Systematic Innovation

e-zine

Issue 161, August 2015

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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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.
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No Needles In The Haystack?

Ah, Net Promoter Score. There's an emerging trend we're seeing at the moment inside a lot of organisations. The trend comes in two parts. The first part of the trend is that CEOs and CFOs seem to love managing the business using the feedback provided by Net Promoter Score (NPS) dashboards. No great surprise on this front, given that there is a very strong correlation between NPS scores and company share price. When shareholders see NPS scores heading in the 'right' direction, they are quickly able to see that, yes, this company is serving their customers well, so therefore they must be a good bet. NPS is good!

The second part of the NPS comes from the people at the other end of the NPS dashboard results: the poor people that have to live with the consequences of the latest figures emerging from the dashboard. This trend highlights the growing emergence of a bunch of highly frustrated, increasingly befuddled managers. Right at the heart of the problem here is that although their dashboards tells them that the number of net endorsers is going down, or the net satisfaction is on the decline, or that 'brand strength' has just taken a turn for the worse, they have absolutely no idea what to do about it. NPS is bad.

Its okay for the CEO and CFO: when they see the dials heading in the wrong direction, all they have to do is thump their fists on the table and shout at the managers below them, and demand something be done to fix things. The managers, on the other hand, the people tasked with doing the 'fixing' are in big trouble. They're in trouble because the dashboard doesn't give them any information at all about *what* to do.

NPS dashboards, in other words, are big expensive haystacks with no needles in them. The needles being the insights that enable meaningful response actions to be taken.

The Big Data Analytics world is full right now of equivalent needle-less haystacks. 20 billion dollars a year worth to be precise. The heart of the problem is that 'data people' are not 'solutions people. They know how to collect lots of lots of data, but because they're

SYSTEM·ATIC INNOVAT·ION

never the people tasked with doing anything with the data – like designing ‘a solution’ – they have no idea whether the data is in any way the ‘right’ data. The situation is somewhat chicken and egg – the data people tending to acquire data that’s easiest to acquire because they don’t know any better, and the people responsible for making management decisions don’t know what kinds of data to ask for, because they tend not to know what’s possible. That, or worse, they don’t know what data they need in the first place. Very often what results is an expensive game of the blind-leading-the-blind. And vice versa.

Chicken-and-egg situations like this are classic contradictions. The contradiction challenge, here, then, boils down to knowing what needles look like.

The NPS world doesn’t know what needles look like. Neither does the UK rail network. Figure 1 shows a screenshot of the liveppm.co.uk dashboard. An extremely impressive piece of haystack-building technology that quite literally increments every time a train leaves a station anywhere in the UK.

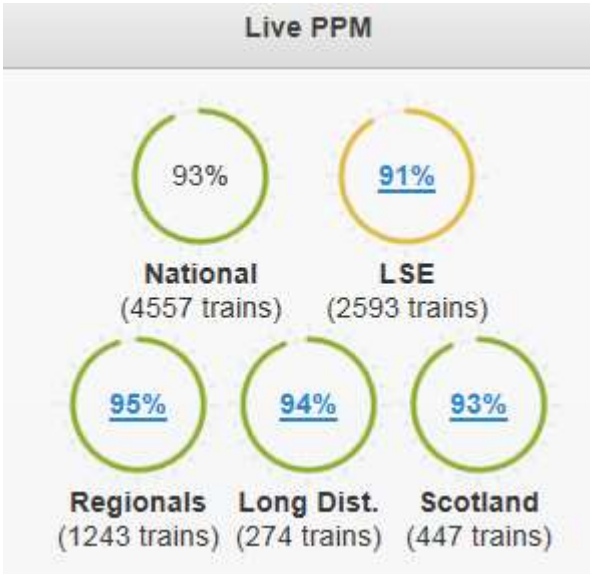


Figure 1: ‘liveppm’ Train Punctuality Dashboard

As a UK taxpayer I hate to think how much money has been spent building and maintaining this capability. I hate to think about it because I know that as an occasional user of the rail network, the site is of absolutely zero use to me. Knowing that the train operator I’m about to take a trip with is currently running with a 91% punctuality record doesn’t help me plan my journey any better: should I arrive to catch the earlier train? Should I take the car instead? I really have no idea.

If it’s pointless for me as the user, it must be even worse for the train operators because like their NPS dashboards, it’s another haystack with no needles in it. It doesn’t tell anyone what needs to be done to improve the figures. For the operators, liveppm is merely a stick with which they get beaten-up every month when they fail to meet their (equally meaningless) ppm targets.

So, how can we know what ‘needles’ look like? That’s the million – make that ‘multi-billion’ – dollar question of the highly dysfunctional Big Data Analytics world right now.

If ‘needles’ are all about insights that help improve a system, the first thing you need to be able to establish is what ‘improvement’ looks like. For some reason, people outside the

TRIZ/SI world seem to have a lot of problem thinking about this question. For those of us inside, it is pretty much self-evident: everything improves in the direction of 'more benefits, less cost and less harm', all the way to an Ideal Final Result of 'all the benefits, none of the cost and none of the harm'.

This fact in turn should lead to a further clue about what 'needles' look like: the TRIZ/SI trends are the signposts that point problem solvers towards the IFR destination. And so the untapped Evolution Potential contained within any system should help us to define not only what 'needles' look like, but what *all* of the needles look like:

Figure 2: Evolution Potential Reveals 'Needles'

By way of example, looking at the highlighted Potential in the figure, knowing that the system hasn't advanced along the Customer Intangibles trend, tells us not only where the system will evolve in the future, but also what we need to be able to go and measure in order for the jump to be able to happen. The same applies to all of the other Trends and all of the Trend jumps that haven't been exploited yet.

If the Customer Intangibles trend tells us we haven't jumped to the 'conscious intangibles' stage yet, we know we need to go measure those conscious intangibles. Likewise, if the Design for Robustness Trend tells us we haven't thought about 'transients' yet, then, hey, that's precisely what we need to go and find out how to measure next.

