Systematic Innovation

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

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

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Where Innovation Attempts Fail: MNC v SME

We have previously published (Reference 1) the results of a piece of research we did over the period 2008-2009 on the primary reasons why innovation attempts ended in failure. During that study we broke the failure causes into the five main elements of the System Completeness model reproduced in Figure 1.

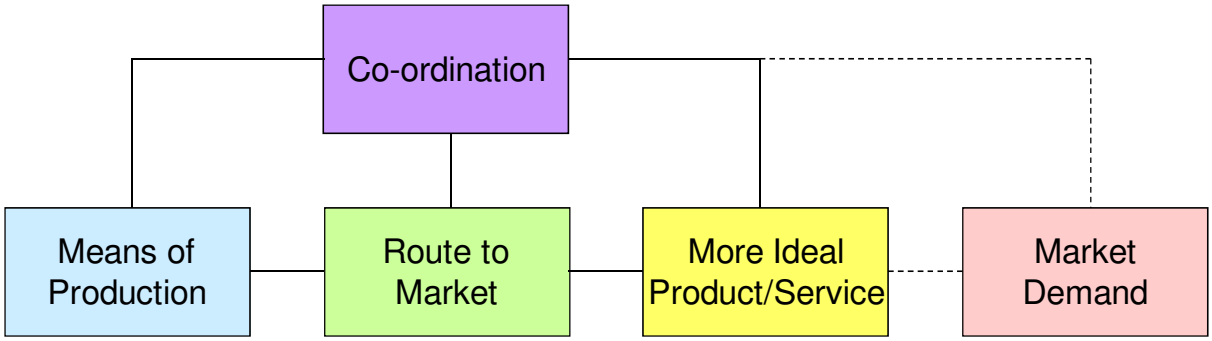

Figure 1: Five-Component Business System-Completeness Model

At the time we made no distinction between small, medium or large organizations, publicly or privately held ones, or different kinds of industry. In no small part, the reason being that we were more interested in exploring the relative importance of the technical aspects of the innovation story ('more ideal product/service' in the System Completeness model) versus the marketing or 'business' aspects of the story. The primary finding of that research was that, overall, getting the technical part of an innovation attempt wrong accounted for slightly less than 20% of the overall failure rate. Innovation failure wasn't, in other words, usually the fault of the designers and R&D people tasked with coming up with a new product or service.

Since the time of that initial research, we have had cause to re-frame and update the data to consider other aspects of the innovation attempt failure rate story. The focus of this short article is to consider the differences between failure causes between small and medium size enterprises ('SMEs' in European terminology) and large multi-national corporations (MNCs).

Figure 2 illustrates the overall failure breakdown from a representative sample of just over 500 SME based case studies examined over the period 2008 to September 2011.

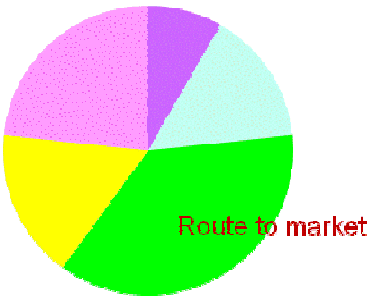

Figure 2: SME Innovation Attempt Failure Source Breakdown

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The figure, which uses the same colour-coding convention as Figure 1, shows that by some considerable distance, the biggest cause of SME innovation attempt failure comes as a result of failure in transitioning the eventual solution idea to market. Or more specifically, failing to acquire access to an adequate route to market.

The biggest single contributor to the problem, as reported in Reference 1, is that SMEs continue to fall into the trap of targeting solutions that are 'superior' to incumbent products and services. In so doing, the big players that have fought hard to dominate the existing market have every reason to want to squash the upstarts. The easiest way for them to do this is to deny access to a route to market. Either by (if the SME gets lucky – at least money-wise) buying the SME assets in order to sit on them, or by squeezing the supply chain pricing models to deny the SMEs access to the profits that would allow them to thrive.

Figure 3 switches attention to innovation attempt failure sources in the MNC world. Again, the dataset from which the breakdown was compiled comprised around 500 case studies:

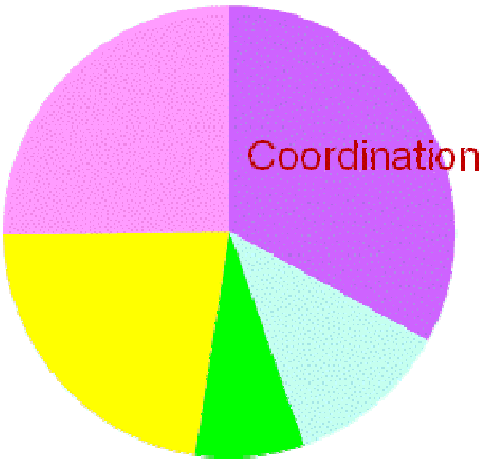

Figure 3: MNC Innovation Attempt Failure Source Breakdown

The breakdown between the five different failure sources looks somewhat different this time, the 'Route To Market' category shrinking to become (not surprisingly) the smallest of the five possible sources. The biggest source of innovation failure for the MNCs turns out to be dominated by failures of Coordination. Which essentially means that the leadership team responsible for the innovation either failed to connect all of the necessary other elements together at the right time and place, or they failed to define an appropriate strategy for the business.

To a very large degree this failure of senior leadership can now be causally linked to the innovation capability maturity of the business, and specifically, attempting to do things that the organization does not have the capability to do successfully. The most visible link here seems to occur between the ICMM capability of the business and the hierarchical level at which the innovation is attempted. Figure 4, although crude (we're still compiling the next raft of data), suggests that, if we divide the type of innovation (vertical dimension in the picture) into five levels from 'Process' at the base working level inside the organization, to 'Societal' when the organization in effect looks to innovate at a level that goes beyond the traditional boundaries of the company's workforce and structures, there is a direct correlation between which Levels the organizational capability is and the hierarchical level of innovation project they can hope to succeed with:

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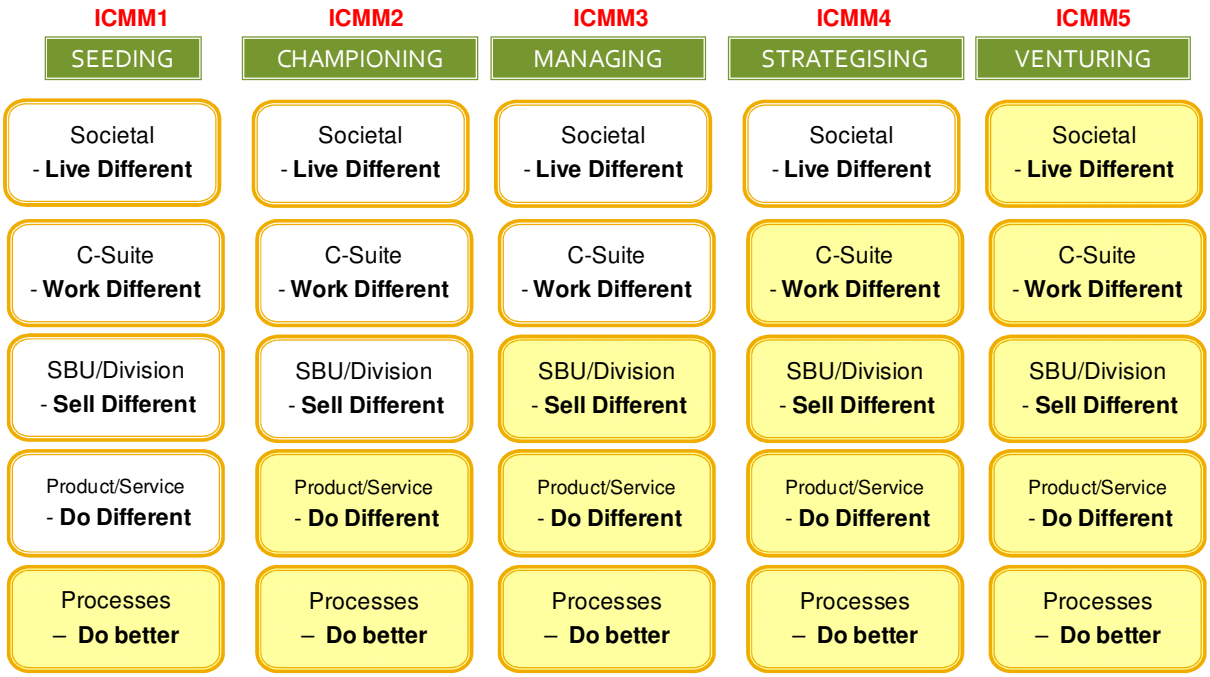

Figure 4: Connection Between MNC ICMM Level and Deliverable Innovation Project Type
(yellow shaded regions indicate project levels where there is a reasonable chance of innovation success)

Put in stark terms, ICMM Level 2 MNCs (where the majority are) are delivering extremely high failure rates right now because they are trying to innovate new products and services, without a corresponding innovation (or ability to innovate) in their 'sell different' business models.

