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.

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

The Oversell/Undersell Paradox

Here's one of those case studies where defining the right problem turns out to deliver more than half of the solution. Those of us permanently caught in the world of TRIZ/SI know that we're supposed to be constantly on the look-out for conflicts and contradictions. Some, however, are more obvious than others.

The specifics of this case aren't so important. In fact, in order to make the case as generically relevant as possible, we might simply think of it as 'a' project to get an already created new product concept into its intended market in the most effective manner. We might even think of it as a key problem in the TRIZ world – where, despite being the most powerful method in the world, it still fails to gain any significant traction beyond a cult-like band of followers. We were using a version of the Gartner 'Hype Cycle' model with the client as a means of describing some of the trials and tribulations of presenting the world with new ideas. They were at a particularly crucial stage of an innovation project – both internally, and with regards to their intended lead customers – and we were using the Cycle to explore where they actually were, and what they should be planning in the coming weeks and months in order to secure the most appropriate launch of their new offering. The basic Hype Cycle model is reproduced in Figure 1. We have discussed the model in previous issues of the e-zine (Issue 85, April 2009), and used it often to think about a range of different projects. But we'd never thought about the question a delegate in this particular session asked:

"if over-selling an idea creates a 'trough of despondency' backlash, why not just prevent over-selling?"

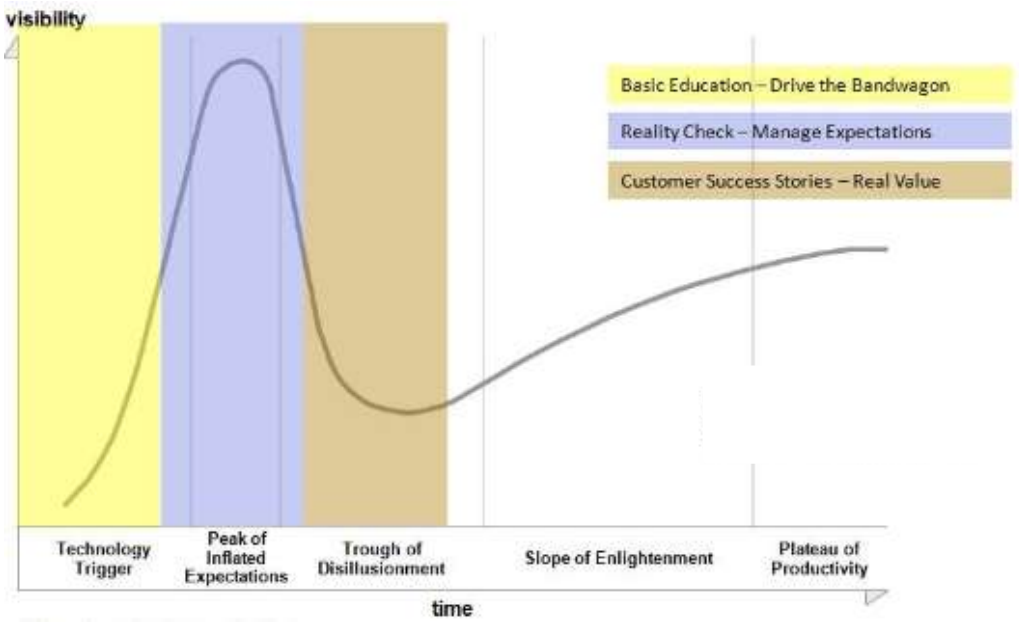


Figure 1: Gartner Hype Cycle

In an ideal world, we might surmise that we ought really to present the world with just enough visibility of our new 'x' to match what it's actual capability merits. Crudely speaking, if capability increases relatively linearly over time, then visibility should track it in a similar way such that it is always at an 'optimum' level. In many ways, the last but one stage in the Gartner Cycle ('slope of enlightenment') is where actual capability and

visibility begin to coincide. In the phases prior to the start of this slope, we get an oscillating over/under mismatch of a sort shown in Figure 2.

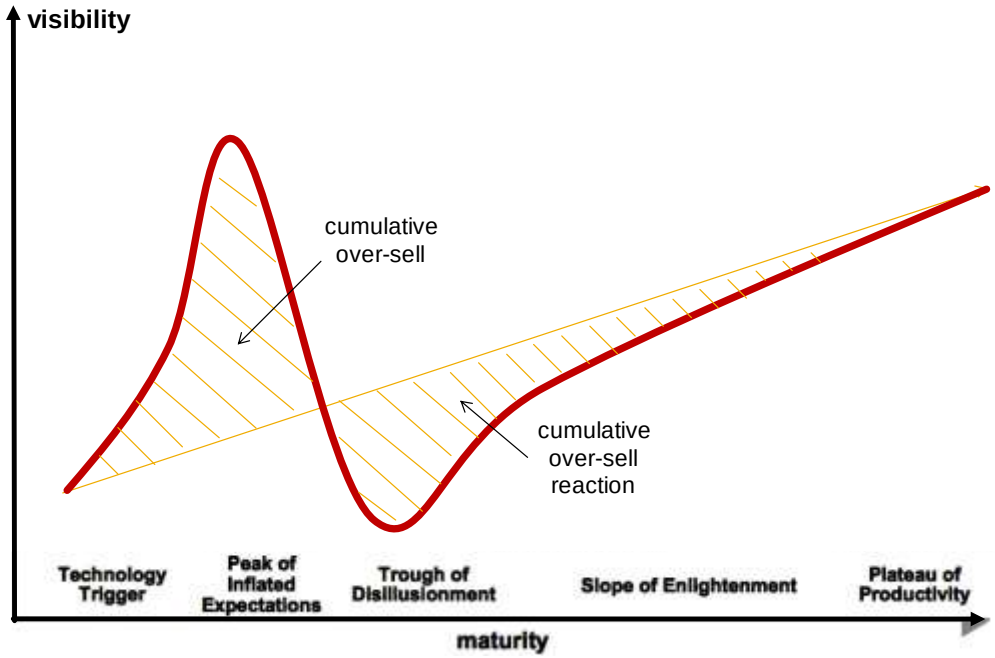


Figure 2: Actual Versus Merited Visibility

As shown in the figure, the over-selling of an idea creates a bubble that has to somehow be deflated without killing the idea completely. The figure represents a subtle contradiction, but this whole idea that we might somehow be able to calculate and maintain some kind of 'optimum' level of selling of a new idea, certainly when expressed in that way, immediately becomes an obvious one. Expressed as a physical contradiction, the idea of an 'optimum' suggests that we need to find the right balance between under-selling and over-selling. Here's what the problem might be expanded to look like using our conflict-mapping template:

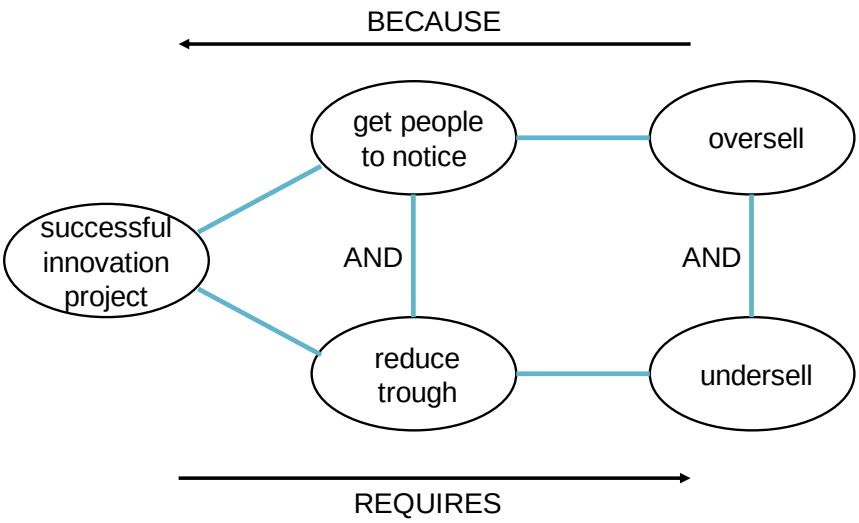


Figure 3: Under/Over-Selling Contradiction

The moment we are able to express a problem as a contradiction in this way, we know, of course, that we are in a position to start tapping into the ways and means that other

people have resolved similar situations. Figure 4 illustrates the outcome when we map the central conflict pairing (we want people to notice, and we don't wish to create a trough of despondency) onto the business version of the Contradiction Matrix:

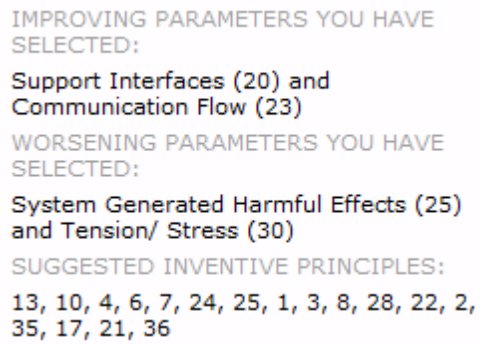


Figure 4: Solving The Under/Over-Selling Conflict

Having obtained some Inventive Principle suggestions, it was possible to make a rapid transition into idea generation mode:

The presence of Inventive Principle 13, The Other Way Around' at the head of the list of Principles used by others to resolve similar problems was quite a surprise. It is often a very powerful solution trigger since it forces users to effectively turn the box they're in inside-out, but on the other hand it usually offers solution directions that are so radical that teams are either unable or not brave enough to give them a try.

Given that we had started this particular project with the Gartner Cycle model, one of the first connections we made to Principle 13, was whether we could somehow turn the whole Cycle the other way around. Rather than telling the world about the new solution, in other words, maybe the right thing to do was to make it completely invisible?

There is nothing new in such a strategy of course. It was, for example, central to Steve Jobs' means of launching every new Apple product: keep it a fiercely guarded secret up until the moment of launch when, hopefully, you've got all the bugs ironed out and that people recognize it's innate 'insanely great'ness.

All well and good when you already have a reputation (Inventive Principle 10?), but what about when you don't?

Here we might choose to look at possible combinations of the Other Way Around strategy with other of the Inventive Principle suggestions. With the client on this project, for example, we obtained a lot of mileage out of the idea of segmenting the intended customer-base into the usual innovator, first-adopter and early-majority categories and successively telling each group that they 'couldn't have' the new product. And that 'they weren't ready for it'.

This, of course, plays on another commonly observed human phenomenon: tell people they can't have something and they tend to want it even more. It doesn't work with everyone, and it needs to be played differently for the innovators relative to, say, the early adopters. Telling the early adopters that they're not ready for the product will tend to alienate if they get their hands on one and it doesn't meet expectations. With the 'innovator', on the other hand, openly telling them that the product 'won't meet their standards' yet and that you're looking to work with an exclusive bunch of beta customers to improve it, and that they're 'not able' to do that job is an almost guaranteed way of

getting people frothing at the mouth wanting to be a part of your team. Rather like Tom Sawyer's fence whitewashing skills.

Well, it seems to be working for the client in question. And, thinking about it, a few recent experiments using the approach with TRIZ/SI seems to be producing some intriguing results too (for example, one or two people who won't be able to read this e-zine – at least for a few months – because we've told them they can't subscribe (projecting forwards a few months, for the benefit of those non-readers: 'sorry, and thanks for being part of the experiment')).

Not that these are the only ways to solve the problem by any means. The whole point of mapping the problem as a contradiction is to first recognize the importance of looking for good ones. And then being able to tap into the brains of thousands of people who've been on a similar journey before us.

Trend: Brain Time

"Put your hand on a hot stove for a minute, and it seems like an hour.
Sit with a pretty girl for an hour, and it seems like a minute.
THAT'S relativity."
Albert Einstein

"It took me 25 years to work out what that song was about."
Bob Dylan
On one of his own compositions.

Back in the June edition of the e-zine, we introduced a new Trend of Evolution – or rather one that we had newly uncovered – looking at humans and physical proximities (Issue 111). This month we examine another newly-uncovered trend relating to non-linearities in human behavior, this time one relating to temporal rather than special phenomena.

First-up, imagine you are walking along a street and ahead of you is the scene depicted in Figure 1. What do you think you will do next?

Figure 1: What Will You Do Next?

The answer, of course, will largely depend on your context. If you're dressed in the same way as the people in the picture, your first reaction is likely to be 'friend'. If not, it's much more likely to be something along the lines, 'uh oh', closely followed by, 'could I subtly cross the road without them noticing?'

Whatever your specific reaction was, one thing for certain is that it appeared almost instantaneously. And then, not far behind came the second. One that we would most likely consider to be a more 'rational' one.

What we are experiencing here are what we might think of as two distinctly different types of 'time'. As such they represent the first two in what we believe to be four distinctly different time modes as may be found in the way the human brain operates. Each might be considered to be different 's-curves', and as such, we might in turn say that they represent the various stages as may be found in our collection of discontinuous (TRIZ/SI) Trends Of Evolution.

We think the overall ‘Brain Time’ trend looks like the picture shown in Figure 2:

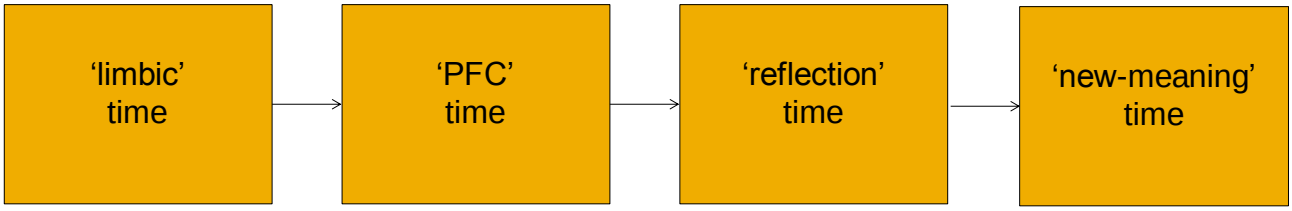


Figure 2: ‘Brain Time’ Discontinuous Trend Pattern

The first two stages are determined by the anatomy of our brain. As humans evolved, the brain became substantially larger as our frontal and prefrontal lobes appeared and then, over evolutionary time, became increasingly distended. Our ‘ancient’ and limbic brain is the equivalent of the brain found in most life-forms that possess a brain. It’s where we get out ‘first reactions’ from. It’s where we make those crucial and potentially life-saving ‘fight-or-flight’ decisions. We don’t have time to rationalize these decisions; rather we need to make the fastest possible decision that will maximize our chances of continuing survival. These ‘limbic’ time’ decisions are typically made in something a shade under half a second. Or rather, we might better think of our limbic brain as an instrument for predicting what is going to happen in the next half second. ‘Limbic time’, in other words, is all about decisions that we tend to ascribe to ‘gut reactions’.

In terms of one of our favourite quotes of all time (‘a man makes a decision for two reasons: the good reason and the real reason’, J.P.Morgan), we make all of our ‘real reason’ decisions in limbic time.

We then shift to the discontinuously different type of time during which we make our ‘good’ decisions. Good, in the sense meant by the rather smart Mr Morgan, is where we rationalize the merits or otherwise of our gut reactions. Such rationalized decisions are discontinuously different to the ‘real reason’ limbic time decisions, because they are made in a physically different part of our brain – the pre-frontal cortex (PFC). The evolution of this ‘rationalising-brain’ was one of the primary reasons for the emergence of humans as the dominant life-forms on the planet. Being able to effectively pause for a moment before reacting to our limbic-time decisions is both a great social benefit, and also, thinking back through evolutionary time, a great way to out-think a predator or prey that could only think in limbic-time.