Needles come from untapped Evolution Potential. In many ways needles *are* untapped Evolution Potential. Suddenly the world of Big Data gets rather simpler.

Talking To The Mental Gears

One of the most frequently used slides in our marketing-innovation armoury is the summary of the likes and dislikes of the various different Gravesian Thinking Styles or 'Mental Gears' as we refer to them in the TrenDNA books:

	Pleasure Seeking	Pain Avoiding
1. Survival	reproduction	food, water, warmth, safety
2. Tribal	good fortune, 'one of the gang' revenge	curses/spells/rejection/isolation
3. Feudal	ego-gratification, 'my way' mass adulation, rebellion	defeat, loss of power rivals/threats
4. Order	stability, obedience, medals status, promotion	change, rebellion from others loss of status, outcast
5. Scientific	peer recognition, 'best in show' biggest/best/fastest, merit pay	losing, 'keeping up with the Jones'
6. Communitarian	'making a difference', harmony 'maximise my potential'	orange or blue attitudes aggression/conflict/hierarchy
7. Holarchy	knowledgeable/'wise', 'life-long learning', discovery/challenge	sub-optimization, rigidity 'stupid rules'
8. Holistic	'defining the jigsaw', 'wrong jungle', empathy/trust	non-holistic non-spiritual

Figure 1: Pleasure Seeking & Pain Avoiding Memes Across The Gravesian Thinking Styles

The usual purpose of the slide is to help identify the likely conflicts and contradictions that occur when trying to communicate *across* a group of people containing multiple of the different Styles. The intention being to demonstrate that it is very difficult indeed to craft a communication message that will resonate and be acted upon by a spectrum of listeners.

In theory, however, if we're trying to design a communication for a particular individual – subordinate to their boss, for example, or clinician to patient – life ought to become somewhat easier. Providing that is, that we're able to identify the prevailing Mental Gear of the intended recipient of the message a priori. The PanSensic 'Mental Gears' lens, of course, is intended to help do precisely this job, and so as use of the tool broadens, it becomes increasingly the case that we can have a pretty good indication of how someone is Thinking.

Achieving that not insignificant task still, then, leaves another one: if a clinician is about to deliver a piece of information to an Order-Mental Gear patient, how should that information be framed? Knowing, from the Table, that they like 'stability, obedience, medals and promotion' and don't like 'change, rebellion or loss of status' is a start, but to stand the

best chance of getting things right, a deeper level of guidance is probably going to be useful. The purpose if this article, therefore, is to suggest a broader spectrum of 'do's and 'don't's when communicating to individuals listening in one of the various possible Mental Gears:

	Do	Don't
Gear 2: Tribal	Things that keep people 'in the crowd' or get them back to the crowd ('back to normal'); involve other family members is discussions; speak authoritatively; keep it simple; demonstrate a clear way forward focusing on very short timescales; use definitives, pay on Placebo Effect; ensure rapid feedback; recognize that words like 'ancient', 'omens', 'good sign' are okay.	Try and explain why things happen; isolate the person from their tribe; use peer language if trying to get them to do something; be ambiguous; talk through options; expect long feedback cycle times to be effective; deny a clear 'sense of progress'; talk about death, mortality, voodoo, bad-omens.
Gear 3: Feudal	Make everything 'their' idea; offer options (even if they've been engineered such that only one is sensible); make every attempt to get them out of the Feudal Gear and into Tribal by playing on isolation fears; offer small tangible rewards; in order to make sure something is done, tell them they can't do it; emphasise they are special and unique; chunk instructions into the smallest possible pieces (ideally designed by them); provide autonomy, control and at least a perception of power; recognize attention span is very short; recognize that minds will change with the wind ('strong opinions, weakly held'); expect a lot of trust; use expressions like 'death-defying', 'beat the odds'.	Allow opportunities for shirking; expect dedicated, prolonged hard work; expect them to make any calculations or think through consequences by themselves; give detailed explicit instructions; use definitives; restrict use of pen or other control decision instruments; expect submission; argue; use the word 'no'; talk about death, mortality, 'life-changing', or loss of liberty.
Gear 4: Order	Offer clear, specific rules; offer rewards for compliance; emphasise 'the majority', 'everyone', safety', doing 'the right thing'; present clear pathways; focus on the immediate/short term; stick to the plan (uncertainty level dictates how far into the future the plan can go); focus on high-level common ground; use check-lists; process steps; focus on detail ('the devil is in the detail');	Speculate about their right/wrong boundaries; allow any ambiguity, unless it's a very clear if-then-else scenario; move the goalposts; deny a reward they believe they have satisfied the criteria for; deviate from their 'normal'; use jargon words unless you know they know them; talk about change, risk, 'unknowns'.

Gear 5: Scientific	Use data (data proves); present clear goals and associated rewards; offer benchmark/comparison information; present clear pro-con data and let them make the calculations and make the decision; ask their opinion; allow them to challenge and answer their questions with quantifiable data; offer evidence; present clear risk/return ratios; talk about 'root cause'; if a subject is close to the boundaries of knowledge, explain what the boundary is and how they might best venture beyond them.	Dictate; do the calculation for them; obscure or alter the data; obscure the logic; use definitives; prescribe *the* solution; use 'new-age' language ('fair', 'consensus'); say 'we don't know', 'you don't need to know', 'tradition', 'folk remedy'
Gear 6: Communitarian	Seek consensus; allow exploration of all avenues; explore the big picture; consider 'externalities'; use 'system' language (Gaia); focus on 'outcomes'; focus on causes rather than symptoms (prevention is definitely better than cure); accept and discuss the limits of knowledge 0 it's okay for things to be 'unknown'; involve all stakeholders; use words like 'natural', 'balance'	Try and 'prove' anything (especially using purely data); argue; attempt to ignore any elephants in the room; show any sign of aggression (especially passive); use definitives; isolate them from friends and (extended) family; isolate them from third party information sources; get correlation and causation mixed up; chastise; refuse second opinions; use competitive language (best, winner, loser, etc); use words like 'man-made', 'artificial'.
Gears 7/8: Holarchy/Holistic	Emphasise freedom; explain things from first principles; outline and emphasise challenges; prompt for their thoughts and ideas; focus on context and win-win; involve them in the design of the solution and pathways and way-points; embrace complexity; allow incubation time after conveying data; recognize 'the between' is as important as the entities; talk about 'unknowns', 'holes', 'gaps'.	Dictate; provide 'the answer'; enter into any kind of competitive behavior; use definitives; attempt to strip out 'irrelevant' data (they will decide what's relevant or not); attempt to trap or corner them into a decision; assume they don't possess the relevant domain knowledge; assume they won't be able to work it out; extrapolate; use words like 'or', 'but' (unless you are seeking challenge)

