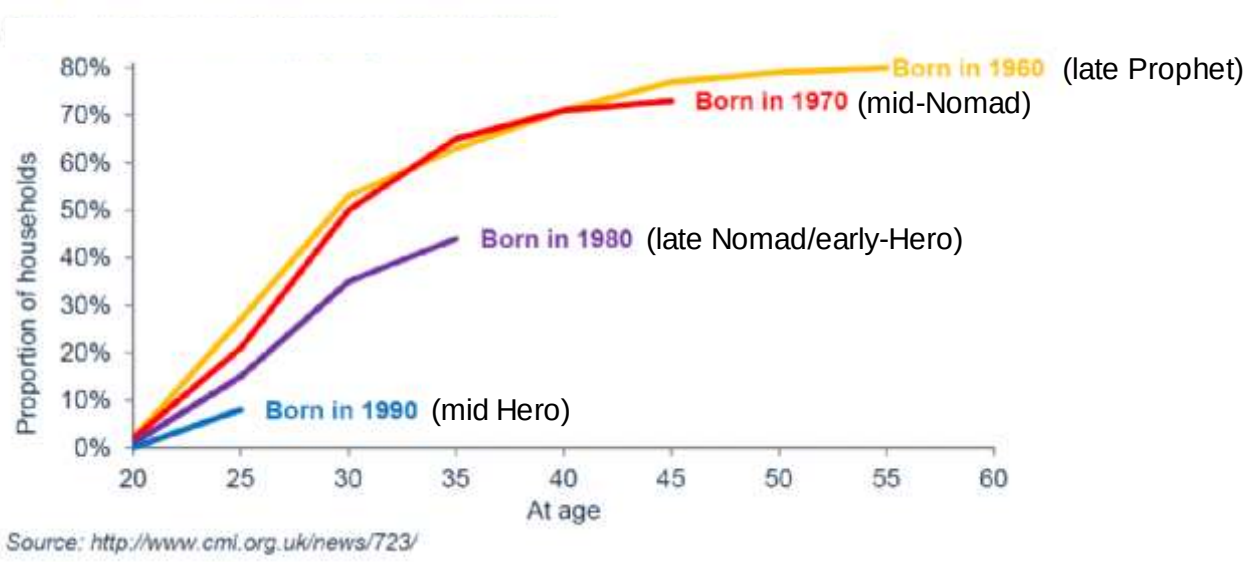
(Damn. I live in Torridge!)

Top 10 Silent Generation (Artist) locations:



This might all be interesting (if you live in the UK), but why does any of it matter? There are inevitably many reasons, but here are two that extend beyond UK boundaries. First, the ageing of the population has serious implications for how local governments provide local services, particularly healthcare. What's happening in Christchurch right now, for example, should give a pretty good indication of what's to come in Torridge in the next few years.

Second, in those countries like the UK where there is currently a housing crisis, with affordability, lack of supply, and overheated demand for social housing, the combination of effects is creating a potentially toxic problem. Understanding the nature of the demographic balance in each area helps us identify current - and future - housing needs. From this perspective, we need some of the housing wealth from the older generations to pass down to the young, and just not in the form of inheritance tax breaks when our older generations are no longer with us. And also – perhaps most toxic of all – the transfer needs to happen geographically as well as demographically. If you were in any doubt about the seriousness of the situation, take a look at this:



Somehow, I don't think I'll be moving back to my birthplace any time soon. Although, from a money transfer perspective, I perhaps ought to at least be thinking about it.

Read the full (scary) story here:
http://www.huffingtonpost.co.uk/alasdair-rae/the-generations-of-the-uk_b_7856198.html
It's like actual research.

Biology – Ampullae of Lorenzini

Sharks, skates, and rays can detect very weak electric fields produced by prey and other animals using an array of unusual organs known as the ampullae of Lorenzini. Exactly how these electro-sensory organs work has remained a mystery, but a new study has revealed an important clue that may have implications for other fields of research.

First described by Stefano Lorenzini in 1678, the ampullae of Lorenzini are visible as small pores in the skin around the head and on the underside of sharks, skates, and rays (known as elasmobranchs, a subclass of cartilaginous fish). Each pore is open to the environment and is connected to a set of electro-sensory cells by a long canal filled with a clear, viscous jelly.

The ampullae detect electric fields in the water, or more precisely the potential difference between the voltage at the skin pore and the voltage at the base of the electroreceptor cells. A positive pore stimulus would decrease the rate of nerve activity coming from the electroreceptor cells, and a negative pore stimulus would increase the rate of nerve activity coming from the electroreceptor cells.

In the new study, published this month in *Science Advances*, a team of researchers from UC Santa Cruz, University of Washington, and the Benaroya Research Institute at Virginia Mason investigated the properties of the jelly contained within the ampullae. They found that it is a remarkable proton-conducting material, with the highest proton conductivity ever reported for a biological material.

"The observation of high proton conductivity in the jelly is very exciting," Rolandi said. "We hope that our findings may contribute to future studies of the electro-sensing function of the ampullae of Lorenzini and of the organ overall, which is itself rather exceptional."

