Systematic Innovation

e-zine

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.

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

Good Instinct/Bad Instinct
(Or: Why Our Politicians Are Hard-Wired To Make Terrible Decisions)

Darrell Mann, Paul Howarth
Systematic Innovation/Akumen, UK

*'There is no limit to the amount of intelligence invested in ignorance
when the need for illusion runs deep.'*
Saul Bellow

Top of the UK media agenda in recent weeks has been the Mid Staffordshire NHS Trust 'scandal'. The crux of the story centres around a government report confirming that above average mortality rates in the Trust were due to a 'systemic failure' of management. The report had been commissioned in the light of whistle-blowing members of the public who had, in a series of tragic cases, lost relatives being cared for by the Trust. Staff at the hospital, the whistle-blowers claimed, were 'looking up' at their bosses and financial targets and not 'looking across' at the patients under their care. To the outsider it looks like a classic case of a dysfunctional system. One that, 'clearly' – said every politician looking to jump on the 'outraged' bandwagon – needed something to be done to fix the problem. Politicians being politicians, and the public being the public, what then very quickly happened was people began conducting their own personal, largely un-informed root cause analysis, in order to be able to start making public pronouncements about 'the solution'. Which, in the case of Mid Staffs, rapidly descended to become the wonderfully sound-bite-worthy 'duty of candour' idea. Staff inside Mid Staffs, apparently, had seen things going wrong but, for fear of being punished if they blew any whistles, they hadn't said anything. By introducing a 'duty of candour', 'therefore', people would be compelled to speak up when they saw things going wrong.

Now, if you're hearing this sad, depressing story for the first time, you're probably already thinking that this doesn't sound like the smartest solution in the world. Expressions like 'knee-jerk stupidity' are probably somewhere on the tip of your tongue. But before despairing too soon, put yourself in the position of the politicians and Trust managers that are now under pressure to be seen to be 'fixing the problem'. From their perspective you can probably also start to imagine that, in the absence of anyone coming up with any better ideas (which, so far, in public at least, they haven't), a chain of events gets put in place that will quite likely lead to some form of 'duty of candour' 'system' being put in place in the coming months. Purely because, a) it demonstrated positive action was taking place, b) it was defendable in the sense that it fits a 'common-sense' view of the world that says 'if people are doing wrong, they should be forced to do it right', and c) the good old 'plausible deniability' phenomenon found in much of our post-GFC world, the politicians and managers can safely state that 'it was the only solution on offer'.

One has to have a degree of sympathy for the politicians and managers in this kind of situation. Mid Staffs is on the press radar today, but we know that in a couple of months time it will inevitably be something other 'crisis' or 'scandal' (amazing how everything very quickly gets escalated to this kind of emotionally-charged language these days). The tragedy in all of this is that few if any of the politicians and managers concerned is equipped to meaningfully tackle these kinds of issue. Worse, the system they operate

within almost fundamentally prevents them from dealing effectively with just about any situation they're expected to face.

At the heart of the problem here is that societal situations are inherently complex. That's 'complex' in the mathematical meaning of the term: a complex system having no guaranteed rules, no such thing as root-causes, and being very prone to unexpected non-linear effects. To paraphrase the words of the oft used cliché, what we have here is a butterfly flapping its wings in Whitehall, leading to a likely tornado in Mid Staffordshire and quite likely the rest of the NHS.

According to Malcom Gladwell's modern classic book 'Blink' (Reference 1), when dealing with complex situations, the most effective people for are those that have developed highly tuned instincts. Typically, Gladwell observed, these kinds of instinct required around 10,000 hours of committed effort to develop the right kinds of expertise.

The thesis of this article is that our politicians are almost inherently prevented from ever being able to develop such expertise and therefore never develop the instincts required to formulate and execute any kind of meaningful change to the complex systems under their care.

Before getting into the details of why this is so, it is worth diverting for a second or two to think a little deeper about Gladwell's 10,000 hour rule. Not every 10,000 hours is the same as every other 10,000 hours. I'm pretty certain I, for example, have spent pretty close to 10,000 hours playing my guitars. Alas, however, that time hasn't made me into an expert. Far from it in fact. More often than not I still feel as if today is the first day I ever picked an instrument up. When I look back at my 10,000 hours, I can safely say I enjoyed nearly well all of them – otherwise, why do it? playing the same chord progressions over and over again and generally noodling around is great relaxation. But having fun and relaxing has almost nothing to do with building expertise. Building expertise comes through putting yourself through painful, out-of-comfort-zone experiences, from failing time and time again, learning from those failures such that eventually you manage to not fail. I'm not sure I'm prepared to put myself through what's necessary to get to the sort of expertise professional musicians attain. I might never be an expert guitarist, but I am absolutely an expert in my role as an innovator. I say that not because I'm bragging, but merely because I can think about all of the pain, misery and learning that being outside my comfort zone pretty much for the whole of the last 17 years has done for me in terms of allowing me to see what works and what doesn't. My guitar playing instinct is poor; my innovation instinct is highly tuned. Highly tuned instincts fundamentally come through experiencing as many of the unusual and uncomfortable situations as you can put yourself through. Physicist Niels Bohr probably said it best, 'thank heavens we have found a contradiction, for now we might make some progress'. Finely tuned instincts come, in other words, from finding and solving the 'yes, buts'.

Now let's see how this fits into the world of a politician working inside any kind of democratic system. There seem to be four main problems that need to be addressed:

Problem 1: in most countries, while politicians might ultimately accrue their requisite 10,000 hours as a politician, it is extremely unlikely they will ever accrue anything like 10,000 hours within any given Department. In Gladwell's terms, Barack Obama might just have accrued enough hours by the end of his second terms as a President to be an 'expert' at the job. Jeremy Hunt –responsible for the Department of Health in the UK since September 2012, will be lucky if he's allowed more than a couple of years in the post. He has no chance to accrue that necessary amount of time.

Problem 2: accruing the requisite amount of knowledge acquisition time is one thing, ensuring the incoming information is accurate is quite another. This is the classic Garbage-In-Garbage-Out issue and thanks to their inherent separation from the 'real world', it is a particular problem for politicians of all persuasions. Politicians tend to be 'protected' from the raw data by a number of intermediary layers whose job is frequently, explicitly or otherwise, to filter out the uncomfortable, the contradictory, or that which might cause messengers to be shot.

Problem 3: most democracies work using a Socratic debating system, in which everything those in power tell us is one way, those in 'opposition' are expected to argue it's the other. Overall, this is not such a bad thing. Another great quotation, this time from Winston Churchill had it about right: 'democracy is the worst system of government ever devised. Apart from all the others.' It's definitely good that 'someone' is forced to take on the devil's advocate, negative, side of a debate. The problem, though, is that it's someone else and not you. Once Jeremy Hunt has 'weighed up' the evidence and made a decision about what the Department is going to do, it becomes his job to defend that decision. And for the Opposition parties to attack it. What, therefore, kicks in is a society-wide case of confirmation bias. We're all affected by this phenomenon every moment of our lives. Once we've made our mind up about any kind of issue, our brain tends to filter out any information that contradicts that opinion, and to only look for the information that confirms it. It happens to all of us whether we like it or not. It happens to politicians because their job actually demands it. Politicians in effect work under a Socratic system of compulsory confirmation bias. Once Jeremy Hunt's Department make a decision that 'duty of candour' (or whatever they eventually decide is the 'positive action' the need to demonstrate to the public turns out to be) is the right way forward for the NHS, they are forced to become blind to contrary evidence. Worse, the more the Opposition tells them they're wrong, the more entrenched they become in their current views.