Not So Funny – What Could Possibly Go Wrong?

Last month saw the launch of this rather scary smartphone accessory:

Now, I think we all know that the smartphone accessory world is hitting the top of some kind of s-curve, so we shouldn't be too surprised that the world starts to see a degree of barrel-scraping, but for the life of me, I can't imagine anyone thought this idea through.

It turns out to be a fairly common occurrence. Especially, for some strange reason, Principle 5, Merging, solution ideas. And, if the US is anywhere close by, usually involving firearms of some description. Here are a couple of fairly scary Mergers:

SYSTEM·ATIC INNOVAT·ION

This one might take a bit more thinking through to work out potential unforeseen circumstances. If you're arachnophobic at least…

This one, I have a kind of sneaking admiration for. In an 'I'd quite like to see someone do that' kind of way:

Ditto this one, although, it's probably as much about Principle 17 as it is about Merging cars and trees…

Sticking with cars, but now shifting to Principle 35 applied to that pesky missing car door problem, this one is borderline Darwin-Award winning territory…

But, in the final analysis, anything the Americans, Turks or Canadians can do, the Brits can always do better…. all set to go…

Patent of the Month – Oral Insulin Capsule

Patent of the month this month is US9,101,457, granted on 11 August to an 8-person team at the Nano And Advanced Materials Institute in Hong Kong. The invention take us into the holy-grail territory of diabetes care, and, as suggested by the title, the widespread desire to move away from injected insulin.

The inventors describe the problem that has prevented the needle from being superseded as follows:

Multiple daily injections of insulin remain the traditional approach for the treatment of insulin-dependent diabetic patients. However, suboptimal control of blood glucose level and poor patient compliance are the associated disadvantages with this treatment. Oral insulin delivery is a more convenient way to administer insulin to diabetic patients as it is the most physiologically comfortable means. Nevertheless, creating an oral formulation is a daunting task for all bioactive macromolecules, due to the highly organized barriers that the macromolecules encounter in the gastrointestinal (GI) tract, such as rapid enzymatic degradation and the poor intestinal absorption. In addition, protein drugs that possess narrow absorption windows often exhibit variable exposures leading to their poor drug transportation in the GI tract. For many years, various strategies have been developed to enhance oral delivery of insulin. Polymeric nanoparticles are of special interest due to the pharmaceutical advantage such as enabling modulation of physicochemical characteristics. Moreover, their submicron size and their large specific surface area favor their absorption compared to larger carriers

Another invention disclosure in which the basic contradiction is plainly indicated – we're trying to avoid losing the insulin due to the 'highly organized barriers' of rapid enzymatic degradation and poor intestinal absorption. A pair of conflicts we can best map onto the Matrix as follows:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Loss of Substance (25)

WORSENING PARAMETERS YOU HAVE SELECTED:

Harmful Emissions (30) and Compatibility/Connectivity (33)

SUGGESTED INVENTIVE PRINCIPLES:

2, 13, 24, 34, 33, 35, 28, 21, 5, 15

The description goes on to give us more information, then, about previously attempted solutions to the problem:

In order to overcome the barriers mentioned above, oral insulin nanoparticles have been widely investigated to increase their biological activity in experimental animals. The first obstacle for oral delivery of insulin is in the stomach which forms the boundary between the intestine and the external environment. Special pH-sensitivity of nanoparticles provides the protection to confront this first barrier by preventing insulin from contacting the highly acidic medium in the stomach. The second barrier for oral delivery of insulin is poor intestinal absorption. To overcome this barrier, special muco-adhesive nanoparticles are developed to prolong insulin nanoparticles' intestinal residence time and increase the permeability of mucosal epithelium, thus finally facilitating insulin entering into systemic circulation. Double-functional nanoparticles with both pH-sensitivity and muco-adhesivity can overcome all the barriers mentioned above. Inserting the double-functional nanoparticles into the enteric-coated capsule could protect against the pH instability of

nanoparticles in the stomach. It has been suggested that the positive charge of insulin nanoparticles is a positive factor for insulin absorption. The nanoparticles having a more positive charge are more effective on opening tight junctions, leading to an increase in paracellular permeability. However, a polycationic nanoparticle with muco-adhesivity and pH-sensitivity may be a non-synergistic carrier for insulin, since the positive charge of the polymer in those nanoparticles could reduce the stability of the nanoparticles in the stomach and the pH-sensitivity of the polymer in those nanoparticles could weaken the positive charge of the nanoparticles in the intestine.

Which in turn leads to this insight:

Fortunately, the GI barriers are sequential in nature; therefore the probability of reaching the therapeutic objective is the contribution of each individual probability to overcome each barrier. The multistage delivery system has a separate intended function, which can efficiently overcome various barriers and simultaneous delivery of independent systems. Thus, a two-stage delivery system is needed for allowing a high degree of selectivity in the stage 1 enteric capsule and in the stage 2 cationic nanoparticles Such a two-stage deliver system would have an excellent synergistic effect together with pH-sensitivity and a muco-adhesive property.