The integration of signals from several ampullae allows sharks, skates, and rays to detect changes in the electric field as small as 5 nanovolts per centimeter. But how such weak signals are transmitted from the pore to the sensory cells has long been a matter of debate. The researchers speculate that sulfated polyglycans in the jelly may contribute to its high proton conductivity.

Proton conductivity is the ability of a material or solution to conduct protons (positive hydrogen ions). In a system with very many ordered hydrogen bonds, such as a hydrated

hydrophilic polymer, proton conduction can occur along chains of these bonds, Rolandi explained. In technological applications, proton conductors such as Nafion can be used as proton exchange membranes in fuel cells.

From a contradiction-solving perspective, the ampullae have evolved to perform a delicate sensing problem: how to detect potential prey that are to all intents and purposes undetectable… unless you're able to sense the very small electrical signals they inevitable emit even if they're buried in the sand.

Here's how we might best map that conflict onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Ability to Detect/Measure (49)

WORSENING PARAMETERS YOU HAVE SELECTED:

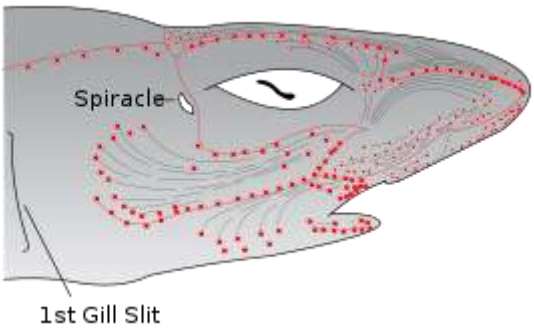
Loss of Energy (27)

SUGGESTED INVENTIVE PRINCIPLES:

35, 3, 19, 15, 28, 37, 13, 2

Encouraging, first up, to note the presence of Principle 28, Mechanics Substitution, in the list of recommendations since this is the most direct connection to the use of a 'field' to solve the problem. Also worth noting is how the Principle 37, 'Relative Change' Principle is illustrated by the ampullae jelly itself and the potential difference that forms between the two ends when an external electrical signal is detected. Slightly more speculatively – since the scientists don't claim to fully understand the mechanism themselves, are the (Principle 3) 'sulfated polyglycans' contained within the jelly.

I suspect, too, that when we step back a little and look at the network of ampullae rather than just a single ampulla, the fact that they're positioned at different angles and orientations probably has something to do with how the overall system works as a network of potential difference detectors:



Read more here:
Erik E. Josberger, Pegah Hassanzadeh, Yingxin Deng, Joel Sohn, Michael J. Rego, Chris T. Amemiya, and Marco Rolandi. **Proton conductivity in ampullae of Lorenzini jelly**. *Science Advances*, 2016 DOI: 10.1126/sciadv.1600112

Short Thort

"There was a wall. It did not look important. It was built of uncut rocks roughly mortared. An adult could look right over it, and even a child could climb it. Where it crossed the roadway, instead of having a gate it degenerated into mere geometry, a line, an idea of boundary. But the idea was real. It was important. For seven generations there had been nothing in the world more important than that wall.
Like all walls it was ambiguous, two-faced. What was inside it and what was outside it depended upon which side of it you were on."
Ursula K. Le Guin, The Dispossessed

"Indeed, the only truly serious questions are ones that even a child can formulate. Only the most naive of questions are truly serious. They are the questions with no answers. A question with no answer is a barrier that cannot be breached. In other words, it is questions with no answers that set the limit of human possibilities, describe the boundaries of human existence."
Milan Kundera, The Unbearable Lightness of Being

News

PanSensic Seminars

We are happy to announce that Darrell will be presenting a PanSensic seminar with our good friends at BMGI in India on 8 June. The session, 'Big Data Analytics For Innovation' will be held in Mumbai. More details on the website…. For those people that can't make it to India, we'll be running a version featuring the same basic content with less of an innovation and more of a waste-reduction focus at our MasterClass at the University of Buckingham on 21 June. Details of that session and booking form can be found at… http://www.buckingham.ac.uk/event/big-data

TIES Annual Conference

Darrell will also be presenting at Minnesota's education Technology and Innovation centre annual conference, scheduled to take place in Minneapolis from 11-13 December. Expect more information on the website shortly, in the meantime, after Darrell's August trip to the US, this is expected to be his only other trip to the continent this year… if you want him to come and do something with you, on either side of the conference dates, please contact him directly.

New Business Matrix

Well, for a while we thought it was going to kill us, but we're happy to announce the completion of the new edition of the business version of the Contradiction Matrix. The

previous 31x31 matrix will shortly be superseded by a much-expanded 45x45 parameter version…. Which means over 1000 new boxes we've had to populate and verify. The likely schedule of release of the new tool is now looking like this:

- Fold-out sheet version – June
- Business Matrix 2016 book – end-July
- Matrix+ software – early August

Fingers-crossed our printer agrees!

New Projects

This month's new projects from around the Network:

Industrial – Problem-Solving workshop
Pharma – Certification Workshops
Pharma – Innovation Strategy Project
FMCG – IP Workshop
Education – SI workshops
Industrial – SI & TrenDNA workshops
Consulting – Design Thinking Workshops
FMCG – Future Technology Domain project
IT – Patent Analysis project
Textile – Eyes-on-the-World study series