As shown in Figure 3, it is brain anatomy that determines the first two of our four-stages of ‘brain time: we make our gut reaction, 0.5 second, limbic-time decisions in the oldest part of our brain, then switch to what we have called ‘PFC-time’ when we make our pre-frontal cortex derived rationalized decisions. If limbic time is measurable in fractions of seconds, PFC time is typically measurable on whole numbers of seconds. On average, around 2 seconds. (As an aside, the recently discovered phenomenon of ‘facial coding’ works on the basis that you can best assess what a consumer *really* thinks about your new product by analyzing the micro-expressions that appear on their face in the first second of their exposure to the product, rather than anything they might say during an interview or any expression that appears on their face after the PFC has done its job. Facial-coding, in other words, is a really good way to separate limbic-time from PFC-time.)

So much for the first two of our four stage Trend pattern. What about the other two? These are less distinct, at least in terms of precisely how much ‘clock-time’ they operate over. That said, given that our Trends are all about discontinuous jumps, they both represent what we think are two very clear discontinuous jumps.

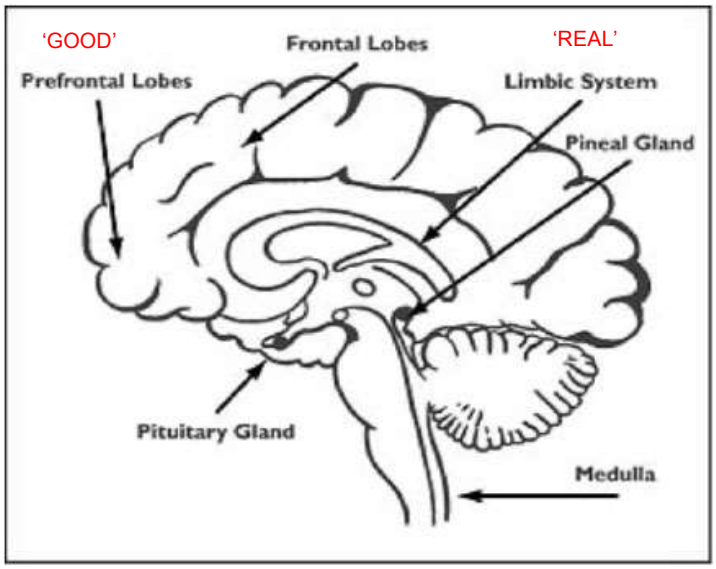


Figure 3: Brain Anatomy And 'Good' Versus 'Real' Decision Making

The first of the two, and the third stage in our Trend, we have labeled 'Reflection Time'. Take a look at the insurance industry, for example, and notice the – usually these days, legal – requirement for a 'money-back' time allowance. Or think about the importance of incubation in and after any idea generation session.

Both hint at the fact that the brain sometimes needs an amount of time to fully assess the implications and consequences of a decision. What is happening here is that, thanks to our abilities to imagine possible futures we have a propensity to build (consciously or otherwise) *scenarios* representing different possible futures.

Again, the precise time needed to adequately do this job (the time before 'the answer' sometimes magically seem to appear inside our head) depends on the specifics of a given situation. According to most insurance policy law, the period may be up to 28 days. Read interviews with Nobel prize-winners and they will frequently describe the torment of possibly months or even years of incubating a good problem. Whether it turns out to be overnight or a year, 'Reflection Time' is a brain decision making mode that is distinctly different to limbic or PFC activities, being instead about imagination and scenario building and testing.

For a while, we thought that 'Reflection Time' was the final step in the Trend sequence. We knew also, however, that Clare Graves psychology work on Spiral Dynamics and our insight that the information inside our brain is periodically re-organised according to the emergence of new problems and our resolution of those problems. Each of the Spiral levels, in other words, sees a significant re-organisation of our worldview. A Level 4, Order, thinker, for example, sees no ambiguity in the world, believing that there is only black-or-white. A dawning realization that there are always rules that can be bent and options that appear as a result creates a profound shift in thinking style. As such, we now believe these Spiral Dynamic level 'jumps' represent a distinct fourth stage in the Trend sequence.

As with the 'Reflection Time' stage, it is difficult to put a clearly defined clock-time window on how long the discontinuous shifts triggered by the emergence of 'the next' Spiral Level in a person will take, what we do know is that each time we solve a problem at one Level and create the capability to think at the next Level, there are clear shifts in the way that the information in our brain is organized. Graves talked about 'Vmeme's as a way to describe

these fundamental worldview shifts. As far as our trend is concerned, we decided that the expression ‘New Meaning’ Time was a more useful descriptor.

In no small part, we think the word ‘meaning’ is the right one to keep in mind when using the Trend, since – per the Bob Dylan quote at the top of this article – when our worldview shifts, what has actually shifted is the meaning content of the knowledge inside our heads. Put another way, to take a lead from another human psychology sage, Edward Matchett, think about a possession that is dear to you. A favourite mug or shirt. You most likely cannot elicit why that thing is meaningful to you (a lot of ‘current meaning’ is driven by Limbic Time decision-making – ‘love at first sight’). The day you work out what is actually making that thing meaningful in your mind is the day you create the ‘New Meaning’ as named in the fourth of the Brain-Time Trend stages.

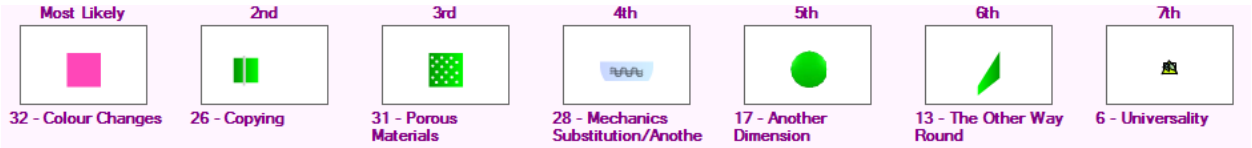
Having unraveled what we think is the big-picture ‘brain time’ pattern, next month we’ll explore some of the implications when it comes to innovation and particularly product design.

Humour – Principle Gift Ideas

Many of our readers will be looking forward to the upcoming gift-giving Christmas celebration. A fair proportion will no doubt also be feeling the first twinges of dread at the thought of the annual attempts to work out what to buy for their nearest and dearest. Well, at last some good news. No need for any more head-scratching procrastination about which Metallica CD to get Auntie Rosemary: simply let the Contradiction Matrix do the heavy lifting for you.

Here's the problem. We want to get people nice stuff, but we don't know how to find it:

And here's how other people have already solved the problem for you:



Now all we need to do is turn the generic into the specific. Here are a few winning suggestions for you to bear in mind:

Principle 32 – Colour Changes:
(Awesome colour change umbrella – so you know when it's raining. Err. Way better than checking in with the Weather Channel. Or looking out of the window.)

Principle 26 – Copying:
(in gift-buying terms, this could be interpreted as getting everyone the same thing you got them last year. Not so helpful. Maybe, instead, you could go with this option: ('replace a fragile object with a copy'?))

(sperm bank, just in case you need a little help)

Failing that, try this:

Principle 31 – Porous Materials/Holes:
An unbeatable bubble-wrap calendar. The ultimate test of will-power: can you really stop yourself from popping only one bubble a day?

Or, for our new-mum readers, who among you could resist this (it's called a 'peekaru' in case you want to get one):

Principle 28 – Mechanics Substitution/Another Sense:
(a difficult one. Easier once we allow ourselves to focus on the five senses and adding anew one to an existing product. We particularly liked:)

Principle 17 – Another Dimension:
(Any spectacle handles that bend in one direction, really ought to have a geometric feature bent in a second direction too. Especially if you're short of a bottle-opener.)