The solution, in other words, starts with a recognition that there are two different problems occurring at different times and places. We therefore need to separate (Principle 2) the different delivery properties at the different GI barriers.

Nothing's ever quite that simple though, so here's the main Claim the inventors then go on to make:

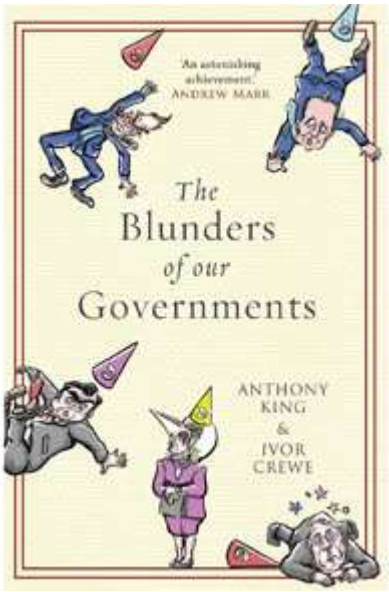
1. A composition comprising an enteric-coated capsule enclosing a plurality of nanoparticles and a solubilizer, wherein each of said plurality of nanoparticles further comprises a polycationic polymer, a biodegradable polymer that is a copolymer which is degradable by hydrolysis following exposure to physiological environment of human intestine, a bioactive substance and a stabilizer; said solubilizer is trehalose in a concentration of 1.5% w/w or w/v.

Which looks a lot like Principle 34 (Discarding & Recovering – the biodegradable polymer), 28 (Mechanics Substitution – hydrolysis), and 24 (Intermediary – the stabilizer). It's almost as if they used the Contradiction Matrix.

And at the same time providing a very elegant example of the analogy we often use of innovation as a process of unlocking the right combination to a safe. The invention disclosure reveals multiple previous attempts that provide partial solutions to the problem, but this team – hopefully, for the sake of diabetic patients – has been the first to get all of the right ducks in a row at the right time and place.

The only problem now is they didn't use TRIZ to help bulletproof the patent. Hopefully that tiny detail won't stop this potentially very important solution from reaching the enormous numbers of patients that currently have to inject themselves everyday.

Best of the Month – The Blunders Of Our Governments



If you live in the UK, this book will make you gasp in disbelief and stamp your feet in rage. If you live outside the UK it ought to quite frequently reduce you to bemused laughter. It should also make everyone tremble in terror at the realisation that the people in charge of our destinies are, in many respects, idiots. With clarity, elegance and wit, Anthony King and Ivor Crewe recall the most egregious blunders committed by British governments over the last three decades. Some of them are widely remembered, such as the poll tax, the Millennium Dome and membership of the Exchange Rate Mechanism, others almost forgotten, such as individual learning accounts and the Assets Recovery Agency. A few, such as Labour's comically bungled distribution of European Union subsidies to British farmers under a new "single payment" scheme, were scarcely noticed even at the time. In all these instances, ministers failed wholly to achieve the outcome they intended; sometimes they achieved the opposite. They also, in several cases, wasted billions of pounds of public money and did great damage, sometimes lethal damage, to the people they were supposedly trying to help.

The causes of the blunders were numerous, but in general – and the reason the book makes it to our ‘best of’ recommendation – it’s because of a failure to understand what a complex adaptive system is. In many cases, ministers and their senior officials were simply ignorant – King and Crewe politely call it "cultural disconnect" – of how large sections of the population lived from day to day. The Tories had no inkling that, if sent a poll tax bill of several hundred pounds, some families, and particularly elderly couples, would not be able to pay. "Well, they could always sell a picture," suggested Nicholas Ridley, the then environment secretary and the son of a viscount, apparently in all seriousness.

But Labour has become almost equally disconnected from real life, with its frontbenchers and advisers increasingly drawn from a cohort that went from school to university (usually Oxbridge) to Westminster think-tank without ever working in a retail store, a hamburger joint or a benefit office. Its tax credits scheme involved paying out weekly or monthly a sum that was determined annually.

SYSTEM ATIC INNOVAT ION

Millions of people short of money, many of whom had never previously completed a tax return, had to fill out complex forms about their previous year's earnings, estimate earnings for the following year and notify the authorities each time their circumstances changed. The scheme, as the head of the Inland Revenue admitted, went "spectacularly wrong". About 2 million eligible people failed to apply; about 300,000 who did apply didn't receive payments in time; and, at the end of the first year, nearly 2 million were found to have been overpaid. The scheme's architects didn't grasp that millions of people managed their finances week to week, even day to day, their employment being spasmodic and their earnings unpredictable.

Labour's individual learning accounts fiasco – still used in some business schools as a case study in failure – got little coverage because, as with the proverbial small earthquake in Chile, there weren't many dead. The biggest victim was the taxpayer. The scheme, giving poorly qualified people modest sums to help "buy" training courses to improve their skills, was pure New Labourism. The courses would be offered not by established further education colleges, regarded as conservative and unimaginative pillars of the dreaded "education establishment", but by a plethora of "new providers".

Potential trainees would choose options from a dynamic and innovative market. Unfortunately, ministers and civil servants failed to devise any checks that "providers" were actually putting on courses, or that "trainees" were taking them, or that the courses indeed existed. The scheme was wide open to fraud. And so, surprise, surprise, fraud quickly took a hold: many learning accounts were criminal inventions. In one instance, 6,000 were created for a single address, and in another the names of account holders turned out to be Hindi swearwords. When the scheme was wound up, fraudsters had pocketed at least £97m out of £290m spent.

Just as Tory ministers, when establishing personal pensions a decade earlier, couldn't imagine that banks and insurance companies would be so wicked as to mis-sell them, or consumers be so foolish as to buy "products" that made them worse off, so Labour ministers couldn't see that an unregulated market in training would throw up so many charlatans. In the age of neoliberalism, the borderline criminality of much private enterprise and the credulity of many asymmetrically informed consumers were just not part of their worldview.

