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e-zine

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In this month's issue:

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Case Studies: Complaint Levels Are High Because…

People don't always tell the truth, the whole truth and nothing but the truth. We are, all of us, often reluctant to reveal things that we perceive might cause us harm or embarrassment. It's a phenomenon that's causing significant problems in the NHS at the moment. What has always traditionally been a very tight-knit community has become even more so in a modern era that sees the Service under intense scrutiny from the media and politicians. With recent stories about the career-limiting consequences falling on 'whistle-blowers', it's a brave person indeed that is going to stand up and say something when they see things going wrong. How, then, do people within the system set about improving that system? Especially when, as was the situation at the start of this case study, the particular hospital in question found itself on the receiving end of a sharp rise in complaints from patients?

Perhaps one of the first things to do is to recall one of the key aphorisms of quality guru W Edwards Deming, who famously argued that 95% of organizational problems were problems coming from the system rather than from people within the system. When things are going wrong, in other words, it's almost certainly due to the system rather than any individuals within it. No-one comes to work to do a bad job, but sometimes the system forces well intentioned people to unwittingly create undesirable outcomes.

The Systematic Innovation Perception Mapping process (Reference 1) has evolved to allow people working in complex systems to begin to make sense of what's happening, so that they can then work to improve the system. It's also, over the years, revealed itself to be another way of revealing what's happening within systems even though people contributing to the process might not directly 'blown the whistle' on a problem. The problem with statements like that is some people – particularly newcomers to the process – tend not to believe that the process will reliably reveal what needs to be revealed. That was the position we found ourselves in at the start of this particular challenge.

Rather than try and convince the stakeholders by dragging them through several hundred case study examples and potentially fall foul of the unbeatable 'well, you would say that wouldn't you?' argument, we decided on this occasion to make use of a number of alternative strategies in order to help delegates feel they could talk truthfully about the hospital without any potentially adverse comeback on them personally. Namely, the strategies were:

1) Anonymity – all inputs were guaranteed to be anonymous, with each person writing on Post-It notes, folding up what they'd written, putting it into a hat that only the facilitator (someone who didn't recognize anyone's writing) would have access to, and then ensuring that they were destroyed at the end of the exercise.
2) Good-Reason-Real-Reason – making everyone aware of the J.P Morgan quotation and asking them to speculate on the 'real' (intangible) things that each of the stakeholders relevant to the problem were most likely to be thinking, all the time bearing in mind the fact that, universally, there were only a small number of 'real' drivers behind all of our behaviours, namely the desire for Autonomy, Belonging, Competence and Purpose (Reference 2).
3) The Ventriloquist Effect – so named because ventriloquist's dummies are uniquely allowed to speak the unspeakable. That's why ventriloquist acts continue to be a popular form of entertainment on stage and screen: the dummy can say all the things

we're thinking but know we could never say. We made use of the effect in this session by having each delegate think of each of the other stakeholder groups present in the problem as a dummy that was able to write whatever they wished to write onto the Post-It notes.

Figure 1: The Ventriloquist Effect – Being Able To Speak The Unspeakable

As far as the actual session was concerned, we were able to assemble representatives from each of the stakeholder groups – nursing staff, clinicians, managers, receptionists, security staff and patients. Well, almost. We actually brought the patient comments into the session in the form of a distillation of the 13,000+ pieces of complaint feedback received by the hospital over the period in which the number of complaints had risen to their present unacceptable level. We scraped through these narratives using the PanSensic tools (Reference 3) prior to the session in order to distill raw feedback comments (Figure 2 shows an example) into perceptions we could include in the analysis.

"…the first ward i was taken into was incredibly dirty the floors were sticky and the staff were so **rude** when i had to have a lumbar puncture for the third time i was unsure whether or not to go ahead as it had been so painful the first 2 times and had made my headache ten times worse the next day a male doctor came in and bluntly said have it done or go home i was terrified and very upset and thought that was no way to talk to a patient he kept arguing with me saying that it wouldn't hurt even though i knew from the first time it would i had it done in the end and i have viral meningitis i was taken onto another ward where everything takes about 2 hours in the morning on the first day i wasnt given pain killers until 11am then nobody noticed that i hadn't had any till 9 that night the nurses are **rude** and the doctors are worse please do not use this hospital if you can help it anything else **disgusting** i felt degraded dirty and treated like a piece of meat."

Figure 2: Results Of Overall Patient Feedback Scrape And 'Typical' Example Of Raw Input

In all, after we had finished gathering and collating inputs from all of the different stakeholders, we had a list containing over 70 unique perceptions to the initial question asked at the start of the exercise, 'complaint levels at the hospital are high because…'

Having collated all of the perception statements, we worked through a 'leads to' analysis with the representative stakeholders. The only new rule compared to a typical Perception

Mapping exercise was to re-iterate that our job was to establish which of the other Perception statements each of the ones in the list lead to, and not to debate the validity of the Perception. The idea being that the Map that emerged at the end of the process would tell us what was important and what was not.

The 'leads-to' analysis ended up taking the best part of a couple of hours, ensuring that the group was happy that each perception in the overall list meaningfully lead to one of the other perceptions. When we stepped back and looked at the overall map we found ourselves looking at what we think is the biggest loop we've ever seen. All of the perceptions lead in some way to drive, what turned out to be a rather insidious downward spiral. The loop is reproduced in Figure 3. Readers may care to reflect on some of the statements contained in the loop in order to gain a flavor of what sorts of thing the Ventriloquist Effect allowed people to write down.