Whether MNC or SME, the truth remains from both Figures 2 and 3 that the blame for failure predominantly lies, not with inadequate technical resource, but with a widespread inadequacy of the senior leadership of their organizations. It's time to right the balance: technical innovation has reached the position of 'science', while management is still largely stuck in a world of trial and error 'art' when it comes to their innovation activities. How well the world's economies hold up through the difficult next ten to fifteen years might just depend upon how well this transition from art to science is managed.

'Management is in the same state today that the natural sciences were in during the seventeenth century. There is not one single, well established concept in the field of management on which you can build a testable theory.'
Elliott Jaques

Reference

1) Mann, D.L., 'Computer-Aided Innovation: Challenges And Contradictions', keynote address, 3nd IFIP Working Conference on CAI, Hebei University of Technology, August 20, 2009, Harbin, China

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Gravesian Psychology & Innovation Projects

Of course it rarely has the opportunity to happen, because most organizations assume that 'employees' are all the same, but over the course of a project life-span the characteristics of the project team ought to adjust to suit the prevailing needs. Finally, it seems, the smarter, innovating companies are beginning to realize that their success rate increases markedly when they are able to re-structure the character and skills of a team to suit each distinct stage of a project. Either way, of course, represents the two poles of yet another perennial and perennially tough to solve business contradictions, as detailed in Figure 1:

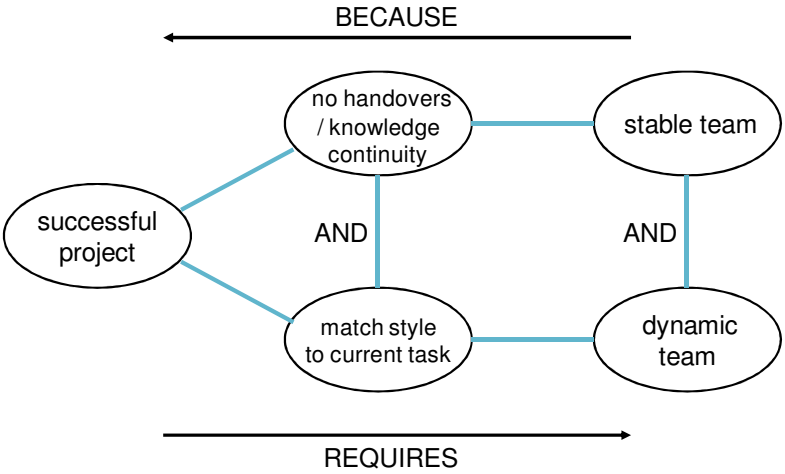

Figure 1: The Stable/Dynamic Project Team Contradiction

Once expressed as in this way, we know that someone, somewhere will have found a solution for us. Typically, at least in the TRIZ/SI world, we might find ourselves veering at this point towards the Contradiction Matrix. Not that that would be such a bad thing, of course, but it has to be said that the Inventive Principle solution suggestions we will obtain will be a somewhat blunt instrument when it comes to genuinely and meaningfully tackling the problem.

Before we do that, it would be a very good idea to go and look for some resources that we might be able to bring to bear on the problem. Not least of which would be a better understanding of what characteristics it actually is that we might need at the different stages of a project, and what denotes the transition from one stage to another.

The most frequently used resource in this regard is the model reproduced in Figure 2. Not perfect by any means, but correlating the different stages of a project to Myers-Briggs profiles at least taps into a profiling method that is essentially ubiquitous in the world of business. Far stronger in the model is the use of the evolutionary S-curve as a way of describing the various different stages of a project. In this case, a project being divided into seven different chunks, arranged along a spectrum whereby, at the bottom of the picture, the team is at the start of a project and looking for the big jumps that will effectively kick-off the new s-curve, and, at the top, the task at hand is all about optimization and preservation of the mature system.

We find ourselves using this model frequently when working with clients on their innovation projects. It is often highly instructive to map the desired MBTI profile for a given

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project stage against the actual profiles of the team members. On occasion we have been known to turn this desired/actual ratio into a project Effectiveness Quotient (or, more often than not, 'Dysfunction Quotient'). If nothing else, it's good to have a measure of where a team is at before intervening to change anything.

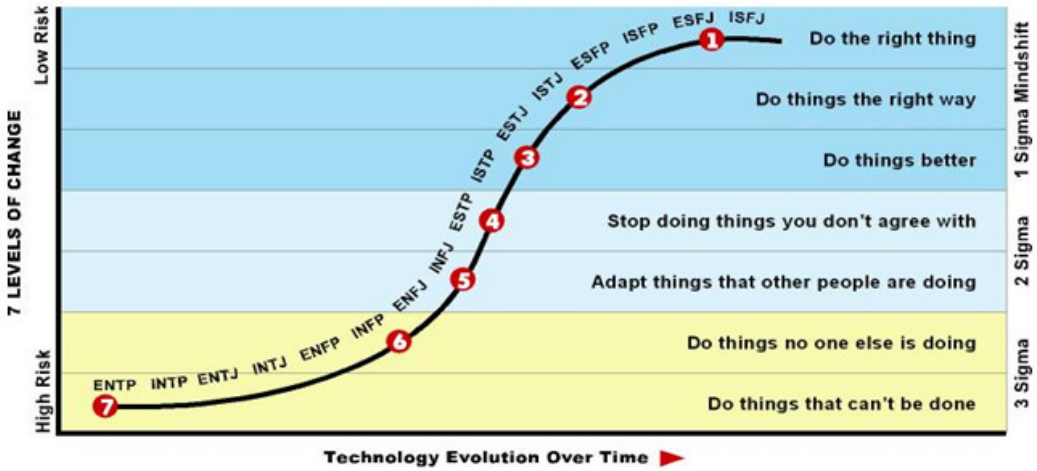

Figure 2: Ideal Personality Profiles Versus Project Stage

The second method – the one we think has the bigger long-term potential involves making use of the Gravesian 'Thinking Styles' as popularized in Spiral Dynamics. Regular readers of our work will know that a large part of our 'understand the customer'/TrenDNA work is built around Graves' discoveries. People that have also been on any of our workshops will also know that this ability to understand the 'DNA' of how people think, is as relevant when looking at the people inside an organization as it is looking at external customers. Figure 3 illustrates how we believe the different Graves 'Thinking Styles' correlate to the main different stages of a project S-curve:

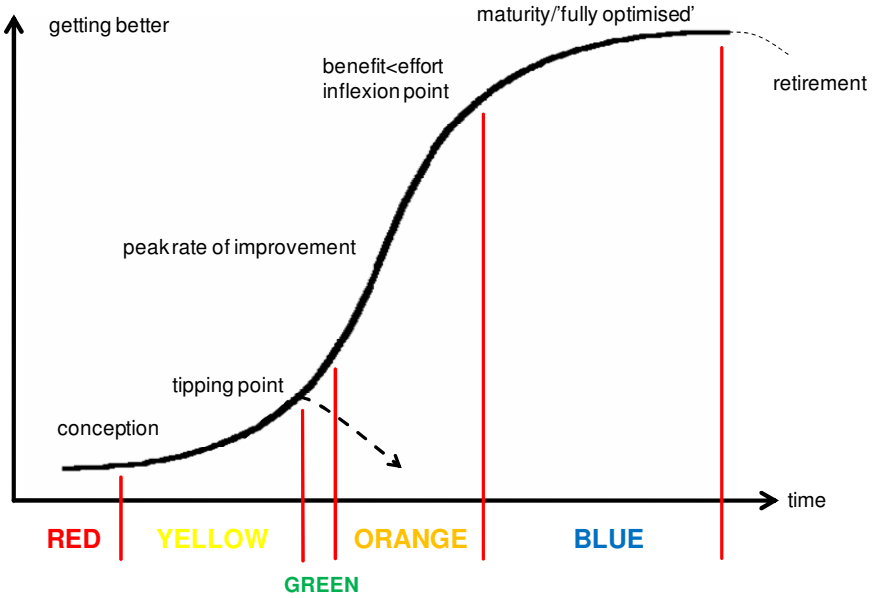

Figure 3: Desired Dominant Thinking Style Versus S-Curve Stage

Let's examine why we think each of the different Levels of the spiral belong where they do at different stages of the S-curve:

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Red (Feudal)
At the start of any new project, there is a strong need for a determined leader, someone with what might be seen by outsiders as a naïve optimism and desire to do things their way. One only has to think of Steve Jobs to get a clear view of what the archetypal 'once more unto the breach' leader is like. By all accounts, Jobs was a classic Red thinker – read through the most recent (most honest) biography of the man and one of the most frequently used words to describe the man is 'asshole'. Not that this is a compulsory feature of the Red project instigator, but given the need to break out of old ways of doing things and travel a previously untrodden path, it is most likely to be the ego-driven bloody-mindedness of Red that will be the best bet to get the show on the road…

Yellow (Holarchy)
… one of the main problems of the Red project leader, however, is their impulsiveness and lack of patience to step back, take stock and think through how best to solve the inevitable problems and hurdles that will appear along the road from idea to commercialization. An awfully large proportion of innovation attempts will be seen to fail at the infancy stage because the blustering-Red takes a wrong road that can't be recovered from (and, worse, won't listen to advice to the contrary). See academic-ego-lead university spin-outs for the archetypal failure characteristics. What is really needed during the immediate post-idea period is some classic Yellow thinking. Yellow is perfect person to have in place when there are hurdles and barriers all over the place, highly dynamic environments, no apparent rules, little or no data, and massive uncertainty over the 'right' directions to take. Yellow is really good at working through tough, complex problems. As such, they are just the sort of person you need in a disaster situation to help you get rid of the redundant old rules and help you find the new ones. Once their world has re-stabilised, however, the Yellow person becomes bored very quickly and you may well find them creating more trouble than their worth to the project: their desire to continue iterating and experimenting will tend to see situations arise in which they will create problems just for the sake of having something interesting and new to work on. In S-curve terms, Yellow will get a project to the Tipping Point moment, but right after the right Tipping Point has been found and exploited, it is time to give Yellows some new toys to play with and hand over the project to someone else…

Green (Communitarian)
…preferably someone Green, since the key job to be done post-Tipping-Point is to formalize the organization structure and working relationships and protocols within the team. Green's biggest skill is the ability to bring some much-needed 'we' thinking to the project, alongside their ability to see systems and bigger pictures. Green has the patience to gather the multitude of different perspectives of individuals within and around the project, the tact to deal with some of the more 'difficult' egos, and the perseverance to see things through to a position of what we might think of as minimum-tension. Greens aren't traditionally great contradiction solvers (they are very often accused of procrastination or even paralysis when are faced with too many dissenting views), so the most effective hand-over from Yellow comes at the moment when the organizational contradictions have been laid bare and the Yellow contradiction-busting skills have done their job. Once the team is stabilized and 'HR practices' are established, it's time to move Green to a more back-seat role, because the next phase of the project is about as far away from procrastination and paralysis as it will ever get…

Orange (Scientific)

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…this is the phase of most rapid growth of the organization and the value of products and services it is shipping to the newly formed, post-Tipping-Point sea of customers. This is the period where the Sales and Marketing team needs to be given the authority to lead the activities of the organization. It is 'deployment' time:

"Deployers, the natural leaders for this phase, are competitive, performance-driven individuals who relish a challenge and love to earn top dollar for besting it. They are the ultimate pragmatists who focus intently on driving out ambiguity both from the situations they seek to master and from the metrics by which their compensation is awarded. Everything that can be quantified will be quantified and a dollar value assigned to its successful fulfillment. Hence the ginormous pay packages at Goldman Sachs, the fortunes created through stock options at Microsoft, and the extraordinary contracts paid to star professional athletes." (from Escape Velocity – see Best of the Month)

Set Orange's tough targets and reward them for delivering and if there is a way of delivering, they will find it. They're the rule-benders of the business world (so careful they don't go bending them too far!), the people that will work out the optimum way of doing any job or activity…

Blue (Order)

…which is just what you need until such times as the growth curve begins to flatten out. This is the point at which the Orange team is most likely to start breaking rather than merely bending the rules: they're still looking for their next big bonus cheque, and when they're unable to deliver (as is eventually inevitable due to the fundamental dynamic of the S-curve), they will tend to get frustrated to the point at which they will contemplate doing things you don't want them to do. Beyond the maximum growth inflection point, the person you need to bring into the leadership role is the classic Blue, Order thinker: the person who knows exactly where the rule boundaries are, and the person whose drive is to strip out waste and maximize stability in the organization. They are the ultimate rule-refining optimizers:

"The optimizers that lead these efforts are people who cringe at inefficiencies in workflows and relish the opportunity to streamline or even eliminate them. They are by nature analytical, patient, thorough and data-driven… Optimization lends itself to hierarchical structure with clear channels of authority and review. Such organizations are inherently conservative, slowing down changes to make sure they are truly for the better, guarding against unintended consequences." (again, quote from Escape Velocity)

Tell Blues what the rules are (including how to gracefully retire the business!), and they will follow them. To the letter. No exceptions… Just keep them away from the next round of Reds that will inevitably start to (and need to) begin appearing when the next S-curve begins to rear its ugly, newborn head… at which point, we're ready to start the next cycle.

Every single one of these phases of a project S-curve demands a transition from one type of leadership to another. Typically, being contradictions, they will demand some tough re-thinking and noses-out-of-joint. How to solve the problems is a subject for another day. Right now, most organizations are at (or haven't quite reached) the 'awareness of the problem is 50% of the solution' phase. Hopefully that's something we've been able to clarify at least a little during this article.

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Worst Of 2011 Awards

With fists aloft, and a primal lupine howl in our throats, we hereby celebrate the worst of 2011.

Joint 'It-Can't-Be-KLM-Again Suck'y-Airline Of The Year' and 'All-Conversations-May-Be-Recorded-For-Training-Purposes Customer Service' Awards - well, right up until the very last moment, it looked like KLM were going to scrape an illustrious third-time win of the award (would that have meant they got to keep it in perpetuity?) after a trio of flights all managed to be late. Not massively late, but on the other hand, seeing as I only made three flights with the worst of SkyTeam's ineptitude-meisters, having a 100% late record never looks good. In the end, however, the award goes to Sabiha Gökçen airport in Istanbul. They managed to pull their late rabbit from its hat on a spectacularly inglorious performance that all began the moment I stepped out of my taxi and walked up to the doors for Departures. 'World's Greatest Airport' the signs etched permanently on the glass façade announced. A pretty brave move I thought, setting such high expectations to early. As it turns out, the sick sense of humour of the sign-writer became apparent within a few seconds of entering through the sticking automatic doors. The reason they were sticking was due to a small army of people crammed, waiting in the insufficient space between the outer door and an inner door to get through an x-ray security check. Literally everyone entering the building had to have everything x-rayed. 15 minutes later, I'm just about through this ordeal, thinking that maybe, inefficient as the idea seemed, maybe the whole building was now 'clean' and wouldn't require any more security checks. Alas, that illusion wasn't to last too long. But first, I had to pass a few more ordeals. The next one being that the check-in hall gave the distinct impression that the whole population of Turkey had converged all at one time. If 'sea' is the right collective noun for prospective air-passengers, that's what we most definitely had at this stage. I searched in vain for the 'already checked-in bag drop' counter for my airline (the appropriately named 'flypigs' (actually Flypgs.com, or Pegasus)), but eventually gave up and joined the mile-long queue for 'all Pegasus flights'. Another 20 minutes gone. Bag finally checked, I headed to Passport control. Then, having found it, found myself walking a full two minutes to the end of the single-file queue of people trying to get through (collective noun for a mile of passport-wielding bad tempered people?) what turned out to be 4 open counters. By my reckoning, looking at the departures boards, there were close to 5000 people an hour scheduled to fly out of the airport, and yet some bright spark had calculated that four Immigration officials was going to be adequate. And wave goodbye to another 40 minutes… a wonderful way to relax and contemplate the supreme greatness of Sabiha Gökçen airport… prior to, of course, the next x-ray security check, pre-pre-board passport check, pre-board passport and boarding pass check, boarding check, queue to get on the bus to take us to the flypig, and queue to get up the steps and onto the plane. Now I know why the airlines want us to turn up for international flights two and a half hours before departure time: that's precisely how long it takes from entering the building to entering the plane at the world's greatest airport. Awesome.