King and Crewe reckon that Labour and Tory governments are equally prone to system-naivety failures. In a postscript, they judge the recent Conservative-Liberal coalition, with its start-stop-start NHS reforms, its misallocated franchise award for the West Coast mainline, its aborted plan to sell off forests, its malfunctioning disability assessments, and so on, to be "if anything … even more blunder-prone than its predecessors". And they note that private-sector companies also fail to understand things like ‘emergent behaviour’ or, even more worryingly, ‘unintended consequences’: think of the banks in the run-up to the 2008 crisis or BP's oil spill in the Gulf of Mexico that we’ve previously talked about in this ezine. We mock governments for their IT disasters, to which King and Crewe devote a chapter, but similar fiascos have bankrupted private companies.

To err is human but to really foul up, as an American journalist added to Pope's famous line, you need computers. Yet many of the blunders King and Crewe recall can be partly attributed to how the British run their government and politics. Britain is said to benefit from decisive government, without the gridlock that the separation of powers frequently imposes on American presidents. The trouble is that it's as easy to take bad decisions as to take good ones. Parliament has no significant role in framing legislation and no proper system of pre-legislative scrutiny (public bill committees being charades in which MPs

mostly catch up on replying to constituents' letters) such as exists in many other parliamentary democracies, including Scotland. Ministers, advisers and top civil servants rarely involve the people who will have to implement (or, in the fashionable jargon, "deliver") their policies or those who have relevant experience of implementation.

For example, the architects of the Child Support Agency, which failed abysmally to extract maintenance payments from absent fathers – partly because ministers, again ignorant of real life, didn't anticipate how many single mothers would be reluctant to identify the fathers – seem not to have thought of consulting something called "the liable relatives unit", which in a corner of Whitehall had been grappling with the problem for years. Governments, as King and Crewe say, hoard power and ignore well-informed critics, whom they treat as either political enemies or defenders of "producer interests".

Moreover, there are no penalties for messing up. None of those responsible for the blunders in this book resigned or were sacked, unless you count Norman Lamont, who left the Treasury nine months after the ERM debacle but was less culpable than John Major, who sacked him. Only those charged with putting the impossible into effect risked losing their jobs.

The doctrine of ministerial accountability, King and Crewe argue, is a myth. Ministers resign over scandals and gaffes, rarely over policy failure. At worst, they will be moved, but often to a more senior position.

It is hard to overpraise this book, which lays bare the weaknesses of British government so clinically and entertainingly. The authors have a wonderful eye for the ridiculous: how the Child Support Agency spent two years chasing a childless gay man over a nonexistent daughter; how Lord Falconer, after inheriting the Dome project, announced free entry for 1 million schoolchildren, thus instantly undercutting the project's business plan, which was to sell tickets to families; how contracts for the ill-fated public-private partnership to rebuild London's underground specified the time drivers needed to visit the lavatory. But, given the adversarial nature of British politics, they struggle to propose plausible solutions. They call, surely more in hope than expectation, for a more bipartisan approach to legislation, but are otherwise reduced to proposing prizes of £50,000 for ministers whose policies turn out well.

Though this book provides a comprehensive guide for ministers who wish to avoid blunders, I fear the blunder-rate will only continue to increase. As the authors point out, ministers now wish to be seen as men and women of decisive action, sweeping aside doubters and cowards, and in this they are encouraged by the 24-hour media, always demanding that something be done, impatient of delay and eager to portray as ditherers those who think carefully and consult widely before they act.

Government has become so media-conscious that it is run, in many respects, rather like a daily newspaper newsroom. A group of people with even less of a clue about how complex systems work.

For me, the main messages of the book are that a) no-one should be allowed to run a government department of business without having attending Complex Adaptive Systems 101, and b) if anyone graduating the course still wishes to be considered for a government or management role, they should be physically prevented from doing so. Groucho Marx – a master of navigating complex systems tipped over into chaos – had it right when he said he would never wish to be a member of a club that would have people like him as a member. Something to think about.

Wow In Music – Blue In Green

In this series on wow music we have spoken about a few musical pieces that, due to the ability of composers who, manipulating dynamics, timbre, and all sorts of other sound features, are able to make us feel irresistibly attracted to them. The same type of experience is achieved in improvisation, a particular case of music creation where sound is crafted not only by a specific composer but rather collectively by various musicians at the very moment of performance. In this case, the composer is generally only responsible for a few (but important) indications about melody and harmony. The final outcome, however, depends on the musical abilities, including cultural background, of each individual performer. Jazz improvisation has many examples that illustrate that result in many different ways. “Blue in Green” (BiG) is one of my personal preferences.

BiG is the third track of Miles Davis’ famous 1959 album “Kind of Blue”, often mentioned as the number one in many of the top ten ever made jazz records lists. Along with “Flamenco Sketches”, BiG is one of this record’s two ballads that captivate us not by pompous canons or any other flamboyant music resource but rather by what we could call a “peaceful dialogue among intimate friends”. In this case, those friends are Miles Davis (trumpet), Bill Evans (piano), John Coltrane (tenor saxophone), Paul Chambers (double bass), and Jimmy Cobb (drums).

The authorship of this beautiful piece is controversial, being claimed by both Miles Davis and Bill Evans, despite the fact that it was originally credited to the former. Years after BiG was recorded, during an interview in 1978 for the famous series hosted by Marian McPartland on National Public Radio, Bill Evans confirmed he was the composer. Some of Evans confirmed this fact. During an interview, Earl Zingers (referring to BiG) once mentioned he knew that Evans was the author “… because he wrote it over at my pad where I was staying in East Harlem” (Letter from Evans, vol. 5, n. 1, 1993).