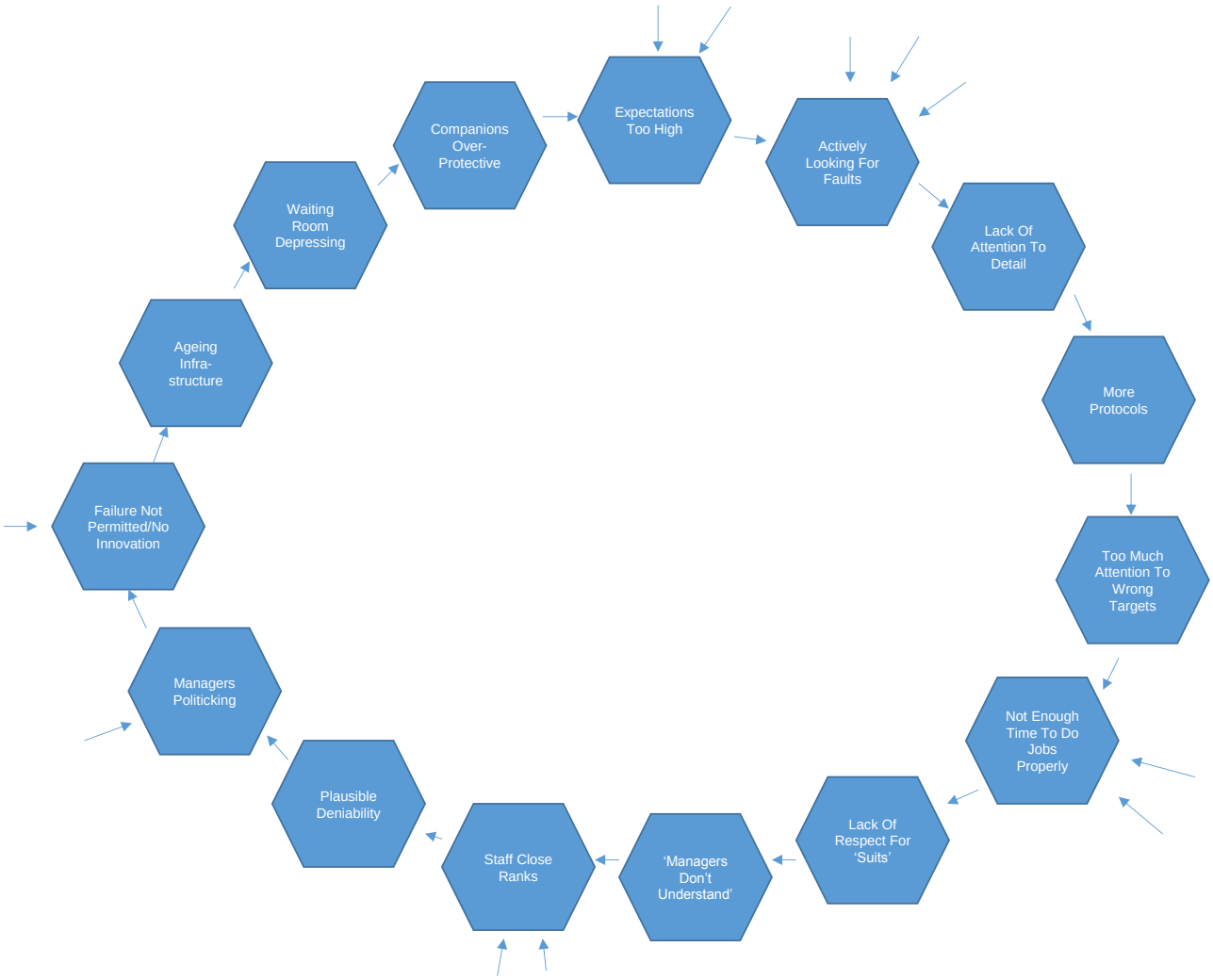


Figure 3: Downward Spiral Outcome From Patient Complaint Increase Reasoning Analysis

Much as some people present in the session were unhappy about what the Ventriloquist's Dummy had said about their function (fortunately, there were no overtly personal attacks amongst all of the inputs), there was a strong consensus that the downward spiral portrayed by the spiral was representative of what was happening in the system.

The job of the Perception Mapping tool is over at this stage. Its job is to help make sense of complex situations, and, as is so often the case in the NHS, few problems in life come with quite the levels of complexity staff in the Service have to deal with. The process helps

us to see more clearly what is happening, but we're still a long way from any kind of answer. All we could say to the group at this stage was that the loop was trying to tell us something important, and that if we were genuinely going to solve the complaints problem, it was our job to somehow 'break' the loop we had uncovered.

So now, where to start in achieving this goal?

Clearly, the group quickly surmised, some of the Perception statements were more actionable than others. Trying to solve the (perceived) 'plausible deniability' or 'lack of respect for 'suits'' problems, for example, might well require a multi-year effort. The key to making progress at this stage was to ask the group to identify which of the perceptions lay 'within their gift'.

The list of 15 Perceptions in the loop quickly reduced down to just two that the group felt they had the ability to directly affect:

- The depressing waiting room
- The 'over-protective' companion (i.e. the person or persons that typically tend to accompany a patient that turns up at the hospital's Accident & Emergency Department)

The immediate new problem ('naturally') was that the group had no new budget available to them to fix either of the problems. This is a fairly standard contradiction in any kind of problem: we know what we want, but we can't afford to get it.

At this stage, it is a good idea to set the group off on a search for 'free' resources. Some of the most important innovations of all time have never had an official budget. Also worth mentioning, when briefing the group is the fact that in addition to being half of the story in any human system, the 'intangible' resources also come for free.

Three important clues emerged from this search for (intangible) resources:

1) The natural tendency of staff and the volunteers that often attend at the hospital was to focus on the patients. The problem with this is that the patient is typically just interested in not being in pain anymore and really isn't of a mind to find things to complain about. The person most likely to complain is the over-protective non-sick companion that arrives at the hospital with the patient. It would be a really good idea, therefore, to ask the volunteers in particular to spend more time working with these companions, re-assuring them that everything was under control, and – perhaps even more importantly – helping them to feel useful in the overall process. i.e. recognizing that the companions are also a potentially useful resource in the system: they want to help too.
2) When we made a deeper dive into the complaints, focusing on what we might be able to do in the Reception area of the A&E Department it also became apparent that there was a strong correlation between the likelihood of a complaint and the presence or otherwise of certain receptionists. If one receptionist in particular was on duty at the time a patient arrived, there were almost no complaints generated either at the Reception, or – more significantly – anywhere further through the treatment process. 'First impressions last' seemed to be the theme. An empathetic receptionist with an authentic smile was just about the most powerful means of heading-off complaints before the thought entered anyone's mind.
3) Examination of 'non-depressing' reception areas from other domains ('someone, somewhere already solved your problem') revealed that they tended not to have officious posters, straight-lines (Figure 4 – organic curves rule!) or unclear and potentially confusing signs. They also allowed people the ability to at least feel like

their time wasn't been wasted. In this regard the no-doubt apocryphal story of the slow-elevator study proved to be revealing: occupants of a new high-rise building complained that the elevators took too long to get them to move them to the relevant floor. Various elevator design consultants were brought in to see what could be done to speed the elevators up. None, despite the big bills for their consultation time, had anything of great value to add. The problem was eventually solved by one of the building's janitors, who put up a couple of mirrors next to the elevator doors. A trick that continues to work with just about every elevator on the planet to this day: we hate twiddling our thumbs waiting for elevators to arrive, but give us something useful to do – checking our appearance – while we wait is suddenly a perfectly acceptable use of our time.

Figure 4: 'Someone, Somewhere' Already Designed A Non-Depressing Reception

While we can't say that these three clues have thus far allowed the solution of staff politicking, plausible deniability and too many protocols at the hospital, we do know that we've created a sense of progress already. Complaints are down for a start. Staff are more inclined to smile, managers are more inclined to get out of their offices and meetings and spend more time 'at the coal-face', and hopefully, provided the progress continues, one day in the not too distant future, the managers might just pause to reflect on whether the system needs yet another protocol, staff are given a few extra minutes to interact with patients as humans, and that new ideas for better ways of doing things will be listened to and acted upon. And all done with zero budget.