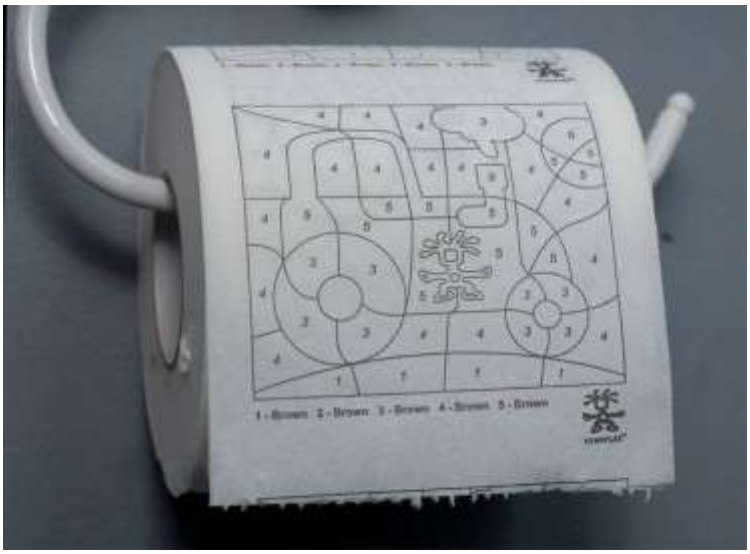
Or, how about the 'use another side' interpretation of the Principle:

Put the pattern on the bottom of the mug. Doh! Why didn't we think of that one?

Principle 13 – The Other Way Around:
(in gift-buying terms, this could be interpreted as getting everyone to buy their own gift. Or you could go with this option:)

Store your beer in a belly! Genius.

Principle 6 – Universality:
(Probably, if we're being honest, our favourite of the bunch):



Happy holiday!

SYSTEM ·ATIC INNOVAT· ION

Patent of the Month - Self-Stratifying Coatings

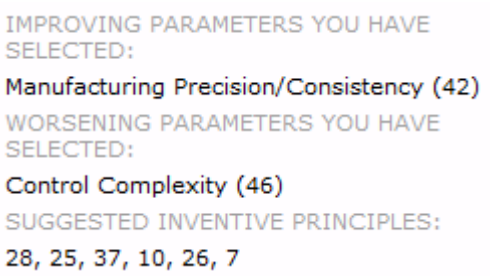
Our patent of the month this month takes us on a rare foray into the automotive world. US8,044,140, was granted to inventors at Toyota and East Michigan University on 25 October. Here's what the inventors have to say about the problem they wished to solve:

Coatings for transportation means, such as, for example, motor vehicles, airplanes and rail-mounted vehicles, may combine both functions of decoration and protection. In many circumstances, the coatings are developed to withstand extreme demands with respect to corrosion protection, scratch resistance, optics, coloring, chemical resistance, and resistance to other possible environmental effects.

Currently, coatings such as composite paints may comprise at least one multifunctional layer. For example, a composite paint such as an automotive topcoat may contain a basecoat (e.g., color coat) which is applied separately and before the application of a separate clear-coat. The functions of the top layer may include protecting coating pigments from the elements of weather, providing scratch and mar resistance, and providing gloss and the depth of field.

Typically, coatings may comprise additional constituents including pigment dispersions used to impart color. Conventional pigments utilized may include titanium dioxide (TiO.sub.2), graphite, and carbon black, for example. In producing known pigmented coating compositions, particularly in multi-layered compositions, it is uncertain whether the pigment dispersion may segregate in a particular layer or be found throughout the coating. In certain applications, it may be desirable to produce a pigmented top or intermediate film layer within a composite paint. Thus, a need exists for methods to control the location of pigments within self-stratifying or self-layering coating compositions.

From a contradiction perspective, the desired outcome – 'control the location of pigments' – is prevented by the absence of a method ('…a need exists for methods to control…'). Here's how we might best map that conflict pair onto the Contradiction Matrix:



The first thing to note from the output obtained from the software is that the inventors aren't the first to think about a 'self' solution to the problem – Principle 25, Self-Service, being the second most frequently used strategy to solve the problem.

More important, then, is how to achieve the self-stratifying effect. Paying due attention to the other Inventive Principles suggested by the Matrix (especially 28 and 37!), here's what the inventors have to say about how they solved the problem:

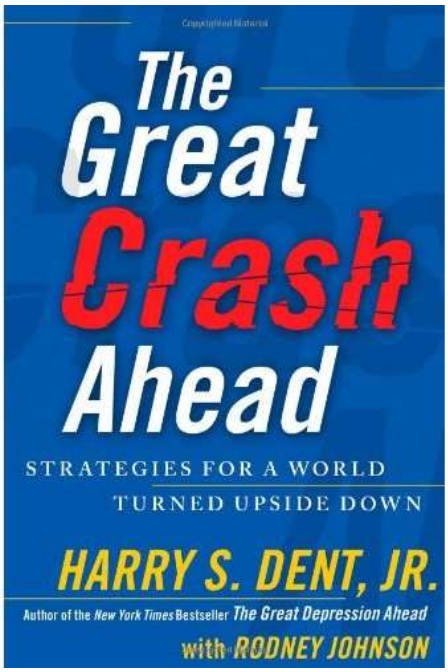
…The present disclosure describes compositions and related processes that may enable the location of a pigment within layers of the composition to be controlled based on the amounts of coating composition components utilized (to be discussed below). The self-stratifying or self-layering compositions discussed herein may result from the selective phase separation of several mutually incompatible (practically partially compatible) single-phase resins, solvents, layers, components and/or additive blends upon application and curing.

Self-stratifying coating compositions described herein may allow the formulation of solvent-based composite systems based on blends of thermosetting polymers to produce micro-heterogeneous polymer/crosslinked polymer composites that separate into a predominately double-layer coating structure. A ***selective chemical reaction*** *may occur between and among the coating composition components, examples of which include a polyol, a silsesquioxane, a polyurethane dendrimer, a crosslinker, and a pigment, as a function of time and temperature. While in liquid form, the components may form a homogeneous solution and may not be crosslinked. Also, preferential migration of certain components may occur upon curing forming a stratified coating.*

The manufacture of self-stratifying coating compositions may be the result of either mutual or partial incompatibility of the composite resins (e.g., resin solid). The resins may separate into discrete phases or layers as a result of various properties, such as ***differing surface tensions****, when they are emulsified or dispersed in a particular solvent. Due to selectivity in using certain components with varied properties such as surface tensions, the composition separates into at least two distinctive layers upon curing. The stratification of a homogeneous one-phase coating into two layers can result from removal, such as by evaporation, of the solvents* (i.e. introduction of a field) *which keeps the system of otherwise incompatible components in thermodynamic equilibrium. Furthermore, due to preferred and time/temperature selective crosslinking reactions among the polymer units which result in molecular growth, the equilibrium shifts and the system phase separates into two distinct layers.*

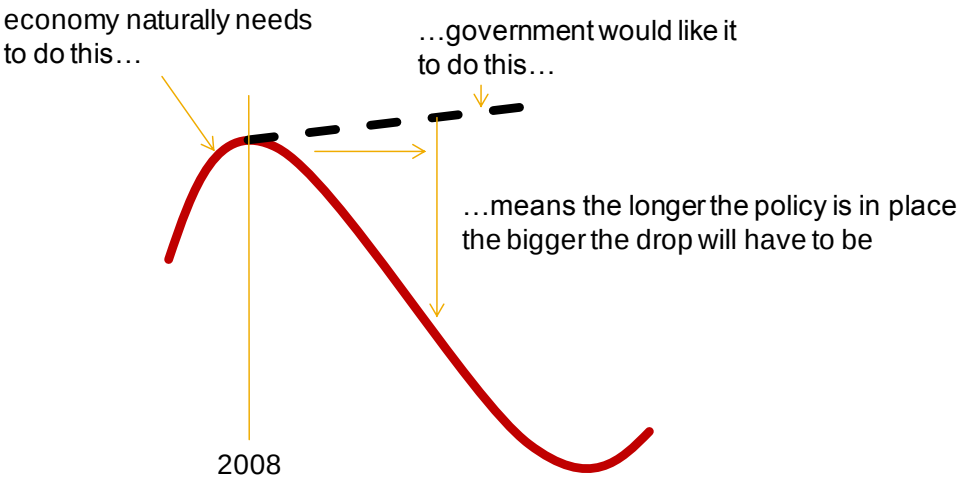
Details of how the inventors achieved their solution aside, assuming it does what it purports to do, we think this is one of the most elegant examples of a ‘self’ solution we’ve seen all year.