Problem 4: if the first three problems are bad, this fourth one is usually the killer. It's easily the most insidious of all four of the issues affecting our government systems. In theory, the problem of the here-today-gone-tomorrow politician stuck in the middle of Problems 1 and 2 gets solved by having a small army of 'permanent' civil servants whose job is to become 'experts' in their chosen fields. Jeremy Hunt might be a 2-year job incumbent, but the people he has advising him are likely to be people with, in some cases, several decades worth of knowledge about the Department of Health and the NHS. There are a host of people, in other words, who *have* accumulated 10,000 hours of experience. The question now is what kind of 10,000 hours have they accumulated - are we in a situation like my guitar playing or my work in innovation?. For the majority, sadly, a large part of their time has been spent in their noodling comfort zones. Doing what looks like and feels like 'hard work' I'm sure. I doubt anyone gets on the Tube after a hard day's work in Whitehall feeling guilty that they haven't earned their salary that day. After 30 years working with all kinds of people in every field of human endeavour, I remain convinced in the Deming quote, 'no-one comes to work to do a bad job'. I do firmly believe, however, that the vast majority of people come to work to do a job that allows them to remain in their comfort zone. One of the results of this is that most people have instincts that are extremely poorly tuned when it comes to change and innovation. For the most part, these kinds of instinct are so poor as to be to all intents and purposes nonexistent.

Here's how this problem tends to manifest itself for most people – including everyone in the Department of Health, and the staff and managers at Mid Staffordshire NHS Trust: when changes happen, our inbuilt expectation is that they will change in a linear fashion. For at least some of the time this tends to be true – the price of healthcare, like the price of

fuel, food and utilities tend to go up over time. Our pay, similarly will tend to go upwards in some kind of inflation-linked manner. Or – if we work hard – by a rate better than inflation, but still pretty steadily. Historically, this kind of gradual, linear change has been a valid assumption. When my father left school, his expectation was that the profession he entered would provide him with a job for the duration of his working career. Today, for many of us, this idea sounds quite odd. In most walks of life, change is happening faster and faster. But it's also changing non-linearly. As in, like this:
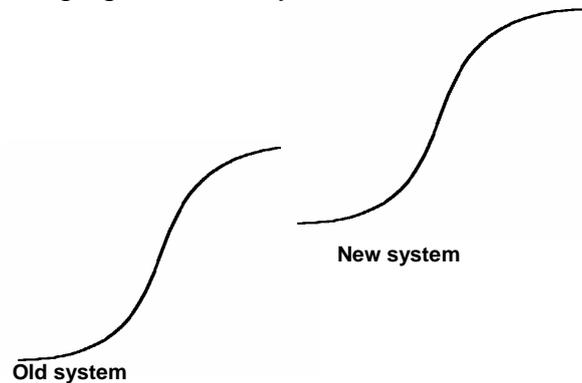
New system

Old system

Figure 1: How Change Actually Happens

Unfortunately, for most people, their linear-world instincts find it very difficult to imagine, never mind know what to do about, the discontinuities associated with a step-change shift from one way of doing things to another. One of the manifestations of this failure to comprehend discontinuity is that we propose solutions – like 'duty of candour' – that fail to take into the account that such a change might well create all sorts of unexpected step-change consequences. And worse, looking at the uncomfortable gap between the two s-curves, that those step changes might demand things get worse before they might have a chance to get better. Statements like that are very difficult to accept in all of our heads (for most people, their idealised life journey is often visualized as a slow, steady climb to reach the top of a high mountain). If you're a politician they're not something that you even want to contemplate. Especially if you're looking to the next election in three or four years time, when, if you have a desire to be re-elected, things had absolutely better be better than they are today.

We see this kind of 'discontinuity-blindness' across every aspect of our society's governance. 'Common-sense' (i.e. 'linear') solutions that get implemented that turn out to deliver sometimes wholly unexpected consequences. A couple of years ago we wrote about the rioting that took place in London in August 2011. The aim of that article was to try and highlight the folly of solution strategies that attempted to distill the riot problem down to a single issue. Everyone with an opinion made their own version of the 'the problem is x and so the solution must be y' logic. A logic that is totally inappropriate in any complex situation. In the aftermath of the riots (and our ignored article), Prime Minister, David Cameron oversaw the implementation of the 'common sense' solution of arresting and locking up the gang leaders. This was a 'solution' that obviously, one assumes, had a certain publicly defendable logic: the riots escalated because the gang-leaders rallied their troops and organized trouble in an organized fashion, so therefore we need to get them out of the way.

Twelve months later – surprise, surprise, - David Cameron is standing up in parliament telling us all that the policy had back-fired; gang trouble was now more rife than it had been before. The 'common-sense' solution had demonstrated that there was no such thing as common sense – locking the gang leaders up had created a power vacuum in the gang

world, and, nature abhorring a vacuum, lots of aspiring future leaders within those gangs began campaigns of terror and destruction to prove that they were worthy next leaders. If it wasn't so tragic it would be funny.

The real tragedy, though, is that how the story unfolded was totally predictable. Firstly because – per our analysis – could never have been a single-issue problem and the wrong symptom was selected for attention. But secondly, and more important, it would have been very simple to have conducted an exercise to explore the likely consequences of locking gang leaders up. What we're heading towards here is a subtle variation on our longstanding Perception Mapping process. That process, for those that haven't seen it involves formulating a question we'd like to have answered and then soliciting as many different opinions as possible about that question. If, in the wake of the 'lock up gang leaders' idea we had asked the question, 'if we lock up gang leaders people will…?' and written down what we thought different stakeholders in the problem (gang members, police, media, etc) would do, then it's wouldn't take long to identify the likely emergence of a power vacuum problem. Which in turn would either have told us to put in place counter-measures to solve that problem before it occurred, or – preferably – would've told us that locking gang leaders up was a dumb idea that should not have been taken past the dumb-idea stage.

There's nothing worse than 20:20 hindsight of course. Especially if the words come from someone – an outsider that can't know the ins and outs of the problem – like me. So rather than reproduce the gang-leader faux-pas story, let's shift back to Mid Staffs and try and look forward to the likely consequences of introducing a 'duty of candour' 'solution' to the problems that exist at the moment.

As usual we start the Perception Mapping with a question. In this case 'if a 'duty of candour' policy is introduced, I will….?'. Then we need to think about the various perspectives of the assorted spectrum of stakeholders – in this case the Trust managers, trade-unions, staff, patients, visitors, media, and politicians. Without going in to the details of who might have said what, the following table details the main answers we thought would be revealed if we were able to tap in to both the tangible, spoken, answers that people would give, plus the intangible 'real' answers they would probably be more reluctant to share:

0	design protocols	21	officially oppose the initiative (union)
1	seek trade-union buy-in	22	assemble case against
2	appoint someone to be responsible	23	re-write grievance procedures
3	establish 'candour channels'	24	threaten industrial action
4	re-assure staff 'no witch-hunt' rules	25	look for a martyr
5	be more vigilant - looking out for offenders	26	'Big Brother'/1984 campaign
6	keep stronger eye on the people i already suspect	27	covert 'close ranks' us-v-them campaign
7	keep doing the best i can for my patients	28	make an example of someone (suspected bad apple)
8	feel more stressed (another initiative getting at us')	29	make sure no-one is watching before using initiative
9	feel paranoid ('what if someone has a vendetta against me?')	30	target weak/guilty managers (staff)
10	seek advice from union (staff)	31	try harder
11	keep my eyes down (be less vigilant - what i can't see, i don't have to report')	32	avoid taking any risks - head below parapet
12	work out who my friends and enemies are	33	make a show of all the good things i do
13	get myself 'in' with the strongest cliques	34	avoid making any 'brave' decisions
14	form allegiances	35	look to demonstrate the system is working - build measures
15	avoid patients (that might see me doing something they think is wrong)	36	try and focus on the 'system' not the 'people'
16	feel guilty (even if i'm not)	37	stay away from staff (people i think have an antagonism to me/my position)
17	be more vigilant for non-compliers (patients and visitors)	38	define targets
18	'no-one likes a grass' whispering campaign	39	solicit press-worthy examples 'it is working'
19	actively look for evidence (patients/visitors)	40	create league table
20	be wary of the press and other outsiders	41	start to look for other jobs

Figure 2: List Of Raw Perceptions For The 'Duty Of Candour' Introduction Story

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The next part of the process than takes each of these statements and asks 'which of the other ones would this one lead to?' As is often the case in these kinds of perception map, there are several possible candidate 'leads to' answers. The key here – where we are looking forwards in time and testing whether a proposed solution is a good one rather than looking at an actual or past situation as has more usually been the case when using the tool – is to choose the things that would occur *first*. In other words if statement A *could* lead to both P and T (say), but T would happen before P, the leads-to answer we chose will be T.