References

1) Mann, D.L., 'Hands-On Systematic Innovation For Business & Management', Chapter 9, IFR Press, 2nd Edition, 2009
2) Systematic Innovation E-Zine, 'Universal Intangibles', Issue 140, November 2013.
3) Mann, D.L., Howarth, P., 'Pansensics: Measuring What's Important Rather Than What's Easy', SI White Paper series, February 2013.

PanSensics: Life Stage Archetypes Tool

"Man is not what he thinks he is,
he is what he hides."
Andre Malraux

This article describes another of the PanSensics, 'reading between the lines' tools, the roster of which has now hit double figures. The overall ethos of the collective suite of tools is that the only real way to capture the things that determine human behaviours is through a bottom-up analysis of our 'social DNA'. To date we have found five such bottom-up factors:

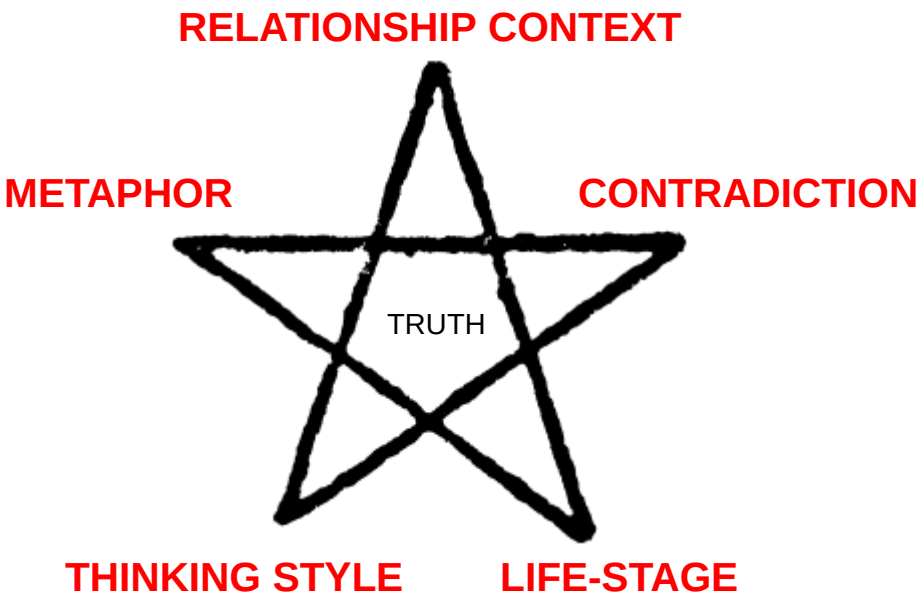


Figure 1: Five Core Human Behaviour Drivers

What each of the tools attempts to do is analyse narrative text in order to assemble profiles associated with each element. Each is best considered as a different lens through which we can view a given situation. Surveying a group of consumers, for example, or assessing the engagement of a work team. We imagine that over time, more such lenses will be uncovered and developed into narrative-scraping tools. For the moment, though, the lens we've spent the least time describing has been the one of the first ones we built, one connected to the measurement of the 'life-stage' or emotional maturity of a person.

The foundations for the tool were laid by Dr Allan Hunter in his book 'Stories We Need To Know' (Reference 1). Like Joseph Campbell before him, Hunter made an intensive study of Western literature in order to establish the presence or otherwise of universal themes and archetypes. Amongst his discoveries was that the main character of every 'great' story in the Western Canon is invited to undertake a symbolic, spiritual journey, and along the way he, or she, has to pass certain mileposts.

If you have ever found yourself admiring the way someone does something, and thought to yourself, how come I never got that good at anything, only to realise later that the person you've been admiring is as flawed as you are in other aspects of their lives. Perhaps their marriage is strained, or their health or finances. You might wonder how can

this be? How is it that we can meet someone whose home life is harmonious but whose work life is uncertain. Hunter's great insight is that most of us move through different stages in our work and personal lives at different times, that others appear to be different to us because they're simply at a different stage in their emotional journey.

Engaging in all aspects of life is a way we grow ourselves and create the lives we want. Whenever we begin a new job or a new relationship we enter again the cycle of stages evident in all the myth and great literature of the last 3,000 years in the Western canon. Like Odysseus in The Odyssey or Elizabeth Bennet in Pride and Prejudice, we'll move from Innocent to Orphan to Pilgrim to Warrior-Lover and perhaps even to Monarch and Magician.

Knowing how far along this kind of life-stage, 'emotional maturity' or 'spiritual development' journey turns out to be a key factor that enables us to predict what will drive their future behaviour.

The Six Archetypes are metaphors for the mileposts we can attain as we go through all aspects of our lives. As Hunter began to study the idea of stages of personal development in literature, he discovered that characters always passed through the same six stages, always in the same order and always faced the same basic types of tests.

The resulting Stories We Need To Know book examines the archetypal stages in depth with examples from literature. It also suggests ways we might forward our own life journeys in terms of these stages. The Innocent, The Orphan, The Pilgrim, The Warrior-Lover, The Monarch, and The Magician:

We start as **Innocents,** as babies, as naïve newcomers. We are 'unconsciously incompetent'. We don't know the rules, but we do want to attach to others and trust them. This is what a baby does in successful mother-child relationships. The child learns how to feed and to cooperate while being fed, and extends total trust and love. In return the mother feels love that is commonly described as "unconditional." Mother doesn't care if the child is a little crotchety or homely, she loves it just the same, without reserve.

Unfortunately the complete trust the child has in the world is not a realistic stratagem to live with. Children are warned not to trust all adults, and especially not strangers with candy. All is not well in paradise. Parents are not perfect, and mother and father can't always make everything better. This recognition is the start of the ('consciously incompetent') **Orphan** phase: The Orphan realizes that all is not perfect but agrees to attach to others anyway, for safety, and so she seeks to be 'adopted' by people she thinks are safe. In Nick Hornby's novel *About a Boy,* Marcus is deeply frightened when his erratic mother tries to kill herself and so he resolutely sets about adopting and being adopted by as many friends as he can manage to secure. It's a book that shows the Orphan at his twelve-year-old best. Safety, for Marcus, is in the number of people he can gather around him who are reliable supporters. As he works to introduce all the people in his life to each other he finds he is, unwittingly, getting them to care for each other, too. And love grows. Adoption is fine for a while, of course, but everyone feels the urge to explore beyond themselves. We all have to leave school, leave our parents, leave home, or we can't find who we are when we are on our own. This can be frightening and some people can't manage it for very long. They scurry to the safety of the secure job, making sure they get themselves adopted by the group, the organization, or the expectations of those around them. They settle down and fit in. The Orphan has looked around, seen what the challenges are, and has decided to remain an Orphan.