The Depeche Mode Everything-Counts-In-Large-Amounts Literature Award – 2011 might just go down in history as one of the vintage years in the shady world of management literature. Which makes it all the more apparent how bad the bad stuff is. Amongst a plethora of candidates, however, two very clear winners emerged. Both homing in on the idea that bad economic times are exactly the right time to be innovating

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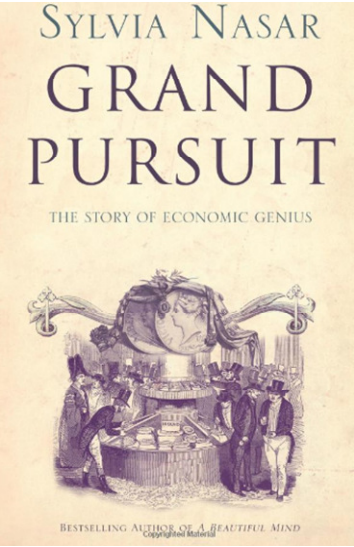
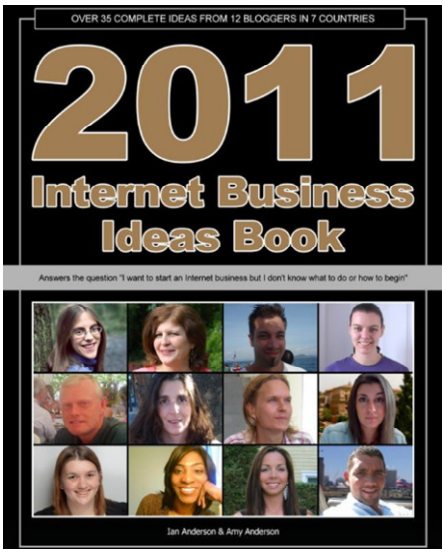
and setting up new businesses, but sadly, both also completely missing the idea that some semblance of insight or coherent thought might be a helpful part of the story.





Sylvia Nasar makes life difficult for herself right from the gitgo in her misguided decision to go study ‘economic genius’. Not that we’re in any way cynical about economists, of course. Nasar is not a bad author (she’s most famous for the John Nash biography, ‘A Beautiful Mind’), just that her premise that a biographical description of the work of people across a range from John Maynard Keynes to Schumpeter, Hayek, Keynes's disciple Joan Robinson, the influential American economists Paul Samuelson and Milton Friedman, and India's Nobel Prize Winner, Amartya Sen, would in some way reveal insights relevant to today’s world. They don’t. Despite over 550 pages of what all too quickly begins to feel like aimless blather. 550 pages being quite a lot. Especially when the payback is so sparse. If 2011 had a theme for me, it was that the economists of the world – as far as I can tell, without exception – have no idea what is going on anymore. In the past, economists had their hands on a number of levers and dials that, when they turned them, had some kind of predictable effect. Today, none of those levers seems to work predictably anymore. The economists no longer having any clue what affects what. Nasar, in trying to reflect on the problem third hand takes her readers on what ultimately turns out to be a circuitous, seemingly never-ending road to nowhere in particular.

In a supreme piece of irony, the authors of the 2011 Internet Business Ideas book, have published their efforts only in electronic form. The irony being that this is a book so dumb that it could only ever be useful for someone who had no idea how to use Google. ‘Over 35 complete ideas’ says the cover of the book. That’ll be 36 then. Or zero if your definition of ‘complete’ also includes niggling details like practicality, common-sense or anything that incorporates even the tiniest shred of insight. Diabolically awful and perhaps the ultimate illustration of the follies of writing a book by committee.

The Necessity-Is-Not-Always-The-Mother Invention Award – the delusional, inept and mis-guided have yet again had a good year in 2011. All hail, then, the worst patents of the year.

As ever, the world of pet-care continues to attract some of the most deluded inventors. We were initially enamoured of the idea of a means of preventing cats from walking across

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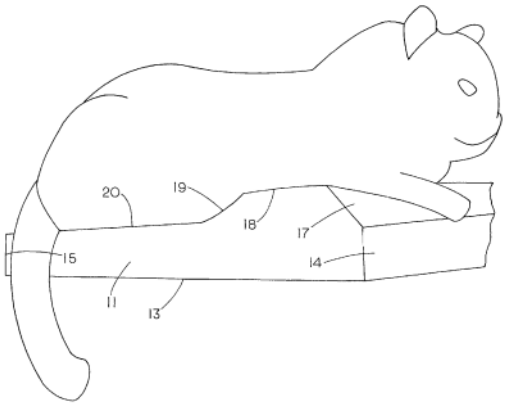
computer keyboards (I had to resort to electrifying mine. (only joking)). But then we saw this:

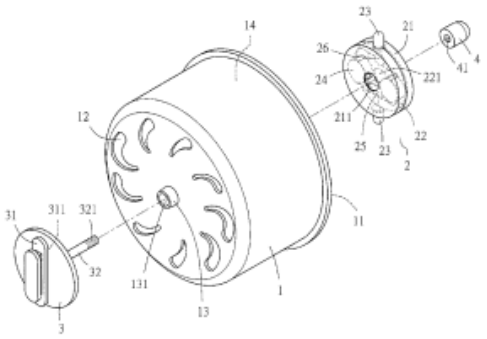


Thanks, Arizona based Kevin Mootsey for getting US8,082,880 past the Examiner in December. Here's what Kevin has to say in Claim 1 of his disclosure:

1. A longitudinal elongated pet pad comprising a foam block having generally parallel side surfaces, a vertical rear surface intersecting with the side surfaces, a vertical front surface intersecting with the side surfaces and a top surface having a generally planar first surface intersecting the side surfaces and the front surface that extends upward and rearwardly at an angle of about 45 degrees, a generally planar second surface intersecting with the side surfaces and the first surface, a generally planar third surface intersecting with the side surfaces and the second surface, a generally planar fourth surface intersecting with the side surfaces, the rear surface and the third surface with the third surface extending upwardly and forwardly at an angle of about 135 degrees relative to the fourth surface and a bottom surface intersecting with the front side and rear surfaces, and a fabric cover surrounding the foam block, wherein each of the front and rear surfaces and each of the first, second, third and fourth surfaces are of a rectangular shape, the longitudinal length of the second surface is about three and half inches, and the spacing of the second surface from the bottom surface is about an inch greater than the spacing of the fourth surface from the bottom surface.

So, basically, a foam cover for the keyboard then. Not in the least bit obvious. I expect the Examiner went home especially proud of himself the day this one was accepted into the annals of patent history.

Matters take a turn for the worse pet-wise, with the granting of US8,069,822, on 6 December. This invention holds open the fearful prospect that it might actually make it to market, given that the invention is actually assigned to a real company. In Taiwan. Here's the invention:



Any ideas?
Try this:

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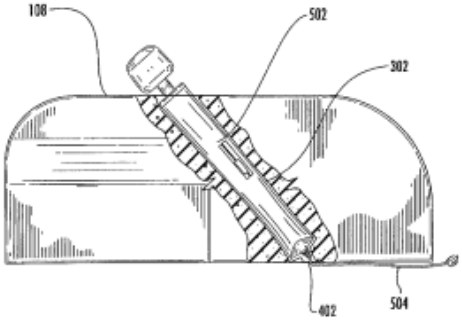
A pet exercise wheel assembly having a light-emitting device includes an exercise wheel made of a material pervious to light. The exercise wheel has a tapered sleeve projecting from a center of the exercise wheel and is axially formed with a penetrating channel. A light-emitting device has a casing coupled to the tapered sleeve of the exercise wheel. The light-emitting device has a circuit board formed with a central hole and provided with at least a lamp, a battery, a rocker switch, and an IC chip that are electrically connected with each other, with the lamp exposed at an exterior of the casing. Thereby, rotation of the exercise wheel drives the light-emitting device to rotate, so that the rocker switch in the light-emitting device is rocked to close a loop of the circuit board, thus causing the lamp to blink and provide a visual entertaining effect.