When we perform this 'leads to (first)' analysis for the Figure 2 statements, we produce the consequence map shown in Figure 3 below:
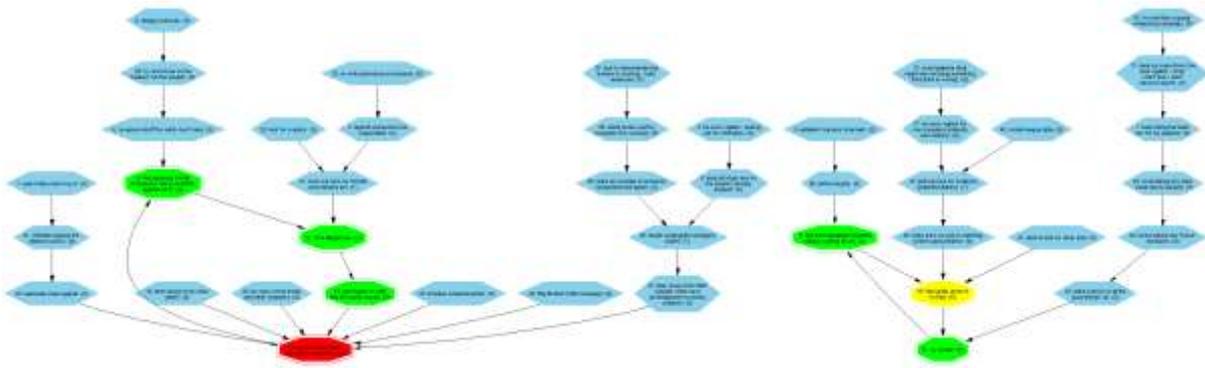

Figure 3: 'Duty Of Candour' Consequence Map

Without delving in to the detail of the map, it already gives a hint at the complexity of the situation. The map comprises two main loops. As in the usual Perception Mapping process, these loops provide us with a way to identify the most important of the statements written down. The reason they signify importance is that they reveal the self-re-enforcing cycles that will either cause virtuous or destructive spirals.

As shown in Figures 4 and 5 – which zoom in on the two loops produced by the analysis, for the Duty of Candour 'solution' both are very clearly downward destructive ones. Straight away the fact that there are two loops tells us there are two independent issues at play so there is no possibility of a single-issue solution. Secondly, the fact that both loops are destructive, downwards spirals, tells us that the 'duty of candour' 'solution' is not looking like a good one. Let's examine the two loops in more detail. The first one is a destructive cycle concerning what happens inside the mind of an individual:
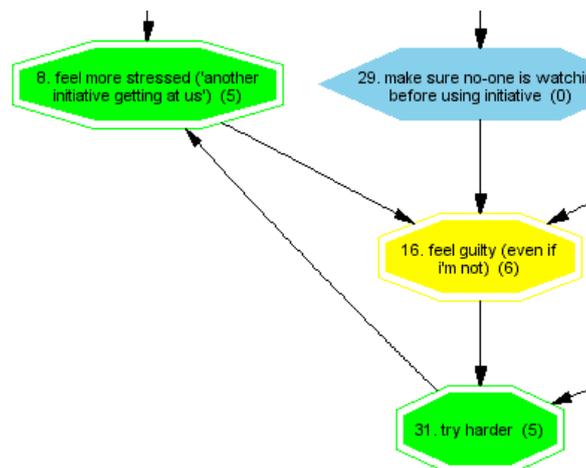

Figure 4: Personal 'Duty Of Candour' Downward Spiral

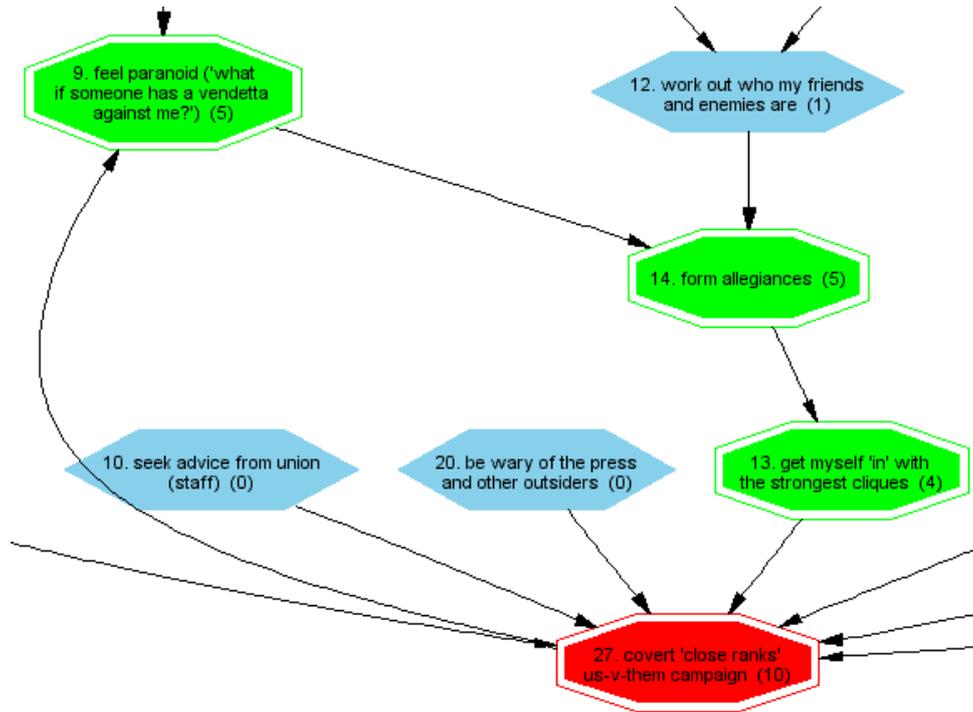The second destructive loop is more about a collective and tribal issue:

Figure 5: Group 'Duty Of Candour' Downward Spiral

We held no inside knowledge when constructing this map (as ever, the robustness of the answer is always helped by having those involved in the situation to be a part of the process – and as such, as with out earlier riot article, we invite readers to contribute their thoughts on the Figure 2 list if they think anything is missing).

It is always dangerous to even hint that you have a 'solution' to a difficult problem without having had access to inside information, nevertheless, we think there is a likelihood that people can look at the two destructive loops and visualise their underpinning logic. If, for example, the problem was generalized away from the specific NHS issue to any kind of enforced reporting when people in the workplace see something being done wrong, we believe the traits and actions we've included in the analysis are coherent, robust and defendable ones.

What the map and loops indicate is that a 'duty of candour' policy would be stressful to individuals in the same way that people who are not guilty of a crime always seem to become when they perceive that they are being accused. And it would be extremely divisive within the organization, very likely causing the creation of increasingly segmented and isolated groups, none of whom trusted the other groups. In essence the policy would act to re-enforce a host of 'us and them' relationships within the Trust. Then, if the story is allowed to proceed down the spirals for long enough (like David Cameron's response to the 2011 riots) the system will eventually explode and give the media a new crisis to fill the front-pages, and an opportunity to attack the politicians for implementing yet another a disastrous 'solution'. Which in turn, will serve to exacerbate the three problems described at the start of the article, and they in turn will ensure that our politicians continue to be hard-wired to make terrible decisions. Plus ca change, as the French might say.

Ultimately, of course, the point of this article is not to intrude into a problem that is none of our concern. Rather, it is to achieve two things: firstly to create a wider awareness that when any of us are working on complex problems, our inbuilt linear-world instincts are

most likely wrong. And then secondly – perhaps more positive than merely saying 'we're all rubbish at solving complex problems' – is that there are tools and processes we can bring to bear – Perception Mapping in this case – that allow us to meaningfully capture and work *with* the complexity. 'Keep it simple, stupid' never works in a complex situation. Keeping things simple by segmenting problems down into their DNA components and then allowing the complexity to emerge by exploring the 'leads to' causal relationships – which is fundamentally what the Perception Mapping process does – is a much more effective way of looking at the world. And exploring the viability of prospective solutions before we begin to devote lots and lots of resource to implementing them.