Yet if we do venture beyond the conventional, get beyond some kind of 'tipping point' and stay on that path, and if we do decide that it's worth seeking for something more, we can become **Pilgrims***.* As Pilgrims we leave behind conventional comforts, we take to the road looking for meaning, which often means we go looking for the sense of purpose that we hope will come with love. Our conscious incompetence creates a discomfort that prompts a search for something – anything – that will allow us to rid ourselves of the incompetence feeling. The Hippy movement ("Make Love not War") was famous for pilgrimages of various sorts. The thousands who flocked to Woodstock, to Altamont, to all the open air concerts of the time - all of them were on some sort of search, whether they knew it or not. Perhaps they just wanted the experience, or the drugs, or the free sex. But they wanted something and they wanted it badly. So hippies traveled to Marrakesh, to Katmandu, to Cairo, to Yogis in India, to communes in Nevada, to surf beaches in Hawaii. On the way quite a few forgot what they were searching for and simply wandered around until, Orphans again, they found a home.

A few knew what they were looking for, and found it. They entered a stage of some form of conscious competence, such that they could make a claim that transformed them into people who had taken on a real cause. They became Warriors*.* And just as one cannot fight for something one does not love and respect, they became aware of love.
This stage, which Hunter called the **Warrior-Lover**, is when the individual commits to another person, or a cause, or sometimes both. This is the point at which the person makes a real commitment to a relationship, and in a way that accepts the other person as one who will change and grow. This means that life will be a challenge sometimes, as each partner will have to understand the other person and the changes each of them goes through, and each will have to adapt accordingly. How different this is from the old paradigm of the man telling the woman who she was supposed to be.

Yet as we know, commitment and energy in a relationship are not always enough, and just as, for example, gifted teachers discover that they can be of more use passing on their knowledge to other teachers rather than teaching every class, so too the Warrior-Lover begins to want to nurture on a broader scale. Whether that means the energetic executive gets promoted to be a director of other executives, or perhaps it means mom teaching her kids how to do their own laundry and take care of themselves, the effect is the same. The hands-on Warrior-Lover begins to allow more space for others. Trust is born of that – and what love can flourish without trust? I give trust to another person; she respects that, enjoys the feeling of being trusted, and returns the compliment. When trust is established the Warrior-Lover ceases to be a one man or one woman army and becomes, instead, a **Monarch***.* Perhaps the easiest way to understand this transformation is that the Warrior-Lover tends to be committed to a special relationship with another, and at a certain point this relationship has to open to include a wider sense of what one can do with one's life. The Warrior-Lover might start in a strong loving relationship with a significant other and devote huge amounts of time and energy to that. There comes a time, though, when each person is going to want a wider acquaintance, a greater role within society. Their conscious competence evolves to become unconscious competence. The loving duo, typically, might find that their children lead them into more connection with their neighbours and society, or with the local school system for example, and this awareness of new issues may prompt them to take on leadership roles within their newer, larger social circle. This is the point at which they can become Monarchs.

The Monarch archeptype is a symbolic representation of the fusion of the stereotypical 'male' executive power with the 'female' virtues of nurturing and compassion. This fusion must happen *within* each individual, just as ying and yang together make up a complete

circle. To reach this level we have to know when to be strict and when to be compassionate. Just as the populace relies on the Monarch to do the correct thing for the whole kingdom, so too the Monarch has to be responsive to the needs of the people around him or her. When this contract of loving interdependency fails the Monarch will not last long. Just before the French Revolution Marie Antoinette's famous statement when told that the poor had no bread to eat was, "Let them eat cake." She simply couldn't imagine that anyone might be hungry because she never was, and she did not bother to make an effort to ascertain what was really going on in the kingdom. And so the French Revolution swept her and many others to the guillotine; tyranny, which is rule without love or compassion, seldom lasts long.

The Monarch's task is to get better and better at trusting, nurturing, instructing, guiding, and building love relationships. This love may well be extended to the idea of the state, or the Empire, or something similar but not in a blind, jingoistic way. It is a deeper love based not in wishing to be attached to something but rather in a profound sense of being *responsible* for that attachment. The truly alert Monarch is always aware that it is his or her duty to prepare the kingdom so that it can carry on successfully after he or she is dead. If this duty - and again it is a loving duty - is carried out successfully the leader will hand over more and more power to others in the actual execution of tasks, and will become a respected repository of wisdom. Such a Monarch transforms into the sixth stage, the **Magician**. Just like the Magician in the Tarot pack, this figure respects the customs and rites of what is holy, will uphold laws and agreements, and will do so in the same way a priest does. A priest of any denomination, merely by existing, can be a reminder to all of us as to how we should behave and what the highest expectations are for all of us. The Magician doesn't need to say much; the magic gets worked by the actions of the people and their belief in what is good. In effect, the Magician is able to see beyond their unconscious competence into the future unknowns. The Magician stands on the top of one s-curve and is able to look over the edge and through the fog to the start of the next s-curve.

And so we see how emotional maturity grows. We are invited on a journey during which we can move from Innocent, to Orphan, to Pilgrim, to Warrior-Lover, to Monarch, and finally to Magician. Each stage represents a fundamental re-adjustment of the self to the outside world, and no stage can be skipped. At every stage we have to reappraise what might be. Indeed, whenever we start something new, like a job or a relationship, we're likely to begin as Innocents and work our way up. Sometimes we can get through the first stages quickly because we know ourselves and are alert to what we are doing, but sometimes we can't…. knowing where a person is on their journey – especially where we are able to connect a person to their relationship with a given product or service that we are trying to innovate around – turns out to be a vital part of understanding how best to engage them in what you're trying to achieve.

As with other PanSensic tools, we've built a narrative-scraping tool that assesses where a person (or group of people) are along the six life stages. The tool starts categorizing narrative into one of the six archetypes based on a database of keywords, and then ends with a semantic relevance check to ensure that when a keyword is used within a piece of narrative it is being used in the context of the associated archetype. Figure 2 illustrates a typical output from a narrative scrape. The graph in question is the result of an analysis on Generation Y parents on the subject of giving energy drinks to their children:

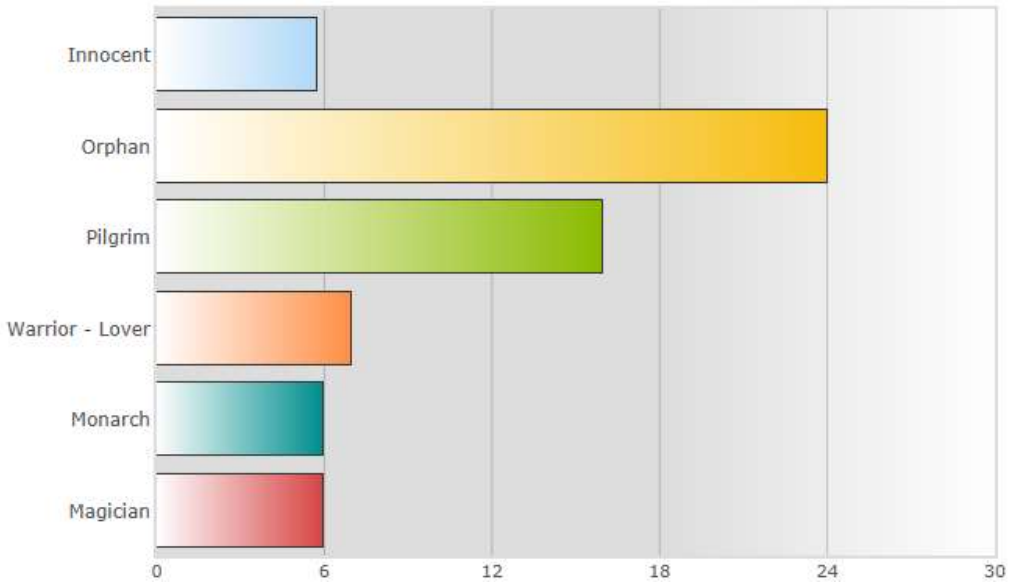


Figure 2: Typical 'Life-Stage' PanSensic Tool Output

The very high 'Orphan' and 'Pilgrim' scores in this analysis turned out to be quite revealing in terms of how best to inform the target parent group about the energy drink category. The high Orphan score was indicative that the majority of GenY parents had reached the point of conscious incompetence when it comes to making an informed decision about the rights or wrongs of giving energy drinks to their kids. The high 'Pilgrim' score reflected a proportion of parents that had started to do something about their new-found incompetence…usually, we saw when digging deeper into the specific verbatims, vociferously against energy drinks. As far as the energy drinks provider was concerned, the key message was to help educate the 'Orphans' make an informed decision about the pros and cons of the energy drink category. Or, better yet, to provide Pilgrim-parents with a more appropriate drink alternative.

One of the main emerging uses of this life-stage assessment tool is identifying the presence of the so-called Lake Wobegon Effect within an individual or group. Lake Wobegon, for those readers that don't know, is the fictional mid-West town created by author Garrison Keillor (Reference 2), where, 'all the women are strong, all the men are good looking, and all the children are above average.' The Lake Wobegon Effect is defined as the natural human tendency to overestimate one's capabilities, achievements and capabilities in relation to others. When interviewed, for example, over 80% of drivers describe themselves as above average. The Life-Stage scraping tool is a good way of reading between the lines and identifying respondents who try and portray themselves as more mature than their behaviour might otherwise suggest. Or vice versa. In either case the big idea being that, once we know where we are along the life-stage archetype spectrum, we stand a far better chance of being able to design and communicate solutions that have the best chance of connecting with where people are and where they'd like to be.

References

1) Hunter, A.G., 'Stories We Need To Know: Reading Your Life Path In Literature', Findhorn Press, 2008.
2) Keillor, G., 'Lake Wobegon Days', Viking, 1985.

Not So Funny – Principle 11, Nanny-States

The whole idea of the TRIZ 'beforehand cushioning' Principle is to prevent things from going wrong by anticipating problems before they occur. All in all, not such a bad thing to do. The problem comes when we find ourselves doing so much beforehand cushioning we teach people to become helpless. Or – worse – get them to assume they're safe and so don't pay attention to what's going on around them anymore. This is the effect that results in more people being injured at controlled pedestrian crossings than there are from jaywalkers.

It's a fine line between giving people useful safety information and turning them into dysfunctional idiots. Here are a few indicators that, if you'll pardon the pun, some kind of learned-helplessness line has been crossed:

Or not.
Water, it seems, has become significantly more worrisome in recent times:

In some cases, I've reached the point where I'm convinced there must be a plot on the part of the government. A beautiful contradiction-solving plot that goes something along the lines, 'how do we simultaneously kill dumb people and also cover our backs so we're not liable?'

Things like this clearly help:

This one's more subtle, but really quite cunning:

I can almost picture the mountain of bodies at the bottom of the escalator.
This one's even more subtle:

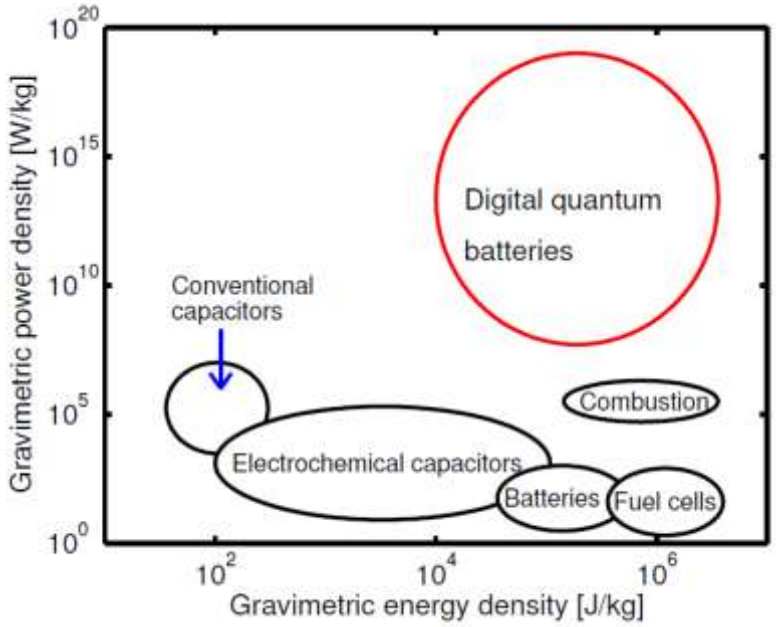
This one has to be the best one of all time though…

…unless you can point us to a better one?

SYSTEM·ATIC INNOVAT·ION

Patent of the Month - Nano Vacuum Tube Energy Stores

When you see pictures like this one, you know that a good contradiction just got solved:



We first saw this picture about four years ago now while trawling through technical journal papers, and this month a patent emerging from the research was finally granted. US8,699,206 was granted to a pair of inventors at the University of Illinois on April 15. Here's what they had to say in their invention disclosure background description:

The present invention relates to devices and methods for high-density storage of energy in materials configured as nano vacuum tubes subject to specified material and geometrical properties.

The position of an electrical charge within an electric field represents a potential energy that may be converted to work through displacement of the charge. Stable separation of electrical charge gives rise to storage of energy as potential energy, and is typically accomplished chemically, in batteries, or electrostatically, in capacitors. Electrostatic storage in capacitors is limited by dielectric breakdown, while chemical batteries suffer from the drawback of limited charge/discharge rates. Reverse-biased diodes used for energy storage are limited by field emission, avalanche breakdown, and Zener breakdown.