Surely nothing less than a plot to create a world full of psychotic hamsters. Or maybe that's the 'visually entertaining' effect the inventors were really after.

Readers of a nervous or delicate disposition may wish to bypass our next winner, this time US7,993,262, granted to New Jersey inventor, Marcus Frank Cianfrani. His 'stimulatory device support apparatus' is introduced as follows:

Disclosed is an apparatus for supporting a stimulatory device. Such device eliminates the need for a user to manually hold and/or position such stimulatory device. Rather, such device remains in a stationary position, and a user may adjust her position relative to the stimulatory device and the supporting apparatus. In one aspect of the present invention, a seat is provided upon which a user may lie, rest, or otherwise support herself.

The main thrust of this invention (sorry, couldn't resist that one!) is that in the prior art, it has been possible to support stimulatory devices in either vertical ('using a suction cup' – very romantic!) or horizontal modes, but now thanks to the wonders of modern invention, it is possible to angle the stimulatory device at angles between horizontal and vertical. What will they think of next? Is there no end to the perversion.



Finally, and perhaps, if it such a thing is possible, even more frightening than the support device, here comes Yahoo's 'automated friend finder' patent. Don't ask how we came across this one… sometimes it hurts to be lonely.

United States Patent **8,027,931**
Kalaboukis **September 27, 2011**

Automated friend finder

Abstract

Disclosed are methods and apparatus for automatically connecting individuals. A private profile of an individual may be automatically generated. The private profile of the individual may be automatically compared with private profiles of a set of individuals such that one or more of the set of individuals are identified as matches for the individual, wherein the private profile of the individual includes private data and each of the private profiles of the set of individuals includes private data. The private profile of the individual is not publicly available to other individuals that

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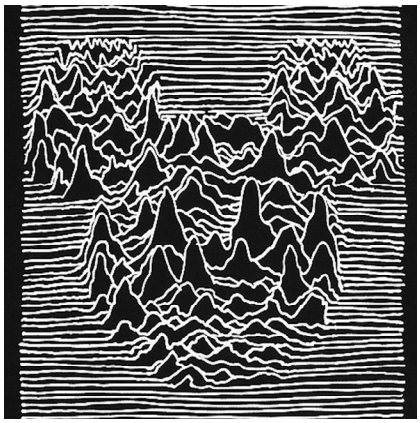
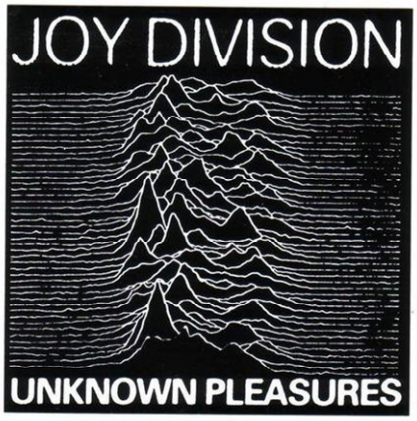
have access to a public profile of the individual. The individual may be automatically notified that the individual has been matched with the one or more individuals, thereby enabling the individual to initiate communication with the one or more individuals. The similarities between the private profile of the individual and the private profiles of the one or more individuals are not revealed to the individual or the one or more individuals.

Inventors: **Kalaboukis; Chris T.** (Los Gatos, CA)
Assignee: **Yahoo! Inc.** (Sunnyvale, CA)

And here's me thinking that people's private data was private. How stupid of me. Yahoo seem to have given themselves permission to go and access it anyway. No doubt to make the first-date conversations pass by with a little extra zing: 'tell me, ha-ha, Darrell, about that time you were arrested for stapling hamsters into their flashing LED wheel'.

The Newly Inaugurated One-Rule-For-You-Another-For-Me Corporate Hypocrisy Award – if my memory serves me correctly, the Disney corporation have a reputation of being one of the most voracious defenders of their copyright in the entire history of copyright. Twenty Disney lawyers will have descended on you the moment you even think about doing your '40 Inventive Disney Character Principles' book. How surprising, then, to find them overtly ripping off one of the most iconic band's of the late 1970s, Joy Division. On the left, the now-sold-out limited edition Disney t-shirt design, and on the left, the 'inspiration' taken from the Joy Division album:





Don't you just hate this kind of 'ssh, it's quite funny, and no-one will ever notice' cool-by-proxy hypocrisy. I hope the surviving members of the band take the evil giant to court for a billion dollars.

The Slow-Fast-Moving-Consumer-Goods Design Excellence Award – unlike inventions, the fact the planet is on the verge of another economic catastrophe cliff fall has had a continuing impact on new crappy products allowed to make it all the way to the shops. Here's the 'best' from the more bizarre ends of the new consumer product spectrum in 2011:

First up, 'Ketchup Salt'. Is it a bird? A plane? Nope. It's a low sodium, kosher, vegetarian, zero-fat, and made with "real tomatoes", carrying about the same number of calories as, oh, let me see, a typical serving of ketchup. Still, I suppose it does carry the substantial increase in convenience of not having to shake the container to get the contents out. Damn, I was missing the point the whole way along.

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Next up, edible silver and gold food paint. Get the non-hazardous Midas Touch at the press of an aerosol button. There might not be any money left in your bank account, but have no fear, you can still impress the neighbours with your most excellent golden tomatoes. Err.

Or maybe go with the slightly more discreet display of wealth offered by this scented candle from White Castle.

Is there anyone out there that wouldn't want their house to smell of a cheap, bottom-of-the-barrel burger chain? A small piece of marketing genius methinks, surely destined to lift White Castle out of the ditch and into their rightful place as the US's finest purveyor of 99c burgers. Or not.

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Meanwhile, over in Princess Leia-Land, the NPD bigwigs (sorry again) have come up with this, the ultimate in personal hi-fi speaker accessorization.

Tends to work better on women than men. According to our experiments.

Finally, the advertising innovators have also been busy plumbing new depths during 2011. Here's recruitment agency jobsintown.de letting the unemployed masses know just where they stand in life:

Somehow massively symbolic of the lot of the working man in 2011.

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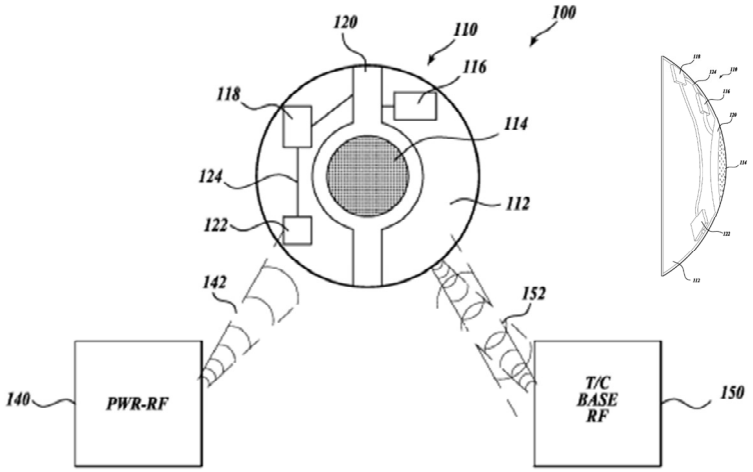
Patent of the Month - Active Contact Lens



Here's one we've been keeping an eye on (excuse the pun) for the last couple of years now (see: http://wireless.ee.washington.edu/papers/biocas2009_jnpyudobpo.pdf for example) due to its potential to transform the human-computer interface. Finally, on January 17, the research team had their patent for an active contact lens granted. US8,096,654 is the patent in question, and an easy choice for our patent of the month slot this month.

The inventors win the award more for the fact that the invention represents a significant step forward rather than for the existence of any great TRIZ/SI illustration or learning point. In many ways, the contradiction that gets resolved by the invention is 'merely' an administrative one: we want to have the ability to integrate a screen display into a contact lens and we don't know how to do it. Here's the main independent Claim the inventors have had awarded to them:

1. An active contact lens system comprising: a transparent substrate shaped to be worn directly over a user's eye; an energy transfer antenna disposed on the substrate; a display drive circuit disposed on the substrate and powered through the energy transfer antenna; a data communications circuit disposed on the substrate and powered through the energy transfer antenna, the data communications circuit being in signal communication with the display drive circuit; and an array of light emitting diodes assembled onto the transparent substrate, the array of light emitting diodes being powered through the energy transfer antenna and controlled by the display drive circuit.