Best of the Month – The Great Crash Ahead



Even the most cursory of glances at the titles of maverick economist Harry Dent's last three books reveals a tale of a United States falling in to a downward spiral. The Great Boom Ahead, turned into The Great Depression Ahead, which has now, following the October publication of the third in the trilogy, The Great Crash Ahead. Oh dear.

The key insight of the first two books was that economics largely boils down to 'people spending money': if there are more people, more money is spent; if there are less, less money is spent. While The Great Crash Ahead follows the same basic logic, it adds the key additional thesis: if the economy is on a naturally downward trajectory and the government tries to artificially stop it from doing so, tension inevitably builds until the point where things have to choice but to go 'bang':



Which, of course, is basically what has happened in the US and Europe since the first global financial crisis in 2008. Governments like growing economies with low (but positive) rates of inflation. When the primary means of controlling inflation (controlling interest rates) no longer works, the only known recourse is to start printing money. More scientifically

known as ‘quantitative easing’, Dent’s compelling hypothesis is that the printing of hundreds of billions of dollars in the last 2 years has done nothing but made the required reduction in the size of the economy into a cliff edge that we will sooner or later have to fall off. Printing money doesn’t solve problems, it merely moves them to a later date.

Regarding the precise date of the US’s precipitous Crash, Dent predicts somewhere before the end of this year and the early part of 2013, with the most likely time being some time during 2012. Whenever it is, the basic idea is that the later it occurs the bigger the Crash will be.

While Dent does a very effective job of not repeating the same method descriptions and models of his previous books, it also feels clear reading this (as ever eminently digestible) tome that this time the publication deadline clock was ticking to an extent that the book had to be published before all the i’s had a chance to be dotted and the t’s crossed: fundamentally, in other words, a book with this title has to come out before the crash happens if it is to have any predictive pull. Which is another way of saying there are quite a few annoying little mistakes and several that feel like quite big ones.

Not that this should prevent anyone from picking up a copy. That Dent continues to run against the vast tide of ‘cautiously optimistic’ economists should be enough to recommend his work as an ‘alternative’ perspective for scenario planning purposes. That the book contains a series of recommendations and strategies to help readers turn the forthcoming ‘winter season’ (a great analogy to the four seasons that runs through the book) into one that will carry the least pain, and ensure the best opportunity to be able to benefit from the inevitable ‘spring’ season that will be upon us during the first half of the 20s.

Conference Report – 2011 Mauritius Leadership Annual Gala Dinner

"I am pleased to be invited as the guest of honour for this 3rd Annual Leadership Gala Dinner, and to be among this large gathering of senior Management and Leaders from some of the largest institutions in Mauritius and the region.

"I understand Mr Tan Chee Peng has been collaborating with UTM for the past 5 years in conducting Project Leadership Commando training, and your presence today is a significant indicator of the success of this Leadership programme, which has attracted more than 600 attendees from 21 African, European, USA and Asian countries to our Mauritian shore. After 5 years and still counting, PLC is by far the longest running international leadership programme in Mauritius and its longevity is in itself a testimony to the high quality of the programme and its delivery.

"The theme for to-night's dinner being innovation, I would like to share a few thoughts with you. Innovation is about new thinking and new ways of working. Innovation brings about new processes, products, services, business models and makes things possible for a better future. The modern conveniences that we enjoy today are fruits of innovation of leading thinkers and organisations around the world. Innovation is also the strategy for organisations and countries to reinvent themselves. Take for instance, the iPod and iPhone. These products made Apple the most valuable technology company by reinventing music players and mobile phones. Countries such as South Korea are surging ahead by relying on their innovative companies such as Samsung.

"You will be pleased to know that Mauritius is ranked first in Africa, slightly ahead of South Africa, in The Global Innovation Index 2011 which is commissioned by INSEAD, the global leading business school based in France. However, we should not be satisfied with this achievement as we have to compete with the rest of the world, not just in Africa. We rank 53rd among 125 countries in this global benchmark.

"The good news is that there has been enough research done throughout the world on innovation and we now have systematic approaches at our disposal. The only question which remains, is whether we are willing to commit ourselves to this journey of advancement."

So said the President of Mauritius during his keynote address at the prestigious Leadership Institute dinner held at one of the island's best hotels on October 21. The event came as the very impressive end to a week of meetings and workshops with many of the 400 leaders in attendance at the dinner. We also had the opportunity to present a keynote address at the dinner – our theme of Systematic Innovation (surprise!) – fitting somewhat wonderfully with the President's words. Rumours that we were able to encourage him to use the words 'systematic innovation' in his speech by getting ourselves a place at the same table are wholly unfounded. Mostly unfounded.

Really, the whole week was a revelation in terms of a country interested in finding a new role in our rapidly changing world. Everyone we met was keen to engage in the innovation topic, and several were interested enough to ensure that we make a return visit early in the new year. With a population of around 1.3 million people, we're wondering if what we have here is the perfect size in terms of being small enough to safely incubate new things and simultaneously big enough to make some real differences. Where else on the planet do you get to have dinner with a President and all the countries leaders in one ball-room?

Indeed, the only missing piece in the jigsaw was a photographer to snap a picture of Darrell at the President's table. Or even one of the First Lady warning Darrell not to eat the chillies. Damn.

Find the Right Honourable President's full speech at:

http://www.gov.mu/portal/site/president?content_id=2ea2c61b19283310VgnVCM1000000a04a8c0RCRD

Investments – Nest Thermostat

Tony Fadell, a former Apple executive who led iPod and iPhone development from 2001 to 2009, helped transform consumer products used by millions of people. Next up: the humble household thermostat.

A boring wall fixture and an unlikely target for innovation? Not to Mr. Fadell, his team of 100 computer hardware and software experts and the venture capitalists backing his Silicon Valley start-up, Nest Labs. They see the conventional thermostat as a dumb switch that can be changed into a clever digital assistant that saves homeowners money and reduces energy consumption and pollution.

“We’ve built the world’s first learning thermostat — a thermostat for the iPhone generation,” Mr. Fadell said.

Nest Labs, based in Palo Alto, Calif., and founded last year, is announcing its offering on Tuesday, and plans to begin shipping the $249 thermostat by the middle of November. Outsiders who have tried out the product are impressed by its stylish design, ease of use and advanced features, like motion-tracking sensors that detect whether people are present and adjust room temperatures accordingly. But it remains to be seen whether consumers and contractors will pay more for a high-tech thermostat, when good enough has been good enough for decades.

There are other digital thermostats on the market, like the Honeywell Vision Pro and the Filtrete by 3M. Yet they have been slow to catch on, and their features often go unused because they are ungainly and people find them difficult to program, said Russ Donnici, president of Mechanical Air Service, a heating and cooling contractor based in San Jose, Calif. By contrast, the Nest product is small, and temperatures are set by turning its outer ring and pushing in the ring until it clicks.