Reference

1) Gladwell, M., 'Blink: The Power Of Thinking Without Thinking', Allen Lane 2005.
2) Mann, D.L., 'Root Cause Fallacies. Or: Why Did The UK Riots Escalate', Systematic Innovation White Paper, www.systematic-innovation.com

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Patent Quality Of The World's Biggest Patenters

Just as they've done at the end of the year for the last decade, IBMers gave themselves another pat on the back at the end of 2012 when maintained their position as the world's most prolific patenter. Measuring the number of patents a company owns is a good first step along the road towards a solid IP strategy. The next, more difficult, step along the journey is to start measuring the quality of that IP. Quality is very often a much more subjective and difficult thing to quantify. A true measure of quality would look end to end and relate an invention to the direct and indirect revenues it helps its owner to secure. This inevitably means 'quality' can only be gauged after the fact. Often several years after the invention was made. In this sense, this tends not to be an effective feedback mechanism to help business leaders ensure they have the right strategy and are doing the best they can to ensure quality is sufficient.

The ApolloSigma tool (Reference 1 for anyone that hasn't seen it yet) is designed to provide leaders with much more timely feedback on IP quality. Seeing as the majority of the effort required to run the tool has been automated, it seemed like an easy, interesting experiment to take a snapshot look at how well IBM and the other prolific inventors of the world are doing when it comes to achieving 'quality' across their portfolio.

The following figures present the raw output from ApolloSigma when we examined all of the January 2013 US patents granted to IBM, Samsung, Canon, Microsoft, and, not quite 'top 10' in terms of quantity, but definitely heading in that direction, Apple. We start with top dogs, IBM:
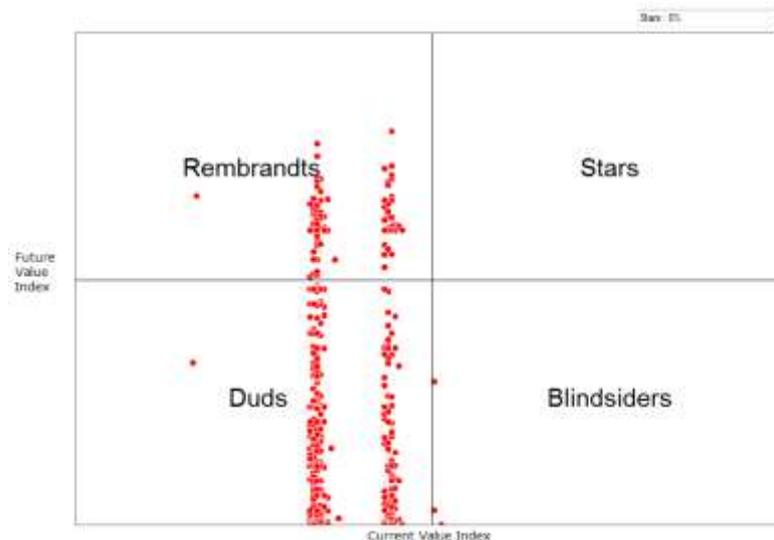

Figure 1: ApolloSigma Analysis Of January 2013 Patents Granted To IBM

Figure 2, next, presents an equivalent analysis for Samsung's January 2013 patents. Interestingly, they managed to exceed IBMs total for the month.

At first glance, the two pictures look quite similar. Very significantly, however, Samsung managed to get a number of hits in the 'Stars' category. Stars, in the ApolloSigma terminology are patents that have both a high current and expected future value. They are, in other words, the real 'high quality' patents, the ones that we can expect will deliver the most tangible benefit to their owner. If you're seeing these pictures for the first time, also

worth noting is that, on the basis that around 97% of the world's patents will never generate any 'profit' revenue for their owners, on average, 3% of patents should find themselves in the 'Star' category. Samsung managed to get just over 1% in January 2013. Below average on a global average perspective, but significantly better than IBM who achieved 0%.
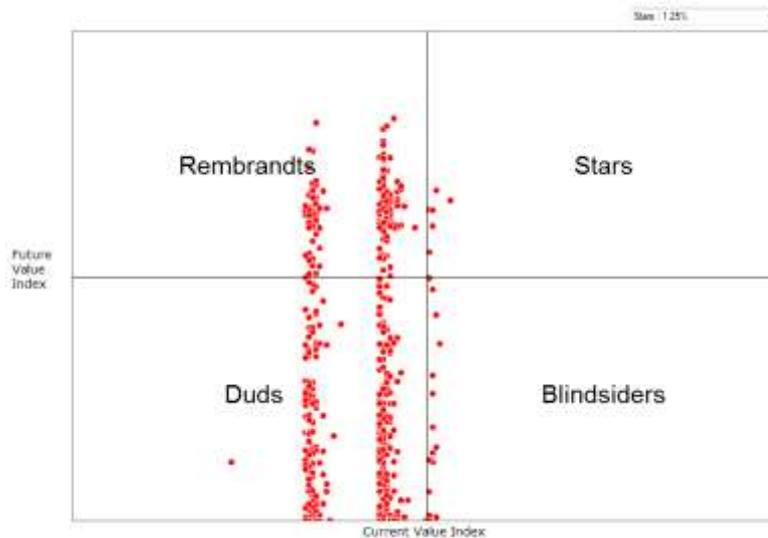

Figure 2: ApolloSigma Analysis Of January 2013 Patents Granted To Samsung
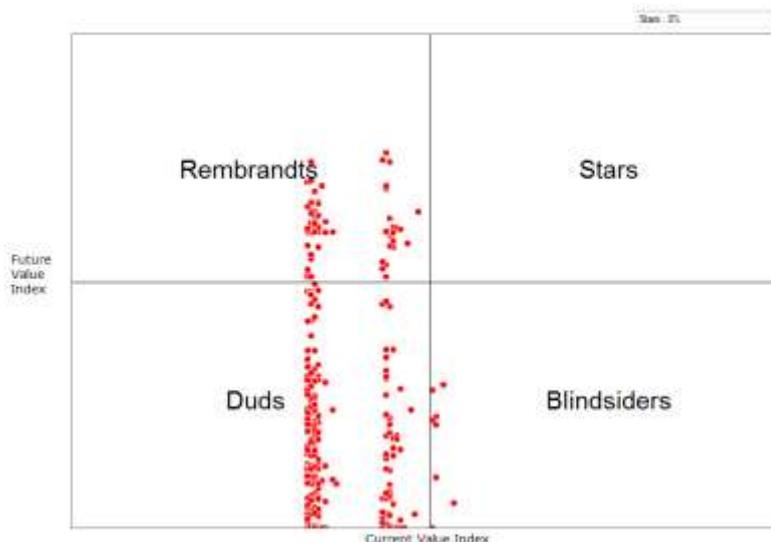
What about Canon:

Figure 3: ApolloSigma Analysis Of January 2013 Patents Granted To Canon

Also 0% in the Stars category. They did better than IBM in terms of getting 7 of their patents into the 'high current value' half of the picture. The new problem, as implied by the 'Blindsiders' title is that although their value might be high today, the IP is easy to design-around and therefore very likely won't be high in the future. Blindsider patents are in many ways the lowest 'quality' patents – lots of hard work making a good solution, but not enough work to make them robust.
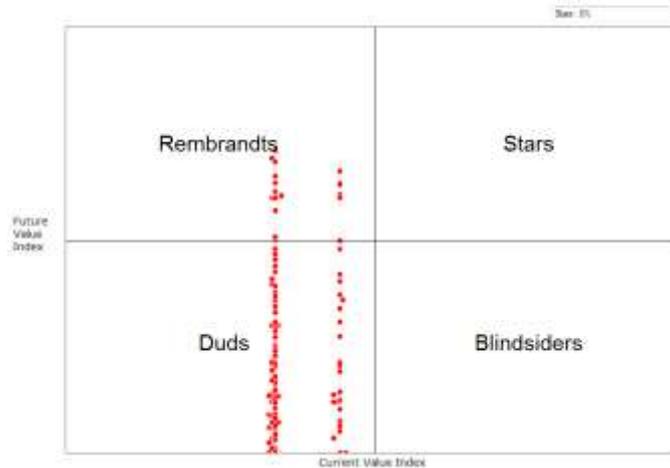
What about Microsoft:

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Figure 4: ApolloSigma Analysis Of January 2013 Patents Granted To Microsoft

Not so great from either the current or future value perspective. Because we draw a lot of these ApolloSigma profiles, the Microsoft picture for January 2013 is typical of an organization that doesn't have a very strong connection between their overall business direction and the solutions they look to protect to get them there.
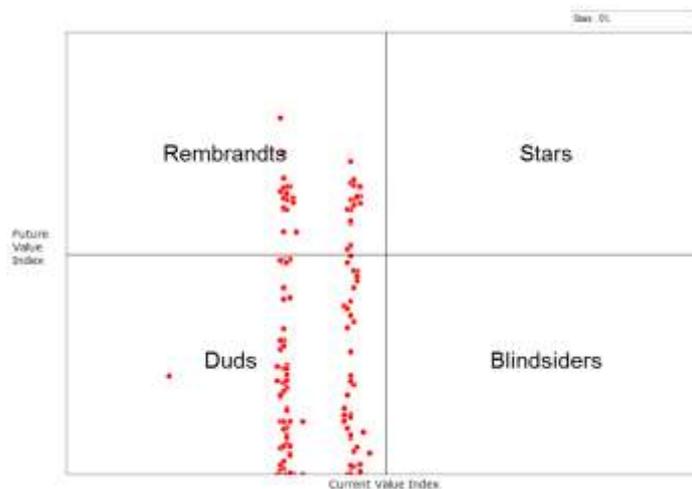
Maybe Apple might be better:

Figure 5: ApolloSigma Analysis Of January 2013 Patents Granted To Apple

Sadly no, they also managed to get nothing on the high current value side of the graph.

While it is difficult to conclude anything of any major significance from just one month's worth of data, the fact that collectively the five companies analysed here had well over a 2000 patents granted to them is of some statistical relevance: All five are well below the 3% Star global average; four of them are not even close. They might be the biggest, but on this evidence, they very definitely aren't the best.

Samsung – the only acknowledged TRIZ/SI user amongst the group – is the one at least getting somewhere close. Whether that has anything to do with their corporatization of the TRIZ tools will be something that we'll have to keep an eye on over the coming months and years. We have a hunch what the answer might be.

Reference
1) Mann, D.L., 'Connecting Real IP Value To Business Strategy', Systematic Innovation White Paper, www.systematic-innovation.com

Not So Funny – Another Dimension

Since the emergence of 2D-that-looks-like-3D advertising began in sports arenas a few years ago, the concept seems to have finally gone viral. Now seemingly everything can be made to look 3D. Even if, errr, the thing it's designed to make look 3D is already 3D. It's genius I tell you. Like this matching bedding set:

Or, who wouldn't want to be seen wearing this snazzy number:

On the other hand, anything you can do, no doubt someone else can do better. This might be the ultimate in 'things I might regret once I'm sober again' ideas:

But then again, maybe not quite as seasickness inducing as this marvelous carpet design:

This one takes the whole Another Dimension a step in a different direction. I'm not sure this one would have the desired effect somehow:

WEAR A SEAT BELT.

This is more like it:

Oh, hold on a minute, that one is really 3D. Amazing what inkjet printers can do these days.

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Patent of the Month – Anti-Frost Coating

Patent of the month this month takes us to the Institute of Chemistry in Beijing, and a trio of inventors who had their anti-frost coating patent granted in the US on 12 February. US8,372,484 is the invention disclosure in question. Its first unusual feature is that it makes explicit a physical contradiction – the need for surfaces to be both hydrophobic and hydrophilic. Here's what the disclosure tells us about the problem and why the two opposing properties are both useful:

Icing is a common natural phenomenon on cold surface. In our daily life, icing on cold surface will lower the operating efficiency of refrigerating equipment and cause huge energy waste, for example: the icing of the cooling towers of power plants, the icing of automobile carburetors, the icing of heat exchangers of refrigerating plants and the icing of refrigerators. As a frost layer has certain thermal isolating effect, the frost or ice on the surface of refrigerating equipment will impair the heat transfer efficiency of the equipment and narrow or even block the airflow channel, thereby resulting in huge energy waste. Generally speaking, a frost layer 5 mm thick in a refrigerator will reduce the refrigerating efficiency by about 20% and accordingly will increase the energy consumption by 20%; more seriously, icing on cold surface may cause a serious safety accident, for example: a plane may crash due to icing on fuselage. There are two ways to solve the frosting or icing on cold surface: One way is to thaw frost through additional energy consumption. In other words, when the frost layer reaches certain thickness, the frost will be thawed or scraped off through electric heating, electric pulse, external mechanical actions etc. These methods play a certain role in removing frost, but they all additionally consume a large amount of energy. Nowadays, energy is increasingly short, so these methods undoubtedly have great limitation. The second method is to apply an anti-frost coating on the cold surface to prevent the formation of frost on the cold surface, thereby realizing the objective of preventing frosting and saving energy.

At present, anti-frost coating mainly has two mechanisms to inhibit the formation of frost: the first mechanism is to make cold surface hydrophobic, increase the contact angle of water on the cold surface and reduce the contact area between water drips and the cold surface, thereby lengthening the condensation time of water drips and playing an effect of frost inhibition; meanwhile, hydrophobic surface may also weaken the attachment of water drips to surface and reduce frost formation. On the whole, cold hydrophobic surface has certain effect on inhibiting frost formation and reducing the thickness of frost layer, but as temperature of the cold surface drops, once frost is formed on the cold surface, the hydrophobic surface will lose its anti-frost effect. The second mechanism is to make cold surface hydrophilic. Relying on its hygroscopicity, hydrophilic material can absorb the water drips condensed on cold surface in the early stage of frosting and meanwhile lower the freezing point of water, thereby inhibiting frost formation.

Here's how we might map the problem onto the Contradiction Template:
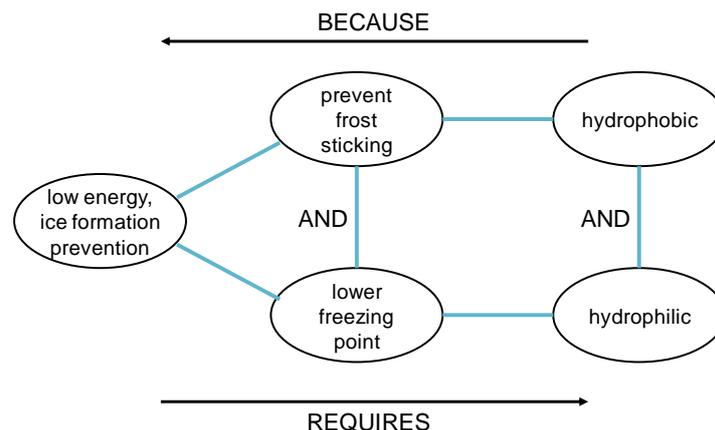
And here's the main inventive step allowing them to solve the contradiction:

An application method of an anti-frost coating, comprising: dissolving a hydrophilic polymer and a hydrophobic polymer in an organic solvent to form a homogeneous solution, coating the homogeneous solution on a substrate to form a film, drying and curing the film to form the anti-frost coat with a hydrophilic and super-hydrophobic composite structure including a super-hydrophobic surface layer and a hydrophilic inner layer; wherein the hydrophobic polymer is one of polyacrylate, polyolefin and fluorine containing polyacrylate or their mixture; or a copolymer of acrylate and fluorine containing acrylate; the hydrophilic polymer is sodium polyacrylate, polyacrylic acid, poly(2-hydroxypropyl methacrylate) or their mixture; or a copolymer of two or more of sodium acrylate, acrylic acid and 2-hydroxyethyl methacrylate; the organic solvent is one or more of dioxane, xylene, N,N-dimethyl formamide, N,N-dimethyl acetamide and methanol; and the drying and curing pressure is 10-1000 Pa, the super-hydrophobic refers to a water contact angle greater than 150.degree..

Essentially, the solution is a Principle 3, Local Quality configuration of two different polymers, mixed together such that the hydrophobic properties are found at the surface, and the hydrophilic properties are within the structure.