In Evans words, BiG is a “10-measure circular form following a 4-measure introduction, and played by soloists in various augmentation and diminution of time values”. Apparently, there is no ‘explicit’ theme, at least in the traditional jazz “theme and variation” way (Principle 2). The structure is built on top a very simple harmonic sequence, unusually

distributed over 10 measures (Principle 19B), along which the soloists played their musical ideas on the modal sketches they were given in the studio with no previous rehearsal. Form is also achieved with the palindromic order in which the soloists succeed after each other: piano, trumpet, piano, sax, piano, trumpet, piano (Principle 3).

Soloist	Harmonic Rhythm	Repetitions of Harmonic Sequence	Measures
Evans	2	Intro	4
Davis	4	2	20
Evans	2	2	10
Coltrane	2	2	10
Evans	1	2	5
Davis	4	2	20
Evans	1 (rubato)	Coda	-

The automated description of the evolution of BiG's emotions done by RealME (our new music player for iOS devices) is shown is this graph:

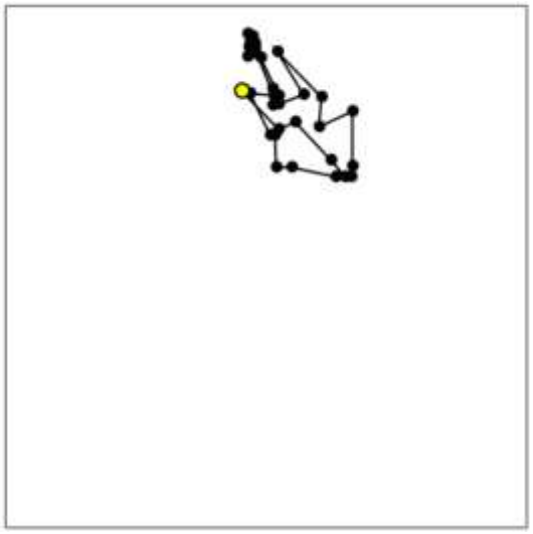


Figure 1: RealME's automated emotion classification of Blue in Green on a valence ('x' axis) x arousal ('y' axis) space. Each dot represents a 10-second music interval.

Once again, it is difficult to evaluate how efficient RealME's algorithms are considering that each one of us experience music in different ways at different times. It is possible to say, however, that there seems to be some consistency in this analysis, as most of the dots are in the same region of the graph, which could correspond to very similar sensations throughout the entire piece.

Given the nature of the piece, mainly its calm atmosphere, it may seem awkward to some that BiG is being featured in hits eZine series right after last month's Tchaikovsky's tempestuous orchestral work (1812). To me, the beauty in BiG relies on profound contemplation and reflection. Wow happens after the piece ends, when I ask to myself how come, after listened to it so many times over the years, it is still able to transport me to the same imaginary, distant and comforting places.

Investments – Ultrahaptics

A UK start-up has developed tactile technology that allows users to "feel in mid air", which it hopes will have profound implications on the emerging field of virtual reality (VR).

Bristol-based Ultrahaptics intends to overcome one of the biggest obstacles to creating a truly immersive experience by integrating the sensation of touch to the technology.

"We'll never create this complete immersion without this physical feedback," Tom Carter, co-founder of Ultrahaptics, told the media earlier this year. "If you don't have the sense of touch it will really break down the VR experience. This is what we're trying to solve."

We first saw the company at the SouthWest VR conference in Bristol earlier this year when they were showcasing the technology for the first time. The hardware, at the moment uses a small array of ultrasound speakers to create "haptic holograms". The haptic feedback created is both invisible and soundless and is capable of replicating textures, such as brick and metal.

Theoretically, any texture can be recreated using ultrasound vibrations so long as the texture can be mapped, even something as complex as flowing water.

Carter and Ultrahaptics are currently in discussions with several companies to help develop a demonstration of the technology within a virtual reality context.

Beyond VR, Ultrahaptics sees use for this technology as a method of replacing controls for devices in everything from consumer electronics to home appliances.

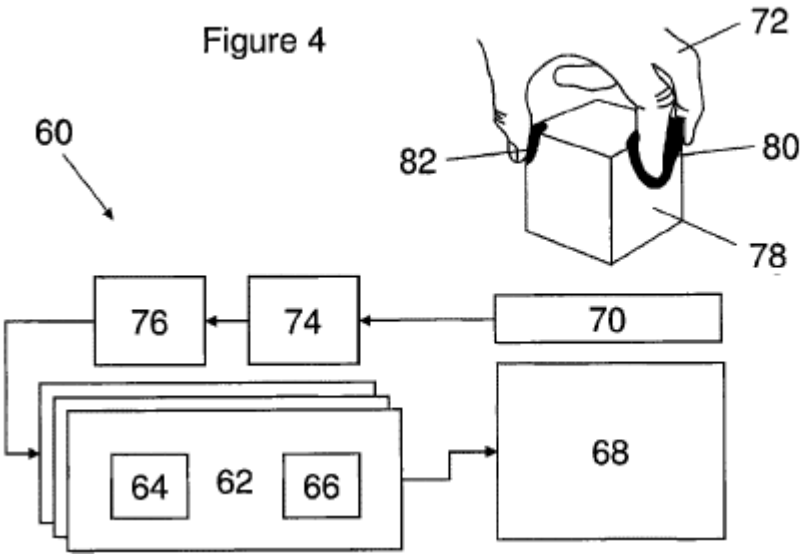
The startup is also working on ways to incorporate 3D shapes, as well as a way to make it small enough to be embedded in devices like smartphones and tablets. So far ultrasound speakers 1/40th of the size of the prototype have been developed.

"We've created a technology that allows you to feel in mid air," said Carter. "My big hope is you'll be able to put on a VR headset and be able to reach out and touch and feel. "I think this is going to be one of the most useful things for virtual reality in the future."

We tend to agree. The TRIZ/SI trends tend to say the same thing. We've said it before and no doubt we'll be saying it again in the future, 'ultrasound rules'.

Check them out (and watch a couple of cool videos) at ultrahaptics.com.

If you're really interested, you can check out their main patent – GB2513884 – and see how long it takes you to design around.