In other words, so long as the display makes use of LEDs, they pretty much own the territory.

Here's the best we can glean from the invention disclosure in terms of what the inventors have done to achieve their working solution and overcome the logistical barrier from the Patent Examiner that their invention is more than an 'obvious combination of known parts':

Recent advances by the present inventors and others in methods of fabricating micro-scale electronic components, and in methods for self-assembly of micro-scale components onto separately-formed substrates, are enabling the fabrication of systems that were previously impossible or impractical to construct. For example, the ability to incorporate silicon-based components onto polymeric substrates to form functional devices provides new opportunities and

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challenges for producing useful systems.

The advantages of systems for reliably displaying information to users in a manner that minimizes the user's need to look towards a fixed display device are well-known. For example, heads-up displays have been built into aircraft cockpit windows and military headgear. For commercial applications, wearable display devices such as head-mounted displays or devices that project images directly onto a user's retina have been developed.

… An active contact lens system is disclosed comprising an active contact lens formed on a substrate, for example, PMMA or an RGP, that is shaped to be worn directly over a user's eye similar to a conventional contact lens. An energy transfer antenna is disposed on the substrate, and is adapted to receive energy, for example from an RF power source. A display drive circuit is disposed on the substrate and powered through the energy transfer antenna. A data communications circuit disposed on the substrate permits data transfer to an/or from the active contact lens, and is also powered through the energy transfer antenna. The data communications circuit is in signal communication with the display drive circuit. A display, for example formed from an array of light emitting diodes, is assembled onto the transparent substrate, the array of light emitting diodes also being powered through the energy transfer antenna. The display is controlled by the display drive circuit.

The active contact lens system may further comprise one or more bio sensors disposed on the substrate and powered through the energy transfer antenna, the biosensor being in signal communication with the data communications circuit. For example, the biosensors may comprises nano- or micro-scale devices that change conductivity as a result of binding to a particular target molecule. Biosensors may additionally or alternatively comprises devices adapted to measure temperature, heart rate, pressure or the like.

The active contact lens system may further comprise a portable radio frequency power supply that is operable to transmit radio frequency energy at a frequency that can be received by the energy transfer antenna, and/or a data communication base station that is adapted to interact with the data communications circuit. The power supply and base station may be constructed as a single unit.

The preferred method for constructing an active contact lens comprises fabricating a planar template with a network of interconnects and shaped recesses adapted to receive a plurality of circuit elements, creating solder alloy compatible pads in the shaped recesses, assembling the plurality of circuit elements onto the planar template, and micro-molding the planar template to a desired contact shape.

If we had to deduce the two main contradictions that have had to be overcome, the analysis might look something like this:

1) I need to power the display, but I cannot get easy access. Which will look like this when mapped onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Power (18)

WORSENING PARAMETERS YOU HAVE SELECTED:

Compatibility/Connectivity (33)

SUGGESTED INVENTIVE PRINCIPLES:

24, 28, 15, 13, 12, 7, 11, 2

No surprise here to see the first two Principle suggestions: use an intermediary and A non-mechanical 'field' – RF in this case.

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2) I need to manufacture accurately, but the curved shape of the eye makes it difficult. Which will look like this when mapped onto the Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Manufacturing Precision/Consistency (42)

WORSENING PARAMETERS YOU HAVE SELECTED:

Shape (9)

SUGGESTED INVENTIVE PRINCIPLES:

30, 13, 10, 12, 32, 21, 40

Flexible shells and thin films (Principle 30) is about as direct a clue as is ever possible. But the use of a Prior Action (Principle 10) – i.e. lay the inter-connects and circuit components down on the flat, and then micro-mould the lens to shape.

Now all we need to know is, 'when can I buy one?' A terrific achievement.

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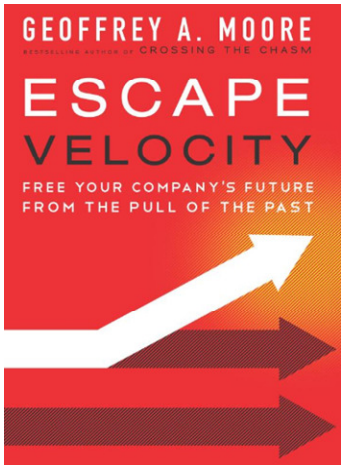
Best of the Month – Escape Velocity



2011, already a vintage year for business books, ended on a real high with the publication of Geoffrey Moore's latest gem of a book, Escape Velocity. In addition to being a great read in its own right, for us, it will go down as the book that delivered us the blinding flash of the obvious that the reason so many management books fail to deliver any tangible benefit to their readers or the organisations those readers work for is because the applicability of the message in the book depends to a very large extent on the capability of the organisation. Escape Velocity is a great book from almost every perspective, but it is only an actionable book if your organisation is, for example, at Level 3 or 4 on our Innovation Capability Maturity Model scale. That is, it will only work for you if your organisation understands the need for unlearning and the periodic need to jump from one S-curve industry paradigm to the next.

Because he uses Silicon Valley as his case-study base, Moore manages to focus on the sector of industry that probably has the highest proportion of ICMM Level 4 companies per square mile on the planet. Which is not to say that every Silicon Valley company gets it – hence the plethora of failure stories contained within the book.

Looked at from 30,000 feet, Escape Velocity addresses what Moore describes as a "power deficit" in established enterprises. This being a (ICMM Level 3) phenomenon that holds them captive to their legacy franchises and renders them unable to capitalize on next-generation opportunities. Moore traces this deficit to a performance-oriented management culture that drives accountability for financial results without establishing equivalent responsibility for replenishing competitive advantage. In this context enterprises continually draw down their reserves of power to fuel the current quarter's results while failing to stake out future positions of power to drive next-generation growth. Moore's analysis shows this behaviour is deeply embedded in the established norms and practices of global businesses and that a new set of frameworks and disciplines are required to correct for it.

Escape Velocity organizes this material around a "framework of frameworks" Moore calls the Hierarchy of Powers. This is comprised of five types of power, all of which must be aligned to achieve escape velocity. They are:

- Category Power, achieved through proactively entering and exiting categories to participate meaningfully in the highest growth opportunities;

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- Company Power, achieved through highly asymmetrical allocations of resources to create “unmatchable” core capabilities;
- Market Power, achieved through targeting the most strategic customer segments and skewing offers and programs to ensure winning dominant shares in each;
- Offer Power, achieved through disentangling three distinct forms of innovation one from another, managing each separately, to achieve differentiation, competitive neutralization, and internal productivity respectively; and
- Execution Power, with specific attention on transformational initiatives that realign the company around the next-generation capabilities required to execute its strategy.

Escape Velocity devotes chapters to each of these five types of power, presenting models, play-books and frameworks to help management teams perceive and address the issues at hand, complemented with in-depth case examples that illustrate successful applications of these methods. All this material, in turn, is encapsulated in a strategic planning framework that grafts it onto the corporate planning calendar as a front end to the annual budget and operating plan process.

Moore, as ever, pulls no punches as he draws on his twenty years of experience advising high-tech management teams to call out the misconceptions and behaviors that trap enterprises into decaying franchises, and he is adamant about the responsibility of executive management to reverse such trends. At the same time, he is empathetic about the challenges involved and highly pragmatic about how best to meet them. The result is a sly gem of a book, pitched right at the intersection of strategy and execution, right in the ‘special world’ limbo that lies between the end of one S-curve and the start of the next. If you’re a Moore fan you will read this book anyway. If you’re a regular business book reader, it’s an never less than interesting read, and if you’re in an ICMM Level 3 organisation, looking to make the jump to the next Level in the coming months and years, its nigh on compulsory, irrespective of the industry you might find yourself in.

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Conference Report – Cross-Strait Conference On Systematic Innovation, Taiwan

January 7 saw the annual conference of the Systematic Innovation Society of Taiwan. This year the event moved from its usual home in Hsinchu, a ninety minute bullet-train ride down to the south of the island and the city of Kaohsiung. I was asked to give a one-hour keynote address on the subject of the newly launched Innovation Capability Maturity Model. Around 80 people attended the event. Which wasn't such a bad thing given that it took place on a weekend, and no-one that was scheduled to attend from the mainland was given a visa to do so. So much for 'cross-strait'… yet again the diligence of the conference organizers was not matched by the amenability of the PRC government. Never mind, the day proved to be one full of fascinating discussions. Despite the fact that only one of the 35 papers on show was presented in English.