Having constructed the Contradiction Template, there are several ways in which we could have been pointed in this solution direction: firstly, Principle 3 sits right at the heart of the physical contradiction solution Venn diagram:
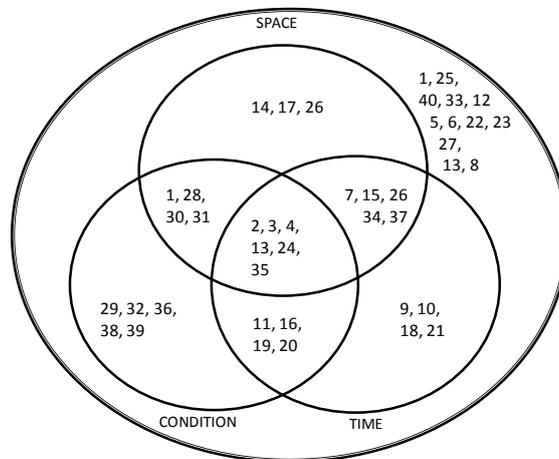
Secondly, if we're happier mapping the more usual conflict pair (vertical central spine of the Template), the Contradiction Matrix would have given us:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Loss of Substance (25)

WORSENING PARAMETERS YOU HAVE SELECTED:

Temperature (22)

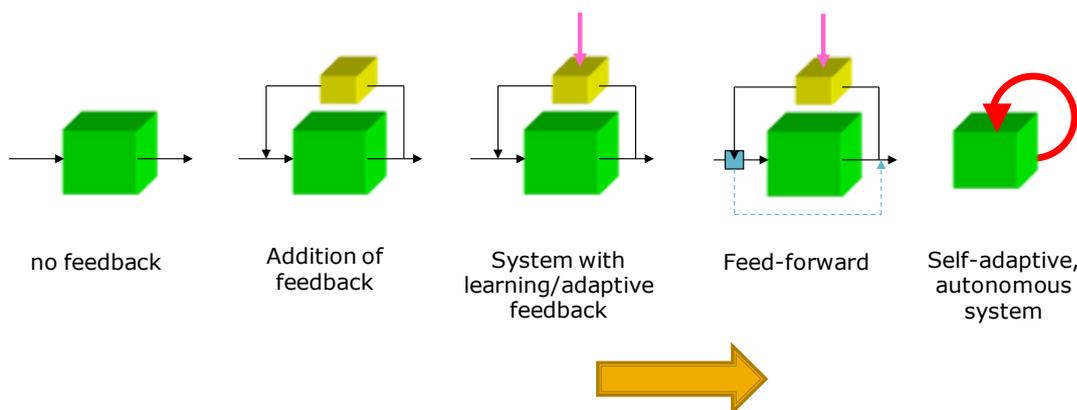SUGGESTED INVENTIVE PRINCIPLES:

36, 37, 21, 3, 39, 2, 31, 24

The solution is a timely reminder that there are multiple ways to get to a desired end-point. Perhaps more importantly, is a reminder that the test of a good solution is that it should sound obvious in retrospect. That the solution hasn't appeared before now is testament to the difficulty of the problem, and how looking at it from a new perspective (I want BOTH properties, not just one) can be the thing that unlocks the breakthrough insight.

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Best of the Month – The Two-Second Advantage
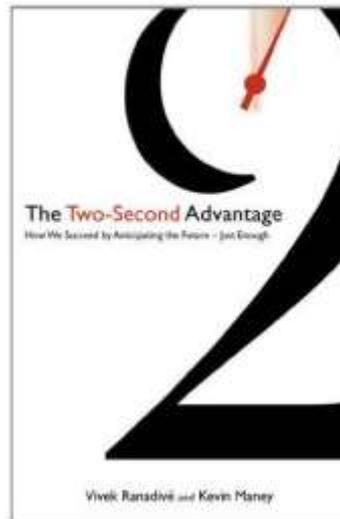
After having selected Kevin Maney's book 'Trade-Off' as our 'best of' selection last month, it feels like a bit of a cheat offering another of his titles this month. Because we'd liked Trade-Off so much, we basically went out and purchased everything else that he'd written. Of which, 2011's, 'The Two-Second Advantage' is the most recent. And quite likely best of the bunch.

In essence, the book is about the Systematic Innovation 'Controllability' trend, and particularly the step that sees a control system making the shift from analyzing what has happened, to feeding-forward to predict what will happen next:

| no feedback | Addition of feedback | System with learning/adaptive feedback | Feed-forward | Self-adaptive, autonomous system |

Identifying the existence of this stage on the trend was relatively easy since, in effect, it defines the manner by which the human brain operates. Maney elegantly recaps the idea of the human brain as predictor of what is likely to happen in the next few seconds. He does it through the use of a host of out-of-the-box examples of people and organizations that have been able to do the job better than others. Ice-hockey supremo, Wayne Gretsky, for example, was nigh on unbeatable when he was playing because of his uncanny ability to predict where the play was *going to be* in the coming seconds, rather than see where the puck was right now.

The main message of the book for organizations is that all of the historical analysis data in the world counts for nothing in a world where your competitors have the ability to project meaningfully into the future. Even if it is only a couple of seconds. USAF pilot, John Boyd's

OODA concept doesn't get a mention, but for those familiar with that model, Maney and co-author, Vivek Ranadive, have in essence tried to quantify how much more prescient an organization needs to be in order to gain a critical advantage. A few of the business examples, I'd have to say, over-stretch the '2-second' idea a tad too far, but overall the argument for being able to project forward even that short amount of time is an extremely compelling one.

Part of the rationale for the book is that Ranadive's organization is in the business of building prognostic software tools that enable organizations to do the forward projecting job. Combining the models and descriptions in this area with some of our new PanSensic capabilities, and something powerful seems likely to emerge.

As described in a beautiful case study involving comedians Joan Rivers and Mo Rocca (told you there were some out-of-the-box examples!), there are two basic ways to be successful as a comedian. Firstly there's the Joan Rivers way. What she's done over the years is in effect create an enormous database of jokes that she keeps in a sophisticated filing system, such that if she knows, for example, that she's coming to do a gig for a crowd of hen-party women in London, she 'merely' has to pull out the right quantity of jokes from the right part of the filing system, put them into a sequence, learn the sequence, then go up on stage and regurgitate it. Work hard enough with this strategy – as Joan Rivers proves – and its possible to build yourself a long and prosperous career. Mo Rocca, on the other hand, has a very different, in-the-moment, improvisational style. Rocca has trained himself to take in what's happening, see an opening, craft something on the spot, and drop it into the conversation with perfect timing. See Rocca on one of his best nights and has performances often seem somewhere akin to miraculous. How has he got to this position? Well, answer 1 is that he's spent a long time (Gladwell's 10,000 hours to attain mastery?) immersing himself in difficult, different situations in order to develop his instincts. Answer 2, more pertinent to Maney's argument is that, 'instinct' in fact means 'ability to be two-seconds ahead of everyone else in the room'.

That idea might just turn out to be the enduring take-away from the book: 'talent' is ultimately not much more than training our instincts sufficiently well that we're always two-seconds ahead of everyone else.

Simple when you know how. Of course, getting hold of the book might also be a useful first step. You know it makes (prescient) sense.

Investments – Matternet
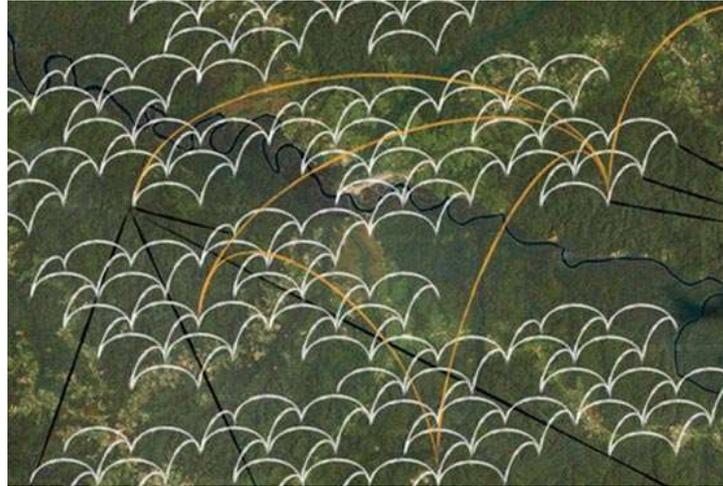
Nearly one billion people in rural areas live without access to all-season roads – meaning a large portion of the world's population can't get medication, food, and other supplies when they need them. The Matternet, a concept created by a group of students in this summer's class at Singularity University, aims to leapfrog road-based transportation altogether with a network of electric autonomous aerial vehicles (AAVs) in the developing world that transports supplies and people from place to place. Think of it as the Jetsons meets Mother Theresa.