The project “kind of brings the thermostat into the 21st century,” said Mr. Donnici, who has advised Nest Labs without pay.

But the Nest device costs twice as much as the most comparable programmable thermostats on the market.

Homes account for more than 10 percent of the total energy consumption in America, including transportation. About half of the residential energy consumed is for heating and cooling, with the rest going for lighting, heating water, appliances, televisions and

computers. Each degree cooler a house is kept in a heating season (winter), or warmer in a cooling season (summer), translates to a 5 percent energy saving. So shifting consumption patterns, say, four degrees on average can mean energy savings of 20 percent, experts say.

Since the average home spends $1,000 to $1,500 a year on heating and cooling, that would translate to $200 to $300 in lower energy bills. It would also mean fewer power plants built and lower carbon emissions.

After leaving Apple, Mr. Fadell traveled with his family for most of a year and began building an energy-thrifty “green” home in Lake Tahoe, Calif. As part of that project, he looked at thermostats and found them lacking in design and utility. “They’re ugly, they waste energy and there’s been no real innovation in decades,” he said.

Mr. Fadell studied the technology and the industry and decided there was an opening. His first recruit was Matt Rogers, who at the time led a staff of 30 engineers in the iPod division at Apple. They met to discuss the idea in October 2009, Mr. Rogers was intrigued, and in May 2010, he became a co-founder of Nest Labs.

“I loved my job at Apple, and had a great team,” Mr. Rogers said. “But in essence, we were building toys. At Nest, you can build a product that could have a huge impact on a big problem.”

The Nest Labs recruits hail from Apple, Google, Microsoft, Twitter, Logitech and other high-tech companies. Unlike other thermostat manufacturers, Nest Labs has a sizable team of specialists in the branch of artificial intelligence called machine learning, including Yoky Matsuoka, who came from Google and whose work won a MacArthur Foundation award.

Nest Labs has also attracted a crowd of venture investors. The start-up will not say how much it has raised, but the backers include Kleiner Perkins Caufield & Byers, Google Ventures, Lightspeed Venture Partners, Intertrust, Shasta Ventures and Generation Investment Management, an investment firm co-founded by Al Gore.

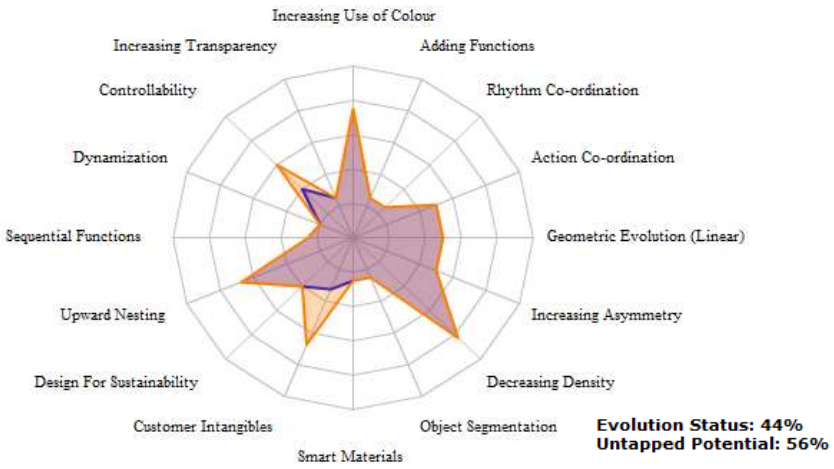
Despite the high cost of the Nest device, Mr. Fadell contends it will pay for itself in a year in energy-savings, with scant effort from the user.

At first, a person may set the thermostat four times in one day — upon getting up, going to work, getting back from work and going to bed. The thermostat uses those settings daily, then adapts to further changes. If a person is out of town each Monday on business, the Nest sensors detect that and switch to an “auto away” setting for lower energy use. “You can, but you don’t have to program it, because it learns,” Mr. Fadell said.

The Nest thermostat will initially be available on the company’s Web site and through Best Buy’s site. Consumers can install it themselves or hire a professional. The company is also working with contractors, which distribute 70 percent of thermostats sold.

An estimated 10 million thermostats a year are sold as replacements and in remodeling. A few percent of that market, Mr. Fadell says, would make Nest Labs a winner. Yet to break through, analysts say, the company must alter the buying habits of consumers, retailers and contractors in an industry unaccustomed to Silicon Valley-style disruption. “Complacency is the biggest challenge,” Mr. Fadell said.

Looked at from the perspective of Evolution Potential, the Nest thermostat represents a pair of very simple (predictable!) jumps relative to incumbent thermostats:



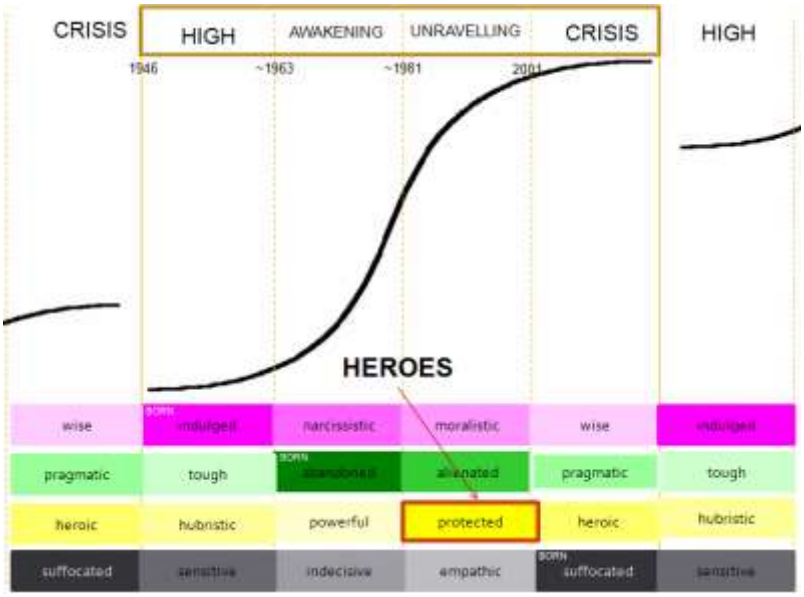
The first is the jump along the Controllability trend from ‘feedback’ to ‘adaptive/learning feedback’. The second – notice how the article makes copious connections to Apple and Apple products – is all about tapping in to some of the inherent intangibles that have somehow managed to attach themselves to the brand. Which of the two turns out to be the more significant, or indeed whether the two together will turn out to be sufficient to make Nest into a commercial success, will no doubt be revealed in the coming months. We’ve put our answer in a sealed envelope marked, ‘not to be opened before March 2013’.

Generational Cycles – Protected Heroes

This article continues the series of sixteen Generation-related articles, each taking a closer look at each of the four main phases of the four main generational archetypes. This month is the turn of the Protected Hero. Also known as Generation Y, they are now all in their Heroic stage, and in this article we take a closer look at their childhood:

		0-20	21-41	42-62	63-83
(Generation Y)	HERO	protected	heroic	hubristic	powerful
(Silent)	ARTIST	suffocated	sensitive	indecisive	empathic
(Boomer)	PROPHET	indulged	narcissistic	moralistic	wise
(Generation X)	NOMAD	abandoned	alienated	pragmatic	tough

The Protected Hero spent their 1-20 age in an 'Unravelling' period in (Western) world history. Life is reasonably good as they grow up, but as they approach and begin to enter adulthood serious warning signs start to disrupt their protected lives. The previous Hero generation began to come of age during the inter-war period. By the time the first half had reached the age of 20, Hitler had been sworn in as Chancellor in Germany. Within 6 months, Hitler's Nazi party were the only legal political party in Germany.