As far as I could tell, the papers represented a now usual blend of the good, bad and ugly. Great that students are encouraged to present their work in a public forum. Not so great that they hadn't been given some decent projects to work on in too many cases. Lots of brain-power on show, usually working on the wrong problems.

It seems to be a TRIZ phenomenon still. One that does a pretty good job of keeping industry and (particularly) industry leaders from attending any event with the word 'TRIZ' in the title. The economy in Taiwan has done a pretty good job of weathering the post-2008 GFC, but there are worrying signs on the horizon (the country's main semi-conductor manufacturer, TSMC, recently lost an enormous order to Samsung), and no-one has yet seemingly made the connection that the problem is not a lack of technical innovation, but rather a failure of management and leadership to play their part in the business innovation needs of organizations.

These niggles and gripes aside, it goes without saying in Taiwan that the informal conference conversations are a joy to behold. The three-person Chinese tea ceremony I was invited to join during the afternoon break was an experience I won't forget in a long time. Everyone was unwaveringly friendly and it is therefore always an easy decision to say 'yes' when an invitation to attend arrives.

Anyone interested in taking a look at the ICMM keynote slides can download them from the 'free downloads' page on the systematic-innovation.com website.

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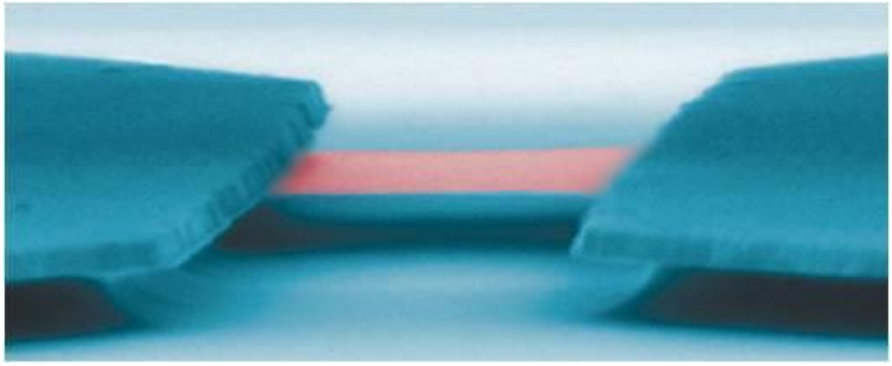
Investments – Graphene Insulator



While we're not entirely sure this counts as close enough to market to be classed as an investment opportunity right at this moment, this month's recommendation is nevertheless a fascinating discovery and, when it does get itself to market, will create a significant step change across a number of different potential applications in and around the digital and infrared domains.

The discovery comes thanks to a research team led by physicists at the University of California, Riverside. They have identified a property of "bilayer graphene" (BLG) that the researchers say is analogous to finding the Higgs boson in particle physics.

Graphene, nature's thinnest elastic material, is a one-atom thick sheet of carbon atoms arranged in a hexagonal lattice. Because of graphene's planar and chicken wire-like structure, sheets of it lend themselves well to stacking.

BLG is formed when two graphene sheets are stacked in a special manner. Like graphene, BLG has high current-carrying capacity, also known as high electron conductivity. The high current-carrying capacity results from the extremely high velocities that electrons can acquire in a graphene sheet.

The physicists report online Jan. 22 in *Nature Nanotechnology* that in investigating BLG's properties they found that when the number of electrons on the BLG sheet is close to 0, the material becomes insulating (that is, it resists flow of electrical current) - a finding that has implications for the use of graphene as an electronic material in the semiconductor and electronics industries.

"BLG becomes insulating because its electrons spontaneously organize themselves when their number is small," said Chun Ning Lau, an associate professor of physics and astronomy and the lead author of the research paper. "Instead of moving around randomly, the electrons move in an orderly fashion. This is called 'spontaneous symmetry breaking' in physics, and is a very important concept since it is the same principle that 'endows' mass for particles in high energy physics."

Lau explained that a typical conductor has a huge number of electrons, which move around randomly, rather like a party with ten thousand guests with no assigned seats at dining tables. If the party only has four guests, however, then the guests will have to interact with each other and sit down at a table. Similarly, when BLG has only a few electrons the interactions cause the electrons to behave in an orderly manner.

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New quantum particle
Allan MacDonald, the Sid W. Richardson Foundation Regents Chair in the Department of Physics at The University of Texas at Austin and a coauthor on the research paper, noted that team has measured the mass of a new type of massive quantum particle that can be found only inside BLG crystals.

"The physics which gives these particles their mass is closely analogous to the physics which makes the mass of a proton inside an atomic nucleus very much larger than the mass of the quarks from which it is formed," he said. "Our team's particle is made of electrons, however, not quarks."

MacDonald explained that the experiment the research team conducted was motivated by theoretical work which anticipated that new particles would emerge from the electron sea of a BLG crystal.

"Now that the eagerly anticipated particles have been found, future experiments will help settle an ongoing theoretical debate on their properties," he said.

Practical applications
An important finding of the research team is that the intrinsic "energy gap" in BLG grows with increasing magnetic field. In solid state physics, an energy gap (or band gap) refers to an energy range in a solid where no electron states can exist. Generally, the size of the energy gap of a material determines whether it is a metal (no gap), semiconductor (small gap) or insulator (large gap). The presence of an energy gap in silicon is critical to the semiconductor industry since, for digital applications, engineers need to turn the device 'on' or conductive, and 'off' or insulating.

Single layer graphene (SLG) is gapless, however, and cannot be completely turned off because regardless of the number of electrons on SLG, it always remains metallic and a conductor.

"This is terribly disadvantageous from an electronics point of view," said Lau, a member of UC Riverside's Center for Nanoscale Science and Engineering. "BLG, on the other hand, can in fact be turned off. Our research is in the initial phase, and, presently, the band gap is still too small for practical applications. What is tremendously exciting though is that this work suggests a promising route -- trilayer graphene and tetralayer graphene, which are likely to have much larger energy gaps that can be used for digital and infrared technologies. We already have begun working with these materials."

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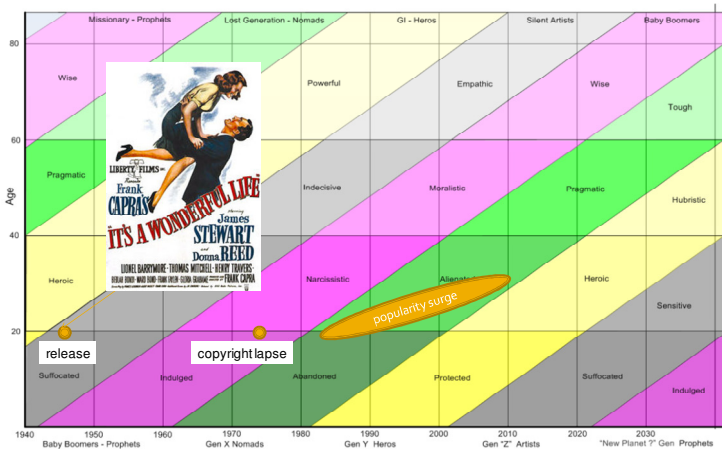
Generational Cycles – It's A Wonderful (Nomad) Life

Christmas time, for many, sees a compulsory viewing of the 1946 film, 'It's A Wonderful Life'. On many levels, it is the ultimate holiday season 'feel good' movie. That said, the film also carries a somewhat strange history. A history that sees it being far from popular for much of its existence. When it was first released, despite several Oscar nominations, the film lost money at the box-office and was declared a flop. Track forward to 1973 and, although the reasoning seems a little muddy, the film company appeared to let the film's copyright protection lapse. Despite being picked up and being shown regularly by the television networks greedy for free content, still it didn't prove to be popular. Spool forward again, this time to the mid 1980s, and the film enjoyed a sudden and enormous surge of popularity. Between Thanksgiving and New Year's Day, television stations everywhere aired it day and night. If your overindulgence at the office party drove you out of bed at 3 in the morning for something to soothe your stomach, you could wait for the antacid to work while watching (pick a channel, any channel) Donna Reed grin as Jimmy Stewart stammered, and the owls of December cooed you back into slumber.