Electrical energy from a DC power source can be stored in conventional capacitors, electrochemical capacitors, chemical batteries, and diodes. Conventional parallel plate capacitors can be charged and discharged quickly and they have a virtually unlimited life time, but their energy density is small, because of dielectric breakdown. For instance, when the electric field E exceeds about 0.118 V/nm in a 25-.mu.m thick Teflon sheet coated with w=100 nm thin-film electrodes, a spark discharges the capacitor and the energy is lost as heat. This limits the energy density in aluminum-Teflon-aluminum capacitors.

Commercial capacitors have energy densities up to 300 J/kg. The inductance of the capacitor circuit limits the rate at which the capacitor can be charged and discharged to about 10.sup.7 W/kg.

Solid state diodes, such as varactor diodes, can be used for energy storage as well. Semiconductor diodes with reverse bias store energy in the depletion layer. However, field

emission, avalanche breakdown and Zener breakdown limit the electric field to about E=0.02 V/mm (in silicon with donor concentration N=10.sup.14 cm.sup.-3), and the energy density is less than in conventional capacitors. Field emission, i.e. quantum mechanical tunneling of carriers through the band gap, is the dominant breakdown mechanism for highly doped p-n junctions. Zener breakdown occurs when the electric field becomes large enough to excite valence electrons in the depletion zone directly into the conduction band. Avalanche breakdown occurs when the minority carriers are accelerated in the electric field in the depletion region to sufficient energies that they can excite valence electrons through collisions. Energy storage in semiconductor junctions is further limited by the fact that the depletion zone is not a perfect insulator and reverse saturation currents discharge the diode. The charge-discharge rate of diodes, limited by the mobility of the carriers, is much higher than in batteries. Tunnel junction have the highest switching speeds (up to 5 GHz), but their reverse-biased breakdown voltage is small.

Okay, so the words don't convey the same striking perspective of the contradiction as the earlier energy density -v- power density graph, but nevertheless, here's how we might map the core problem onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Energy used by Stationary Object (17)

WORSENING PARAMETERS YOU HAVE SELECTED:

Power (18)

SUGGESTED INVENTIVE PRINCIPLES:

2, 5, 19, 13, 35

And here's how the inventors have managed to make their step change advance in capability:

In accordance with embodiments of the present invention, a method is provided for storing energy. The method has steps of:

a. providing an array of vacuum tubes having walls, each vacuum tube including (1) an anodic electrode; and (2) a cathodic electrode spaced apart from the anodic electrode; and (3) a region intervening between the anodic electrode and the cathodic electrode of each vacuum tube evacuated to a pressure below 10.sup.-6 Torr; and

b. storing an excess of electrons on the cathodic electrode.

In accordance with alternate embodiments of the invention, the array of vacuum tubes may be characterized by a cross-sectional density of at least 100 vacuum tubes per square centimeter. Each vacuum tube may be a nano vacuum tube. The anodic electrode may be pointed, curved, or flat, and may be a nano-tip electrode. More particularly, the nano-tip electrode may be a Spindt tip. The nano-tip may be characterized by an apex radius comparable in size to a single atom, and may be a Mueller emitter or a free-standing nano wire. The cathodic electrode may be reverse biased respect to the nano-tip electrode.

In accordance with other embodiments of the invention, the walls of the vacuum tubes may be silica.

In a further aspect of the present invention, a method is provided for configuring a device to deliver powers in excess of 10.sup.10 W/kg. The method has steps of:

a. providing the device, comprising an array of nano vacuum tubes having walls, each nano vacuum tube including (1) a nano tip anodic electrode; and (2) a flat electrode spaced apart from the nano-tip anodic electrode; and (3) a region intervening between the nano-tip anodic electrode and the flat electrode of each vacuum tube evacuated to a pressure below 10.sup.-6 Torr;

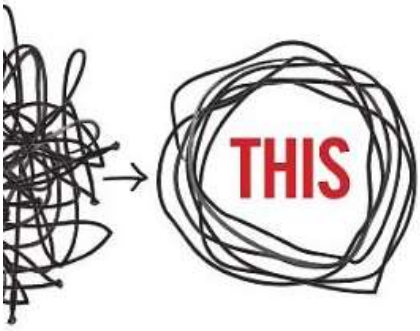
b. storing an excess of electrons on the cathodic electrode; and

c. coupling the nano-tip electrodes and the flat electrodes to an external current path.

The heart of the inventive step appears to be the introduction of a vacuum (Principle 35, Parameter Changes, 'reduce pressure'), although it's also interesting to see the incorporation of the 'excess' of electrons. Not sure if this counts as a Principle 5, Merging strategy… probably Principle 16 would have been a better match. Or maybe Principle 22.

Either way, fitting the solution to the Matrix shouldn't detract from the potential importance of the solution to the world of energy storage. Assuming the University has the wherewithal to escape the gravitational pull of academia, we think we might be seeing more of this solution in first high value niche applications pretty quickly.

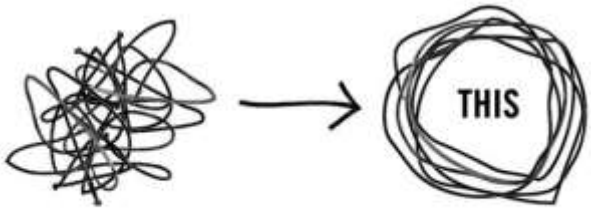
Best of the Month - Essentialism



essentialism
The Disciplined Pursuit of Less
GREG McKEOWN

Hot off the press, our choice this month is Essentialism from Greg McKeown, CEO of a Leadership and Strategy agency in Silicon Valley, and a man who has run courses at Apple, Google and Facebook. The 272 page book shows readers how to achieve what he calls the disciplined pursuit of less. Being an Essentialist is about a disciplined way of thinking. It means challenging the core assumption of 'We can have it all' and 'I have to do everything' and replacing it with the pursuit of 'the right thing, in the right way, at the right time'.

By applying a more selective criteria for what is essential, the pursuit of less is all about trying to help us to regain control of our own choices so we can channel our time, energy and effort into making the highest possible contribution toward the goals and activities that matter. Rather than the usual self-help fodder, however, McKeown has managed to weave together the experience and insight of working with the leaders of the most innovative companies and organisations in the world, and distill everything down into a coherent and compelling whole.



	Nonessentialist	Essentialist
Thinks	**ALL THINGS TO ALL PEOPLE** "I have to." "It's all important." "How can I fit it all in?"	**LESS BUT BETTER** "I choose to." "Only a few things really matter." "What are the trade-offs?"
Does	**THE UNDISCIPLINED PURSUIT OF MORE** Reacts to what's most pressing Says "yes" to people without really thinking Tries to force execution at the last moment	**THE DISCIPLINED PURSUIT OF LESS** Pauses to discern what really matters Says "no" to everything except the essential Removes obstacles to make execution easy
Gets	**LIVES A LIFE THAT DOES NOT SATISFY** Takes on too much, and work suffers Feels out of control Is unsure of whether the right things got done Feels overwhelmed and exhausted	**LIVES A LIFE THAT REALLY MATTERS** Chooses carefully in order to do great work Feels in control Gets the right things done Experiences joy in the journey

The whole essence of the book might be condensed down to ‘less is better’. British-born, American-resident, McKeown’s primary strategy for achieving this is largely built around saying no to the non-essential. Something that’s simultaneously easy to say and difficult to achieve in practice. Especially for ‘live to work’ GenXers. Have no fear, fellow GenXer, McKeown is on your wavelength and full of common-sense advice for regaining control over your diary….