These Protected Heroes were raised by Alienated Nomads, and to also to an extent with this most recent generation, given the rise in marriage age, Moralistic Prophets. Nomads as a whole were determined not to let their children grow up feeling abandoned in the same way as they, the latch-key kids did, and the Prophets have moved on from their Narcissistic stage. Childhood becomes a very different thing to what it was for the previous generation – those Heroes born 1901-1925 are less governed by the notorious saying "children should be seen and not heard". And the more recent generation have benefited from increased child safety awareness – seatbelts on rear car seats became compulsory by law, and infant and bolster seats started to become available. However it wasn't until the current Suffocated Artist generation started to be born that infant and bolster seats started to be required by law in various countries around 2003.

Here is a list of the general characteristics generally found across the Protected Hero cohort. As per our usual convention, if you're a Heroic Hero reading this, these statements don't necessarily apply to your childhood personally (*your* character is determined by how *your* parents raised you), rather they are what may be observed when we step back and look at the cohort as a whole:

- high expectations
- ask and ye shall receive
- removed from menial domestic/manual tasks
- 'little princess on board'/'cheeky monkey on board'
- highly confident due to continual receipt of positive feedback
- eager to work hard and earn place in word, but unfamiliar with both hard work and the world (especially the world of work)… plus have often seen their parents working hard and still having to endure periods of unemployment and recession
- directionless ambition
- cheerful, positive, optimistic and open-minded
- trusting to the level of gullibility (never been taught things from first principles)
- social media dominates life… happy to reveal personal details other generations find astonishing… from primary school age
- self image: "I am the best, I am different"
- little experience with failure (and usually bailed-out by parents when things go wrong or cushioned by educational system)
- rarely told they are 'wrong' (teachers of this generation were en masse told that red pens and competitive sports unduly stigmatised children of this generation)
- little concept of 'boundaries' – so when they reached teen years frequently found themselves in trouble with authorities…
- …with parents, again, likely to come to their defence
- easily bored due to constant available entertainment (TV, games and internet) during teenage years
- highly scheduled lives (especially extra-curricula education/hobby activities)
- very internet savvy… the first generation to have Internet as a significant part of life
- peer-oriented (on good terms with a large number people their own age)
- peer relationship with parents/teachers (first names commonly used)
- disposable income (from parents) leads to brand conscious
- anything is possible (especially since it is easy to convince parents of most things)
- fast-food and eating-out the normal/expected way of life
- no learning curve, impatient
- rampant multi-taskers
- love positive feedback, difficulty dealing with negative (limited experience)
- their own perception of maturity is very high ('12 is the new 19')
- desire for (rapid) fame… no concept of 'paying dues'… X-Factor/Idol/Reality-TV as 'normal' routes to fame and success

Some are the same as those of the Heroic Hero (issue 109, April 2011), others can be directly traced as having lead to different traits as the Heroes started to explore and understand the world they live in.

Particularly useful Hero archetypes, with currently sky-high media presence are Justin Bieber and Miley Cyrus. Both seen as very influential on their respective gender peers. The recent Beiber scandal is perhaps a signal indication of what can happen when they are let off the leash… see also the 'growing-up' years of early Heroes, Britney Spears and Christina Aguilera when they first escape the 'protected' leash.

Key Contradictions:

1) think I am grown up versus very little experience
2) knocks and set-backs develop life skills, but have had very little opportunity to experience them… consequently know a lot of theory but often cannot contextualize it
3) strong-bond with parents but peer-relationship often sees emergence of contempt during teen-escape years…
4) …which frequently then leads to forgiveness and 'failure to launch' problems in late teen years

Relationships With Others:

The following table shows how the Protected Heroes see others around them. As per the convention determined in the February article, the relationship story has been divided into two main dimensions: 1) how the Protected Heroes see the four different Prophet, Nomad, Hero, Artist types, and 2) how they view the people inside their friends and family network versus how they view those outside.

	Prophets	Nomads	Heroes	Artists
Outside Friends/ Family Group	Cultivated rosy image Well-off Self-satisfied: looking for enjoyment they feel they've earned Healthy & vigorous Looking forwards to/enjoying retirement Consider children inferior beings	Slightly distant/reserved? Slight sense of strain/worry Interested and supportive Blind spots Expect to be called "Mrs/Mr"	(peers) Confident Ambitious (in a vague way) Gullible (through limited experience of world) Educated to pass exams, not to love learning "Be yourself" "World is your oyster" Want to be "grown up"	(older) WW2 v delicate Limited power Poor Respect through history lessons
Inside Friends/ Family Group	(late-parents/grandparents) Active & involved but self-centred Sugar-coated orders Sharp hidden boundaries Unvoiced expectations Put self first	(parents) Hardworking Time for kids Reasonably well paid Expect to be obeyed, but not unreasonable (usually), boundaries, voiced expectations Thrifty, treats are treats not everyday	(siblings/friends) Generally polite and well-meaning Think of each other as individuals Put self first but also think about others	(grandparents/great-grandparents) Quiet Unassuming Request rather than order No expectations beyond being the best person you could?

		Supportive, positive, cheerleader where deserved Ultimately put kids first Peer relationship (parents as equals); Parents lacking in confidence… since they never had feedback on 'good' parenting		Put family/peace first

Biology – Daphnia

Daphnia (or Daphnids) are members of a collection of animals that are broadly termed as "water fleas". These are predominantly small crustaceans, and Daphnia belong to a group known as the Daphniidae (which in turn is part of the Cladocera, relatives of the freshwater shrimp and the brine shrimp). They get their common name from their jerky movement through the water. Apart from the jerky movements, the resemblance to real fleas ends: real fleas are insects and share only an extremely distant common ancestry with Daphnia, since both crustaceans and insects are arthropods.

There are approximately 150 known species in North America, and a similar number in Europe (many of these species are found on both continents, either through accidental introduction by man, or nature). Many foreign species have been introduced to America and Europe from Asia and Africa (the most notorious of which is Daphnia lumholtzi, which is native to Africa). It is not uncommon to collect 20 or more species in one small area of lake bottom. A few species of Cladocera are predacious but most are herbivores or detritivores. An important link in food chains of virtually every inland body of water, cladocerans convert phytoplankton/benthic plants, bacteria, fungi and decaying organic matter into animal tissue that can be used by larger animals. In large lakes they are a major food source for many kinds of fish such as sticklebacks, minnows, the fry of larger fish and also larval amphibians. Daphnia, in other words, find themselves somewhere pretty close to the bottom of the food chain.

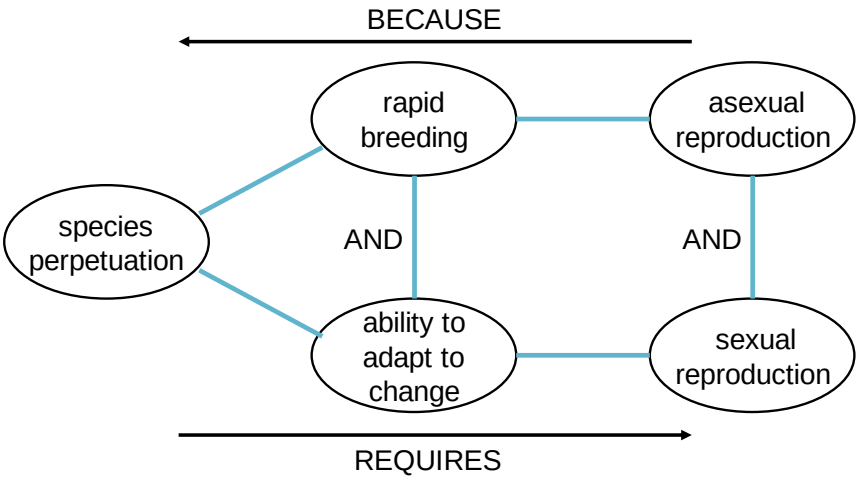
The majority of daphnia feed on particles found floating in the water (phytoplankton, but also attached vegetation or decaying organic material), but the predominant foods are free-living algae (eg Chlamydomanas spp, Volvox spp, etc), bacteria and fungi. In the summer months, they can often be seen "blooming" in ponds and lakes as the concentration of algae builds up. Their prolificity is due to a great extent to their ability to replicate by parthenogenicity.