The Matternet concept was designed by a motley crew of entrepreneurs, engineers, hackers, and more – all of whom were challenged during Singularity University to solve a big problem related to world poverty (other groups focused on space, energy, education, security, and global health). The team quickly came across the problem of transporting goods in the developing world, where in some places it can take up to a month for an HIV blood test to get to a lab and back. "We want to shift the paradigm and say, do you really need roads?" explains Matternet team member Arturo Pelayo.

The Matternet is being developed in three stages. In the first stage, the Matternet team anticipates carrying loads of one to two kilograms. The team's prototype (pictured above) can already do this, but its autonomous capabilities have not yet been tested. During the second stage, the autonomous vehicles will carry 200 kilograms, and automated solar-powered recharging stations will be installed on the ground. In the third stage, the vehicles will be able to carry up to 1,000 kilograms – so they will be able to transport both goods and people. The prototype AAVs are quadcopters that have a range of 10 kilometers, but the technology may change as the project advances.

This isn't just a pipe dream. Companies like AeroVironment are working on unmanned aircraft, and the Matternet team was able to build a working prototype from off-the-shelf materials in just three weeks. And the team, which only started working together this summer, has already signed on the Dominican Republic to fund a pilot project. "They're assisting a lot in the reconstruction of Haiti, so they're very interested to look at this type of aircraft to deliver goods and medicine," says Pelayo.

Pelayo envisions charging organizations for "point to point" vehicles in the first stage. And he says that the Matternet's system could end up being cheaper than what motorcycle transport companies currently charge.

While using the Matternet in the U.S. isn't out of the question, loose aerospace regulations in the developing world will make it easier to use the technology there first. Because in the U.S., the Matternet's AAVs could be classified as weapons delivery systems.

The Matternet team, which will likely be based at the NASA Ames Research Park (home of the Sustainability Base), is currently planning to raise an angel round. And the team has an endorsement from inventor and Singularity University cofounder Ray Kurzweil that would be prized by any startup. Kurzweil's verdict on the Matternet: "The developed world has a huge lead over the developing world in infrastructure but our strategy should be to leapfrog these already obsolete and crumbling systems with 21st century solutions. That's what we did with phone systems as developing societies went right to wireless and will never put in a wired land line system. Bits are already being widely distributed to emerging economies. Matternet will do that for atoms."

Find out more at matternet.us.

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Generational Cycles – Onesies

Every generation it seems has to go through a period of truly horrendous fashion faux pas. For Generation X it was the shell suit. For a while it looked as though Generation Y was too diverse and heroically multi-cultural to succumb to any kind of mass fashion, but the end of 2012 – in the UK at least – say an explosive growth in sales of the 'onesie'. Pre-Christmas sales were up 600 per cent, one supermarket alone (Asda, naturally) revealed they had sold nearly 900,000 of their giant all-in-ones in the run-up to Christmas alone - 42 per cent of their customers gave one as a festive gift, while a third of them chose it as their Christmas Day outfit. All the other major chains, but especially ASOS, Debenhams and River Island also reaped the rewards of stock- piling this year's seasonal must-have, likewise New Look, which announced that its stores were selling a onesie every three seconds in the Christmas run-up.

And all this for what is essentially an adult version of a romper suit. For outdoor wear no less.

"Forget Alexander McQueen or Emilia Wickstead, amid all the fevered speculation as to what the Duchess of Cambridge might wear during her pregnancy, there is one designer who believes he has the ultimate ensemble for the royal mother-to-be.

'I think a pink Nordic folk design "Lusekofte" OnePiece (£139) would be the perfect garment for her to lounge around in at Kensington Palace over the coming months,' says Thomas Adams, 27, co-founder and CEO of OnePiece, the company that gave us the original onesie.

Although the garment is the Marmite of the modern wardrobe, love it or hate it, it has made three young men from Norway very rich indeed. Five years ago, Thomas and two friends, Henrik Norstrud and Knut Gresvig, both now 30, came up with the whimsical idea of sewing their sweatpants to their hoodies to create the ultimate garment for lounging at home.

After inserting a long zip to ensure easy access and exit, the trio found their prototype 'OnePiece' was the envy of their friends, who persuaded them to make more.

'We made 50,' recalls Thomas, who has now left university to devote all his time and energy to his business. 'They sold out in a few days so we made more, and it just grew from there.

'Within 18 months, two per cent of the Norwegian population had them. We were as surprised as anyone when people started wearing the OnePiece at clubs and it became a fashion and lifestyle statement.'

Today, the company has sold hundreds of thousands of their onesies - which range in price from £99 to £159 - around the world, with celebrity fans like Tom Daley, One Direction and Justin Bieber, Rihanna, Holly Willoughby, Cheryl Cole, and Tulisa.
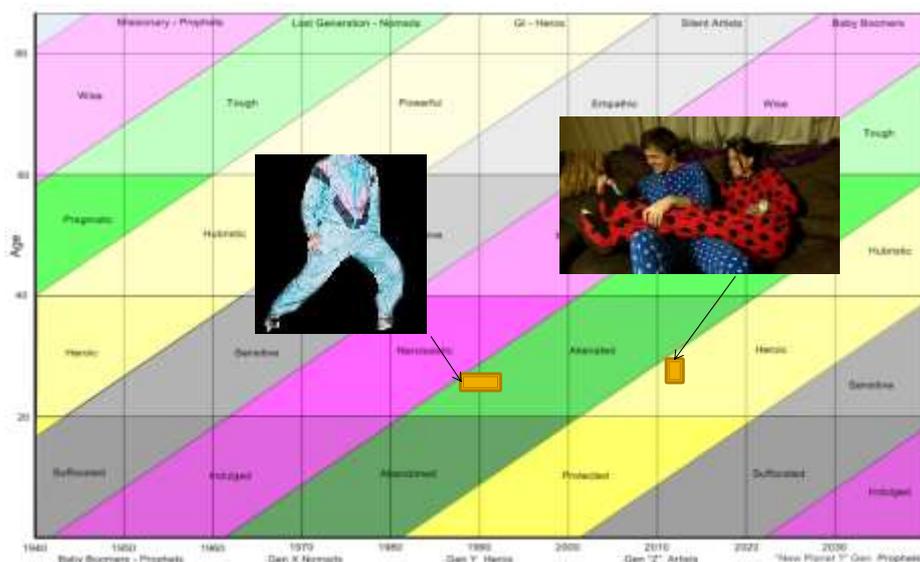
The underlying motivation for wearing either a shell-suit in the late 1980s or a onesie over Christmas 2012 is quite interesting from the perspective of their respective places in generational history:

Shell-suits – were initially popularised by rap stars at the start point of the Generation X in their 20s. The bright garish colours and ultra-casual mentality were intended to be a strong statement of intent to show the older Baby Boomers that Generation X really didn't care what they thought. All the time, though, the sport tracksuit carried a subliminal message that wearing a shell suit was symbolic of some kind of athletic prowess.

Onesies – noticing the age of the One Piece company directors, it is very clear that the adult romper suit is the product of Generation Y. This generation's relationship with their parents is a lot closer than the Xers and their parents, and so the inevitable rebellion that happens when a generation comes of age (see last month's article), is much more muted. Sure, Generation Yers are looking to make their parents despair when they walk out of the house in their Superman onesie, but the clear subliminal message this time is here is a generation that hasn't grown up yet, and, now the majority are in their 20s, have an intention to delay the day they really grow up for as long as possible ('30 is the new 20'). In effect what it says to those despairing parents is, 'hey, mom, I loved the way you brought me up, I want to go right back to the beginning again'. Or almost the beginning: thus far there's no evidence of an increase in GenY-adult diaper sales. We'll let you know if the situation changes.