…Not always in a contradiction-solving manner, sadly, but then, if you’re reading this ezine you’re probably already more than well enough equipped to add what you know about solving contradictions to McKeown’s definition of some of the main essentialism-preventing trade-offs.

Still, quite probably the best book of the year so far.

Conference Report – Agilia 2014, Brno

It's been a long time since I attended a software industry conference, so when the opportunity arose to talk to 150+ software engineers at central Europe's premier Agile conference of the year at the end of March, it was an easy decision to say 'yes'.

Amazingly, it was 2007 when we first published the Systematic (Software) Innovation book. If there was such a thing as an overriding theme to the book it was that software engineers were the most likely candidates to be the overarching integrators of the knowledge economy, but at the same time the least qualified for such a role. The years since 2007, if the attendees of this conference were in any way representative of the software industry, have served only to show that the discrepancy between opportunity and ability has widened rather than become closed.

Maybe the problem was that the conference was about the application of Agile methods? A problem because there's no point being agile about authoring code if the code you've been asked to write doesn't serve a meaningful customer need. Maybe the problem was exaggerated here because the majority of the conference attendees were working for out-sourcing organisations that were one step further removed from customers and thus had little if any opportunity to challenge some of the things they were being asked to be agile about. Talk about the deaf leading the blind. One could only conclude on the evidence in Brno that things in the world of software are going to get an awful lot worse before they get better.

A journey that no doubt won't be helped when we learned from several Agile-experts that 90+% of organisations that purport to be 'doing-Agile' were completely missing the point.

Dave Snowden's opening keynote address about complexity and exaptation and probe-sense-respond design strategies seemed to fly over the heads of everyone but the conference organizer; Suzanne Robertson failed to turn up to reveal anything about 'Uncovering the essence of the problem – how to find what your client really needs', but ooking at her slides, it didn't look like she understood what clients needed anyway; and Thorsten Janning presented the most complicated 'simplification' of any method I've ever seen with his 'Scaled Agile Framework'. Fortunately, nobody listened to or understood that one either. Which left the very excellent Gojko Adzic to get things vaguely back to sanity with his talk on 'making impacts, not software'… although I'm not sure either how that one went down with an audience that didn't look like it had much authority to do anything other than keep churning out their lines of code per day quota, irrespective of how useful it might ultimately turn out to be to any kind of actual customer.

All in all, a pretty depressing foray into the world of software development. An industry that appears to have collectively forgotten all of the first principles and now finds itself focusing on anything that looks like an easy remedy to the problems that now seem to be casting an increasingly gloomy shadow over the whole industry. Roll on software that writes itself; it's our only salvation.

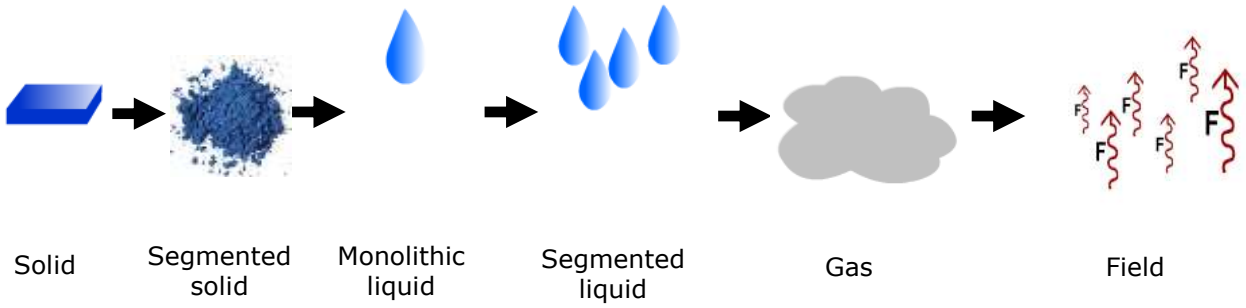
SYSTEM ATIC INNOVAT ION

If you don’t believe me check out the conference programme at
http://agiliaconference.com/2014/en/schedule

(And, just in case you were wondering, about a handful of the delegates made it to my two one-day workshops. Good job I’m not a bitter person.)

Investments – Hot-Wiring Kidneys

This month's investment decision probably counts as 'probably more a long term bet', but on the other hand allows us to make the point that when the SI Trends Of Evolution point us in what feel like 'Star Trek' directions, someone out there is always on hand to prove us wrong, and that the future is already with us. The trend in question this time around is Object Segmentation



And the topic at hand is diabetes. Or, more specifically, the means by which a diabetic patient is given the insulin they need.

We've frequently used the trend to suggest to pharma companies that delivering drugs through needles is not an evolutionary optimum… far better to use some kind of a spray or gas, preferably directly into the lungs. But that still leaves the final 'field' stage of the trend. I have to admit that I've always been stuck to make sense of what that might mean in the context of insulin delivery.

Now I know:

"Incredibly hot-wiring the kidneys may possibly be a new way to tackle type two diabetic issues. Medical practitioners are working with a small wire to burn up nerves to the kidneys that they imagine will enhance the way sugar is processed by the human body.

"Persons with variety 2 diabetes both don't deliver adequate insulin - the hormone that mops up sugar from the blood - or their body's cells do not react to insulin thoroughly. As a result, their blood sugar degrees rise.

"The new process includes destroying section of the sympathetic nervous system, which operates from the spinal cord to the organs and is included in the combat-or-flight reaction - when risk threatens, it would make the coronary heart conquer faster, for illustration. It also has a critical purpose in regulating blood force.

"Persons with higher blood force that does not respond to medicine have been proven to have higher concentrations of sympathetic nervous system activity than normal. One concept is that this is for the reason that of defective signals travelling involving the brain and kidneys along the renal nerves. Destroying these nerves - a course of action recognised as renal denervation - is currently being utilised to handle sufferers with this issue. But a pilot study also showed that the treatment not only decreased blood force, but enhanced the performance of insulin.

"It is recognised that the sympathetic nervous technique influences the use of insulin by the overall body. Blocking the sympathetic anxious method with a drug named moxonidine

has been demonstrated to make improvements to the motion of insulin and raise the sum of glucose taken in by cells.

“Now, in a trial at the College of Monash in Australia, renal denervation is becoming examined to see if it has the similar outcome. Through the forty-minute process, carried out without having a normal anaesthetic, a catheter or tube is inserted into the major artery in the groin and pushed up to the kidneys.