A series of court decisions in the 1990s ended the period of unlimited telecasts; today only NBC is licensed to show it on a national scale. But by now, hundreds of thousands of homes have it on their VHS, DVD or Blu-ray shelves, ready for showing when anyone gets the urge. Although signs are again emerging that interest in the film is on the decline. Despite, no doubt, a certain cohort of parents insisting on inflicting it on their offspring.

So what's going on here? Thousands of other films have seen their copyright lapse over the years and they haven't become 'lost classics'. What did director Frank Capra get right with It's A Wonderful Life? Here's what the history looks like when plotted against one of our Generation shift maps:



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Without wishing to read too much into this – let's call it a 'hypothesis' – the image presents a pretty stark view that It's a Wonderful Life is a film that has developed a very strong connection to Generation X Nomads.

Why might that be?

Two things, we think. The first is that the film's main hero, 'George Bailey' is a classic (small 'n') nomad – a person who wants to go see the world, do exciting things and basically never settle down. Except. Without giving too much away for the half dozen people that might still not have seen the film, he never gets the opportunity to leave the small town of Bedford Falls where he was brought up. The responsibilities of life always work out to confound George's attempts to get on a train and leave town. Responsibilities to his work and then later his family.

Second, and perhaps even more important – especially coming in the wake of our earlier e-zine edition discussions about defining characteristics of the Generation X, Nomad, generation – is that George Bailey turns out to be the archetypal definition of 'not selling out'. He's basically a nice guy, an intelligent person, someone determined to do what is right rather than what will pay him a nice salary and give him an easy life.

Nomad generations are undoubtedly the most difficult ones to market to out of all four of the different Strauss & Howe identified archetypes (we've worked with several FMCG organizations over the last few years that have in effect decided to effectively ignore X'ers because they are so cussedly difficult to convince that they need your product). Neither Strauss nor Howe picked up on the 'not selling out' part of the Nomad DNA (possibly because they're both Boomer 'Prophets'). We think it just might be the key that unlocks the door to a lot of the intangible drivers of the generation. It's a Wonderful Life is part of the cultural DNA of Nomads. Subtly tapping into the George Bailey 'not selling out' DNA is, we strongly suspect, a great way to connect to the Alienated-becoming-Pragmatic emotional drivers of the generation.

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Biology – Golden Orb Web Spider

Ants. What a pest. Once you get them in your house it can be a real mission to get rid of them. But it seems the Golden orb web spider has developed a way to keep its home clear of the little critters. The secret uncovered by researchers from the National University of Singapore (NUS) and the University of Melbourne relates to a chemical compound the spider adds to its web that appears to repel ants. So not only are spider webs providing inspiration for better adhesives and stronger materials, they may also provide the basis for new, environmentally friendly, ant-repelling pesticides.

Golden orb web spiders are already in high demand amongst researchers due to the strength of their webs. The silk of this particular spider is almost as strong as Kevlar, and only a fraction of the weight. But NUS Associate Professor Daiqin Li was more interested in the possible ant-repelling nature of the spider's web after noting that, although ants were ever abundant near the webs of the orb web spiders, they don't typically end up trapped in the webs.

After observing spun webs and analyzing the compounds in the silk, the scientists soon discovered the mystery substance, which was later determined to be an alkaloid compound. Once discovered, scientists observed ants in the presence of the compound and discovered that they displayed evasive behavior whenever they came near the alkaloid.

"We found that large Golden orb web spiders add a defensive alkaloid chemical onto the silk, which stops the ants from walking onto the web when they come into contact with it," said Diaqin Li of Biological Sciences, NUS.

"The type of chemical deterrent found in the spider silk is known as a pyrrolidine alkaloid, which acts as a predator deterrent in many species of ants, moths and caterpillars," added Professor Mark Elgar from the University of Melbourne's Department of Zoology. "The orb spider is potentially vulnerable to attack from groups of ants while sitting in its web waiting for prey, so the chemical defense in web silk may have evolved to not only protect the spider, but to reduce the time and energy that would otherwise be required to chase away invading ants."

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The discovery offers the prospect of the development of a pesticide for keeping ants away from where they aren't wanted.

From a contradiction perspective, this is quite a simple one: the task at hand is the need to ward off predatory ants. From a 'what's stopping me' perspective, there are a number of things that the spider *could* do to defend itself and its web, but the fundamental to all of them is the amount of energy it has to invest in order to achieve the required level of safety. Here's how we might map that problem onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Safety/Vulnerability (38)

WORSENING PARAMETERS YOU HAVE SELECTED:

Energy used by Moving Object (16)

SUGGESTED INVENTIVE PRINCIPLES:

35, 12, 19, 1, 39, 24, 5

At the very least, the use of the pyrrolidine alkaloid pesticide represents a solid illustration of Principle 35, Parameter Changes in action. Perhaps Principles 24, Intermediary, and 5, Merging are also in evidence. It also vividly, we think, illustrates the main problem with the Inventive Principles and just about any chemistry-based problem. As a chemist, would we have got to the pyrrolidine alkaloid solution just by knowing Principles 35, 24, or 5? At best, we'd have to say it was a pretty long stretch.

Ultimately, while of course the golden orb web spider's evolved solution is yet another terrific example of the wonders of nature, from a TRIZ/SI perspective, it perhaps best provides an example of a 'new' (to human chemists at least) entry into a function database in the category called 'repel'. More likely than not, the Melbourne interest in the solution is, being the first ones to uncover it, they get to be the first ones to turn it into a commercial solution in other 'repel' problem situations.

Read more about the team's paper in the journal *Proceedings of the Royal Society B*.

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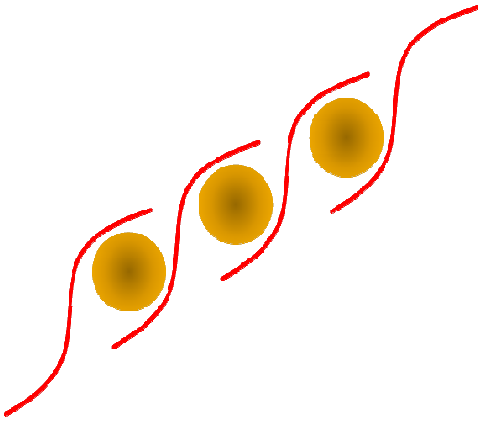
Short Thort

"All the best stories are but one story in reality - the story of escape.
It is the only thing which interests us all and at all times, how to escape."
A. C. Benson



News

Matrix 2010 (Japan)
We are pleased to announce that the Japanese edition of Matrix 2010 will be published in February, thanks to the generous translation efforts of Professor Toru Nakagawa and team, and the publication activities of our good friends at SKI. The book will be available from SKI in the coming days.

Whispered Voices (India)
We will be conducting a two-day public workshop in Ahmedabad, India on February 9-10. 50 places already filled, but anyone interested in attending should still be able to secure a place. Contact Darrell – the one conducting the workshop – for more details.

IMechE Engineering Management Seminar
We will be filling our annual spot at the big UK Institution of Mechanical Engineers young engineers 3-day jamboree. As in the past few years, the event will take place at the University of Keele. We will be there on April 20.

Cardiff University –Lean Enterprise Research Centre Conference
Darrell will be presenting a short session on the new Innovation Capability Maturity Model at the LERC annual conference, to be held in Cardiff on 26 June.

Recruiting
We are currently looking for smart, holistic software engineers if any readers happen to know anyone that might be interested. Contact Darrell in the first instance.

UK TRIZ Forum#4 - Reminder
The deadline for submitting titles for papers at the May 15-16 event is rapidly approaching. Please supply information to hannah@systematic-innovation.com.

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New Projects

This month's new projects from around the Network:

- FMCG – VoC study
- FMCG – VoP study
- Aerospace – ICMM benchmark and re-organisation problem-solve
- Metals/Mining – Problem-solving consulting projects
- Glass – ICMM benchmark and SI workshop
- Electronics – 'B2B intangibles' sales strategy development
- Electronics – new product concept design study
- Metals/Mining – 'business' problem solving projects
- White Goods – next generation product design scenarios study
- Conglomerate – Business Model Innovation workshop

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