GB 2513884

Generational Cycles – Oh, I Don't Like To Be Beside The Seaside

According to a National Trust report published this month, the number of people visiting the UK's coastline is down by about a third in the last 10 years.

The results come from an online survey in which 42% of people said they visited the British coast for a day out each year - down 20 percentage points from 62% in 2005. The report goes on to suggest that the reason for the decline in coastal visitors might be generational. Its findings for the last 12 months include:

- Those aged 18-24 are far less connected to the coast than those aged 55 and over
- Londoners visit the coast much less than the rest of the south-east England, with 64% visiting the coast at least once a year, compared with 76% of those surveyed in that region

The biggest barrier stopping people from visiting coastal areas, the report says, is not having enough spare time - a reason given by 29% of people. Other barriers are UK coasts being too busy when the weather is nice (23%), too expensive (18%), not having easy access to transport (17%) and preferring to go abroad than holiday in Britain (14%). Of those who do go, 64% say they take their loved ones to generate "happy memories", while 61% say visiting the coast or seaside is important to having a good quality of life.

Kate Martin, the National Trust area ranger at Formby, Merseyside, said in the survey that she had noticed a decline in tourism in that part of the country over the last 10 years. She said: "Ten years ago we were seeing around 450,000 people visit a year. I'd say that has dropped to about 250-300,000.

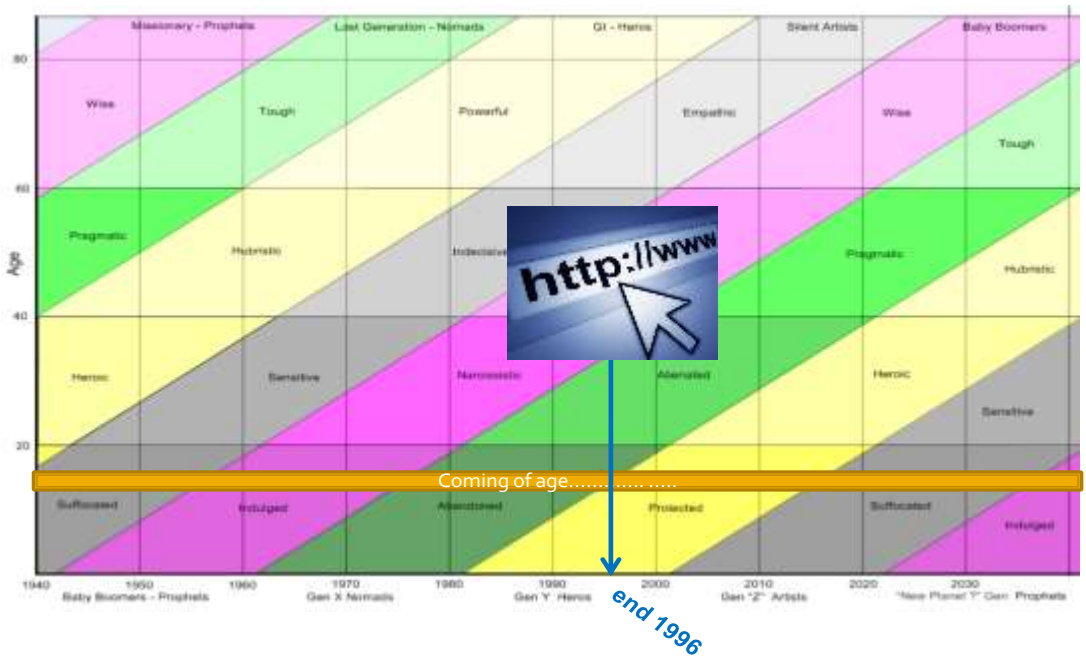
"It does seem to be a generational thing and that partly has come with the rise of cheap package holidays."

According to the Strauss & Howe generational cycle model, and building on one of our earlier ezine articles about 'freedom' and coming of age (Issue 130, January 2013), the problem might just be something different. For Boomers and GenXers, the thing that

tended to signify freedom to them was a car or a motorbike. The moment they were old enough to hold a licence and afford (or borrow) transport, they were out of the house… and the place they were most likely to head, if they lived in the UK at least, was to the seaside:

Mods & Rockers On Brighton Beach in the 60s

For the current generation of 18-24 year-olds (i.e. Heroic Generation Yers), coming of age 'freedom' came from something else entirely:



If your freedom comes from going on-line, you have little desire for a car or a motorbike, and therefore you have a lot less desire to go and physically visit anywhere. Least of all a seaside resort full of old people. If you really are going to leave the house, you're going to book something on line, and, as the survey shows, therefore most likely book a cheap flight to a place where your parents *really* can't reach you. Like Ibiza.

If the survey was all about trying to devise strategies to get people back to the British seaside, commissioning a poem from (Boomer-with-GenX-audience) John Cooper-Clarke very likely isn't going to do the trick.

The National Trust might just have to accept that there is no 'trick' to be had here. The Generational battle for the seaside was lost back in 1996. So today the archetypal 'Blackpool landlady' is stuck in a vicious cycle of providing freedom-memories for old people, largely by old people.

Biology – Flying V

One of the most impressive sights from the natural world is watching a flying-V of geese flying overhead. It has long been understood that several species of migratory bird fly using this formation because it significantly boosts the efficiency and range of flying birds, particularly over long routes. In a V formation of 25 members, each bird can achieve a reduction of induced drag by up to 65% and as a result increase their range by 71%.

What's also known is that the birds flying at the tips and at the front are rotated in a timely cyclical fashion to spread flight fatigue equally among the flock members.

The reason for the energy saving has traditionally thought to be due to the utilisation of a neat aerodynamic trick. As a bird flaps, a rotating vortex of air rolls off each of its wingtips. These vortices mean that the air immediately behind the bird gets constantly pushed downwards (downwash), and the air behind it and off to the sides gets pushed upwards (upwash). If another bird flies in either of these upwash zones, it gets free lift that in turn allows it to save energy.