Biology – Giraffe

A nice simple contradiction example from the natural world this month takes us to Africa and one of the most recognizable creatures on the planet, the giraffe. With its 5–6 m height and 2m long neck, the giraffe has evolved to exploit an evolutionary advantage of being able to reach vegetation that other herbivores and ruminants cannot. The neck contains seven vertebrae, each one more than 25cm long. The neck muscles of the giraffe weigh up to 280kg (compared to an overall weight in the larger males of 1600kg). At the base of the neck, the vertebrae have spines that project upward, and these serve to support the neck muscles as they keep the giraffe's head aloft.

In order to get sufficient blood to its head, the heart of a giraffe is enormous, weighing as much as 12kg in a fully grown male (about 40 times larger than a human heart). It needs to be this large in order to pump oxygen-rich blood up to the giraffe's brain at pressures twice those found in any other mammal. The size of heart and pumping pressure required gives the giraffe a serious contradiction to solve when it wishes to bend down to drink:
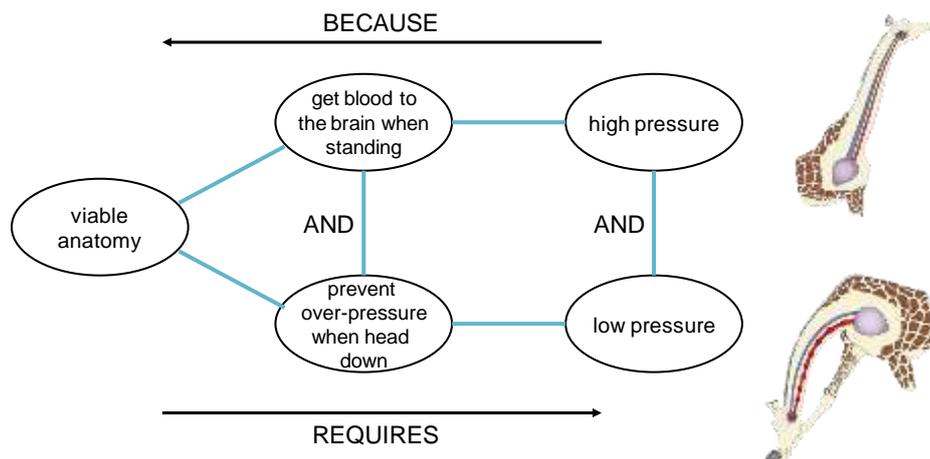
Here's what the contradiction matrix has to say about the central conflict pair:

IMPROVING PARAMETERS YOU HAVE SELECTED:
Length/Angle of Moving Object (3)
WORSENING PARAMETERS YOU HAVE SELECTED:
Stress/Pressure (19)
SUGGESTED INVENTIVE PRINCIPLES:
1, 35, 3, 14, 12, 8, 17, 29

The blood pressure/neck length conflict is resolved through an intricate system that includes reinforced artery walls, a succession of bypass and anti-pooling valves as well as

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a complex capillary network located at the base of the giraffe's brain. This capillary network keeps the flow of the blood to the brain maintained at an adequate pressure by having the very small blood vessels in the head become narrower at the appropriate times in order to prevent them from bursting.

In other words, a combination of examples of several of the Inventive Principles: Segmentation (Principle 1) – the capillary network and chain of valves; Parameter Changes (35) – re-enforced walls; Dynamics (15) – changing the diameter of the capillaries. The Matrix didn't directly get this last one, but got pretty close by suggesting Principle 12, 'Equi-potentiality'.

The giraffe was the subject of an extraordinary edition of Inside Nature's Giants by Richard Dawkins. It's well worth looking up a video of it on YouTube. For the more academically minded, you can also read more by getting hold of a copy of this paper:

# The structure and function of giraffe jugular vein valves

Graham Mitchell[1,2], Sybrand J. van Sittert[1*] & John D. Skinner[1]

[1]Centre for Veterinary Wildlife Studies, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, Onderstepoort, 0110 South Africa

[2]Department of Zoology and Physiology, University of Wyoming, 1000 E University Avenue, Laramie, WY 82072, U.S.A.

When a giraffe (*Giraffa camelopardalis*) lowers its head to drink, blood could enter the jugular vein from the inferior *vena cava* or regurgitate from the jugular veins into the cranial veins. We investigated the anatomy of jugular valves in giraffes to establish if they could prevent either of these regurgitations. Jugular vein length and intervalve distances of 396 valves (192 left, 204 right) were measured in 60 veins from 25 adult (11 males and 14 females) and five foetal giraffes. The average number of valves in the left jugular veins was 6.4 ± 2.7 (mean ± S.D.; range = 2–13) and in the right was 6.8 ± 2.1 (range = 3–12). Male giraffes had 7.3 ± 2.7, females 5.9 ± 2.1, and foetuses 7.0 ± 2.1 valves per vein. None of these differences was statistically significant (*t*-test; $P > 0.05$). Most valves (88%) were bicuspid in structure. Their position in the veins was irregular. Most (36.1%) were located in the first 500 mm of vein. The relative distribution of foetal valves was not significantly different from that in adult giraffes ($\chi^2 = 0.274$, $P > 0.05$). We concluded that the main function of the jugular vein valves is to prevent regurgitation of blood from the inferior vena cava and right atrium into the jugular vein and that the number of valves is fixed *in utero*.

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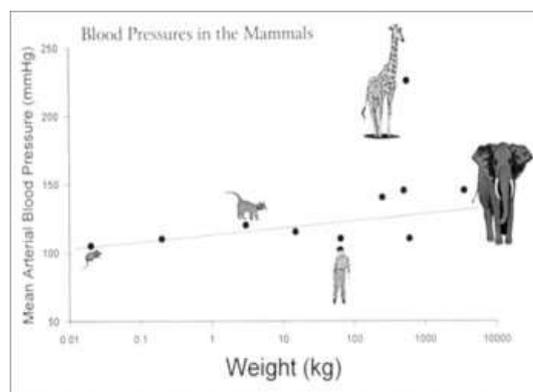
Short Thort

Critical Success Factor #1 In Any Change Programme:
creating a sense of progress

Simplest way to kill progress: 'yes, but…'

Simplest way to create it: 'yes, *if*…'

News

Public Workshops
It's always a problem knowing how many Level 2 SI certification workshops to schedule given that some people decide that they receive all they want from the first Level. That said, it now seems like we have a critical mass of signed-up delegates for at least one more in the first half of the year. April 9 and 10 are the two allotted days; our Clevedon ChangeHub is the venue. Sign up at our online shop. (With a following wind, we will be running the Level 3 follow-on on 9 and 10 July.)

Generation DNA
We'll be running another one-day version of the popular Generation cycles story on 12 June. Most likely in Clevedon, but with a fair possibility of shifting to London, depending on where the bulk of the attendees are based and travelling from.

Hong Kong ICMM
Following the success of the January event, we will be running another one-day ICMM Introduction workshop on 22 March…

CIO Connect – Knowledge Management Conference
…the day after we present at one of the highlights of the Knowledge Management Society's big events of the year.

Buckingham Lean Conference
We'll be presenting a session, 'Invisible Value/Invisible Waste: Tapping Into Unspoken Intangibles' at the UK's new principle Lean conference of 2013. We'll be speaking on the

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main day, 11 July. The event will be held at the MK Dons stadium in the very attractive town of Milton Keynes.

Blog
By the time you read this, there should have been several posts at the new darrellmann.com blogsite. The challenge is to make it a must-visit place on the Internet over the course of this year. The favoured strategy at the moment is to make sure there's something new posted at least twice a week. No pressure.

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

      Automotive – strategy definition workshops
      Machine Tools – technology strategy project
      Financial Services – customer anthropology study
      FMCG – ApolloSigma study
      Aerospace – SI workshop series
      Healthcare – strategy workshops
      Academia – PanSensic change-programme sense-making project
      Government – PanSensic dashboard building project
      Utilities – customer intangibles study

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