Parthenogenicity is the ability to self-replicate without fertilisation of any form (a type of asexual reproduction) - the offspring are exact genetic replicas of the parent (clones), and any differences in the physical state of the clones is due to environmental conditions. Parthenogenesis seems to have evolved to allow daphnia to take advantage of good conditions (food, temperature, etc) as soon as they arise. In the wild, during the late spring, summer and early autumn (depending on temperature, food availability and presence of waste products of their metabolism), daphnia reproduce by

parthenogenicity, bearing, on average, ten live young per individual (the entire race is made up of females during this period). Developing embryos are often visible in the mother's body without the aid of a microscope. Generation after generation of females can be born in this way, with new females reproducing as early as four days old at intervals as often as every three days, for up to twenty five times in their lifetime (though this number is usually far smaller, and females tend to produce a lot less than one hundred offspring). You don't need to be a mathematician to imagine the magnitude of a healthy daphnia population.

When food is scarce some eggs develop into males and the females produce eggs that must be fertilised (the sexes reproduce via haploid means, i.e. half the number of chromosomes to procreate from each sex, as opposed to parthenogenic reproduction which is diploid). These eggs develop into small embryos which then go into suspended animation, and are shed with the carapace as dark brown/black saddle-shaped cases known as ephippia (ephippium is Latin for saddle). These can survive harsh conditions and are quite capable of withstanding a dry spell if their pond dries up for a while, and they can sometimes even survive freezing.

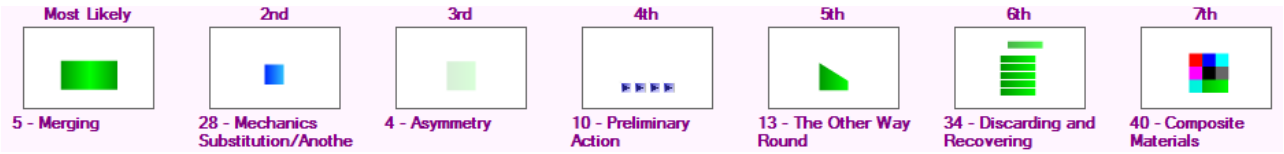
This ability to switch between sexual and asexual reproduction represents an excellent survival strategy for Daphnia. Here's how we might map their extraordinary capability as a contradiction:



The ephippial females of most Daphnids are easy to tell from their live-bearing counterparts because the developing ephippium is visible as a black spot towards the rear end of the animal. When conditions improve again, the egg producing generations begin producing live young once again (all females), and the male sex dies out completely until it is needed when conditions worsen once again.

There are often pulses of population growth, when numbers increase almost logarithmically by parthenogensis, using up a lot of food and causing overcrowding, and then the numbers fall sharply and ephippia are produced. There are usually two of these pulses every year, though in a good year there can be many pulses.

Here's what happens when we map the contradiction story into the wizard in the Matrix+ software:



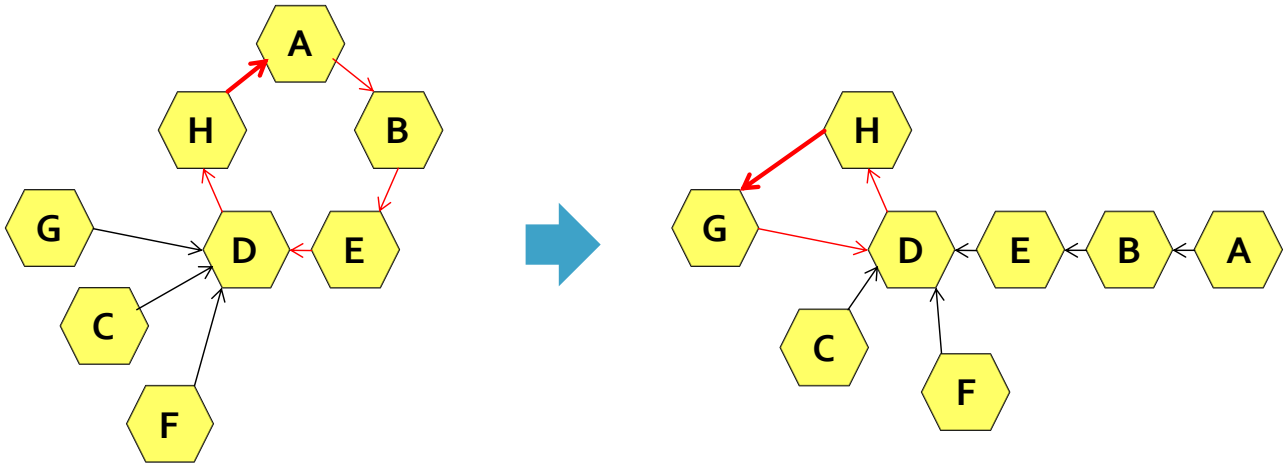
All in all, a very good representation of how the Daphnia manages to survive and thrive as a species. Including – our favourite part – the asymmetry between live asexual births versus (delayed action) eggs when the environment is not so amenable.

Short Thort

The Perception Mapping Tool is designed to help bring clarity to complex problems.
Once constructed, the typical means of resolving the identified issues involves focus on loops, collectors and conflict chains.

Negative loops (downward spirals) are known to be particularly important.
The most common means of breaking these loops involves solving a contradiction.

Another very effective way to break loops is to
cause a switch in what a perception leads to….



"How could we stop H leading to A, and lead to G instead?"
(for instance if the H-G-D loop is easier to resolve)

News

Certification Workshops
Our next round of workshops in the UK are now confirmed as (basic) 9-10 January; (intermediate) 14-15 February; (advanced) 20-21 March. If you're interested in combining a workshop with slightly more attractive surroundings, we're hoping to also be running a version in Mauritius in early March.

'Innovate To Success'
Following the success of the Blackswan event in London on 9 May this year, we will be running an equivalent event – again with some big-hitting globally-renowned speakers – in April 2012. Perth (Australia rather than Scotland) is the place to be on 2-3 April.

ICMM
The first book in the series of five – the 'Introduction' book – will receive its first printing in Taiwan in order to fit in with the SI conference in January. Avid readers will be able to secure a copy from that print run through the usual channels. We're hoping that the fully-logo'd edition will be available from February… as ever with initiatives requiring buy-in

from lots of different parties, it can – and has – turned into something of a cat-herding exercise. The light at the end of the tunnel is now shining brightly.

A Bientot Paul
Eagle-eyed readers will have noticed that this month's e-zine didn't arrive via the usual Paul David route. After nearly ten years with the Malaysia team, Paul has left the company in order to take over a prestigious management role in a new high-tech start-up company. Way to go, Paul. Thanks for all your help over the years. And we look forward to working more with you to make the new venture into the major success it deserves to be…

Future E-Zines
…as with this one, future issues of the e-zine will be organized, delivered and often written (she authored the Generations piece this month) by Hannah. All suggestions, questions and random thoughts for future editions should now be directed to hannah@systematic-innovation.com

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

Education (secondary) – Educate-the-educator programme
Education (tertiary) – Educate-the-Professor programme/bespoke-software
FMCG – manufacture cost reduction Sweat programme
FMCG – IP strategy study
Bio-tech – pest elimination project
Finance – 'agile-project-delivery' process building project
O&G – eyes on the world study
O&G – patent bullet-proofing project
Energy – 'parallel-worlds' strategy study