What's been understood more recently – since the advent of cheap and convenient means of fitting some of the birds with appropriate instrumentation – is that flying in a V isn't just about staying in the right place. It's also about flapping at the right time.

As each bird flaps its wings, the trail of upwash left by its wingtips also moves up and down. The birds behind can somehow sense this and adjust their own flapping to keep their own wings within this moving zone of free lift. "They trace the same path that the bird in front traced through the air," explained Royal Veterinary College researcher Dr Steven Portugal in a Nature paper from 2013.

Imagine that a flying migratory bird leaves a red trail with its left wingtip as it moves through the air. The right wingtip of the bird behind would travel through almost exactly the same path. "It's like walking through the snow with your parents when you're a kid," said Portugal. "If you follow their footprints, they make your job easier because they've crunched the snow down."

This is a far more active process than what Portugal had assumed. “We thought they’d be roughly in the right area and hit the good air maybe 20 percent of the time,” he says. “Actually they’re tracking the good air throughout their flap cycle. We didn’t think they could do that. It’s quite a feat.”

This solution, in effect, presents a potential future resolution to the human equivalent of the flying-V problem: when military aircraft fly in their own version of ‘energy-saving’ formation –

- in which the poor pilots out at the periphery of the formation get a progressively rougher ride as the take advantage of the upwash wake of their neighbor.

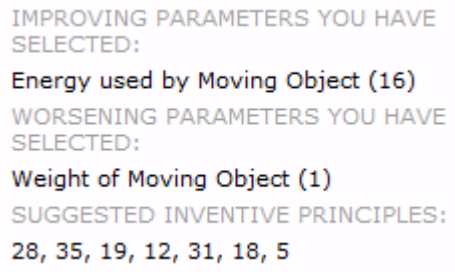
The birds can also change their behaviour very quickly. As they switch places in the flock, they sometimes find themselves directly behind the bird in front, and caught in its downwash. If that happens, they change their flapping so that they’re doing the opposite of what the bird in front does. Rather than tracing the same path with its wingtips, it flies almost perfectly out of phase. “It’s almost like taking evasive action,” said Portugal. “They seem to be able to instantly respond to the wake that hits them.”

How do they manage? Right now, no one knows. The easiest answer is that they’re just watching the bird in front and beating their wings accordingly. They might be using their wing feathers to sense the air flow around them. Or they could just be relying on simple positive feedback. “They’re flying around, they hit a spot that feels good, and they think: Oh, hey, if I flap like this, it’s easier,” says Portugal.

Whatever the answer, it’s clear that this isn’t a skill birds are born with. When they first followed a tracking microlight camera plane, they were all over the place. It took time for them to learn to fly in a V… and that adds one final surprise to the mix.

“It was always assumed that V-formation flight was learned from the adult birds,” says Portugal. “But these guys are all the same age and they learned to fly from a human in a microlight. They learned V-formation flying from each other. It’s almost self-taught.”

The basic contradiction challenged by the flap-coordinated flying-V formation is fairly straightforward: the birds are trying to reduce their energy consumption and the thing that would otherwise prevent it from happening is the basic weight of the bird. Here’s what that problem looks like when mapped on to the Contradiction Matrix:



The main ‘upwash’ solution offers a lovely illustration of Principle 12, Equi-potentiality in action – a classic case of balancing one force by making use of another acting in the other direction’.

Interestingly, too, Principle 19, Periodic Action, gives us a pretty good steer in the direction of not only the flap-coordination solution, but also the changing leadership at the head of the V.

Short Thort

"We who choose to surround ourselves
with lives even more temporary than our
own, live within a fragile circle;
easily and often breached.
Unable to accept its awful gaps,
we would still live no other way.
We cherish memory as the only
certain immortality, never fully
understanding the necessary plan."
Irving Townsend

"At the same moment you are doing something
that nobody else is able to do.
The same moment that you are seen as the best,
the fastest and somebody that cannot be touched,
you are enormously fragile."
Ayrton Senna

News

US

Just like buses, none arrive for ages and then suddenly three come along all at the same time. It looks like Darrell, just back from his first trip to the US this year, now has two more before the end of the year: one during the second half of October, the second during the first half of December. More details on the website if anyone is interested in meeting or doing something.

Australia/Singapore

Talking of travel, it also looks like Darrell will be in Australia (first time this year!) and Singapore (first time for 4 years!!) during the second half of November. Again, more details on the calendar page of the website.

ETRIA TRIZ Future
Flights are now all booked, and three of the four papers we offered up to the conference are written and submitted, so great to be able to confirm we will be attending the world's best TRIZ conference, 26-29 October. See you there!

IRDG ICMM Webinar
On 11 September, we will be following up the ICMM introduction session we ran with good friends IRDG in Ireland earlier this year. Half the webinar will be showing some of the new PanSensic tools and how they're helping to improve the breadth and accuracy of the ICMM assessment and Journey mapping; the other half will be Q&A from participants. Check out the irdg.ie website for details of how to connect in to the session.

Unlocking Innovation Scheme
We will be running a TrenDNA introduction session at the big UK railway industry innovation forum on 30 September. The session is scheduled to take place at the Network Rail Westwood facility, just down the road from the University of Warwick.

Manchester NHS expo2015
PanSensic will have a stand at this year's big NHS innovation event, taking place in Manchester from 1-4 September, if you're in the area. Lots of new tools to catch a first glimpse of.

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

- Financial Services – patent invent-beyond project
- Medical Devices – PanSensic clinician insight scrape
- Medical Devices – SI Certification workshops
- Medical Devices – ICMM assessment
- Aerospace – SI workshops
- FMCG – TrenDNA study
- FMCG – Innovation strategy roadmapping project
- Automotive – Voice of System technology roadmapping project
- Textile – Invent-to-order project
- Automotive – Problem solving project
- Electronics – Patent Invent-Beyond project
- Transport – PanSensic study