“After in area, a radio-frequency generator, which creates warmth and power, warms up a wire inside the catheter. This warm wire is put from the renal nerves and the heat destroys them.

“Stella Vig, advisor vascular and general surgeon and chair of the London Diabetic Foot Network, claimed: 'This is an remarkable strategy that might enable individuals a lot more independence from the diabetic medicine controlling their problem.

“'This approach could make it possible for diabetic issues to be managed with no supplemental medicine or a significant reduction in the amount of money becoming taken. The cost of a life span provide of diabetic treatment is superior and a one-off intervention that allows diabetic handle is thus an important notion for the dollars-strapped NHS.'

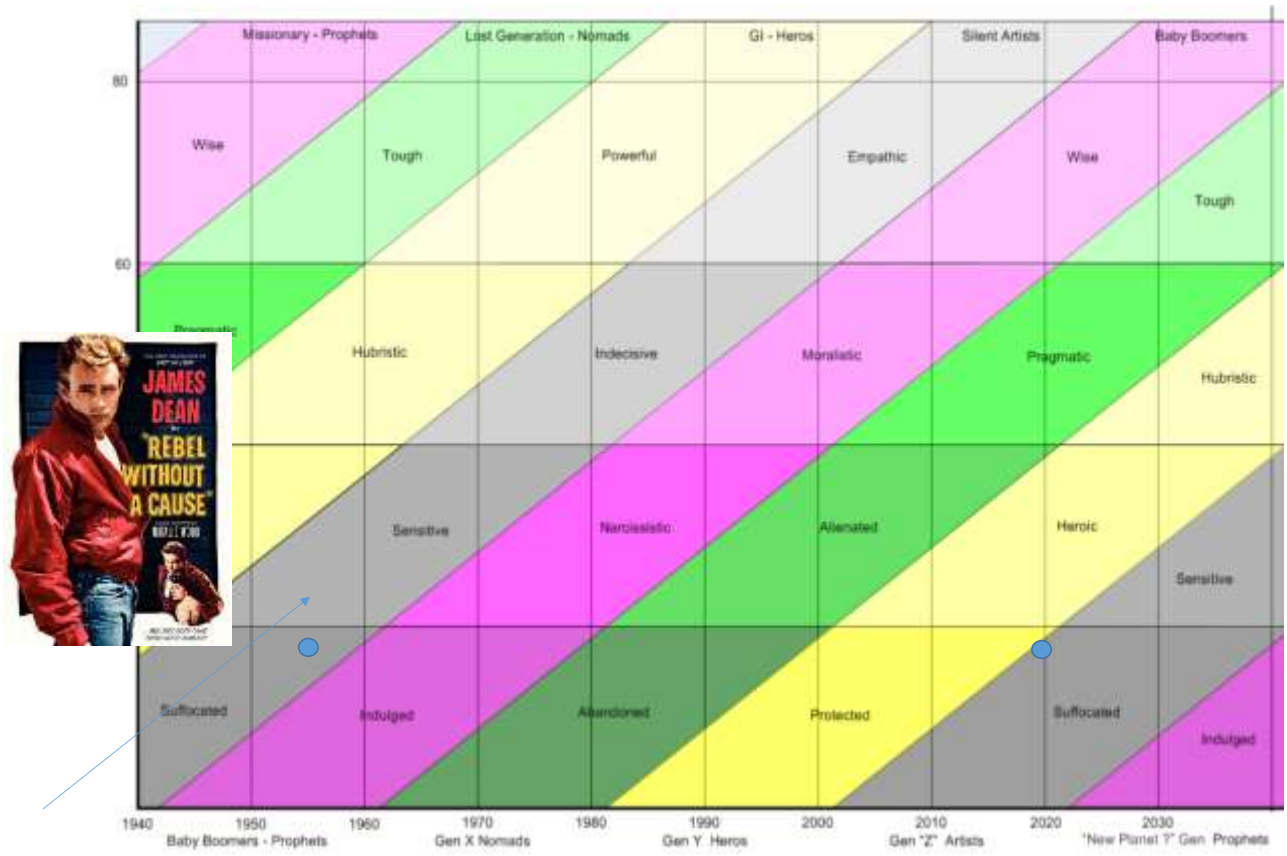
Although almost inevitably not perfect yet, it is already interesting to note the outcry from the traditional insulin provider community. Our bet is that we’ll be seeing more of this one in the future… the field always wins after all.

Generational Cycles – James Dean

The latter part of this year sees the start of a significant generational shift. The first of the children born into the post-9/11 world become teenagers, and therefore, start to become responsible for making the first of their own purchasing decisions. The race is on to work out what this new 'Artist' generation is going to look like and how they are going to behave as consumers. One thing for certain is that they've grown up in an economic climate quite different to that of their mostly-GenY parents. The other is that they've been 'suffocated' by their parents and consequently there's going to be some kind of a reaction and attempted release when they start to be let out of the house on their own.

So what will they be like?

According to the Strauss & Howe generations theory, we ought to be able to glean some clues by looking back four generation to the previous cohort of Artists:



Which takes us quite neatly to James Dean and in particular his 1955 film debut, Rebel Without A Cause. A story of teenage disillusionment, that turned Dean into the cultural icon of his time. Dean's character, Jim Stark, bears nigh on all of the archetypal Artist characteristics, and many of the scenes from the movie offer up potential clues to what we might expect to see in the coming years. First up, one of the universal tasks of the teenage years – i.e. irrespective of generational cohort – is escape from the familial clutches. It's a time when all of us to some extent are forced to reject the wishes of our parents in order to embark on our own life journey. When Generation Y went through their rebellion-stage, they tended to have a pretty good relationship with their parents, who in any event were a fairly alienated/pragmatic lot that in effect shrugged their shoulders when

it came to observing the rebellious actions of their kids. Society also tended to shrug its collective alienated and pragmatic shoulders too. Such that images of heavily tattooed, falling-down-drunk teenagers on our TV screens were perceived as sad but kind of funny at the same time. But then times change. And tides turn. There's a growing feeling that this kind of behaviour is no longer acceptable or appropriate. Alost as if today's GenY parents are collectively saying to themselves, 'well my parents might have let me do it, but damned if I'm going to let my kids do it'.

That doesn't mean that the new cohort of teen-Artists will try to rebel any less. But it very likely does mean that when they do go nuts, society is increasingly likely to lay down the law and stop things before they get out of hand. Just as happened to Jim Stark, the (un-worldy, suffocated, sensitive) 'Rebel' ultimately just wants to fit in.

FADE IN.

A deep night sky. Matte shot. Camera searches slowly upward through the heavens and the silver tone of a bell is heard sounding the strokes of midnight.

On the final note of the bell, camera is full on the Milky Way and there it rests, just long enough for a burst of Easter singing to arise. The hymn is sung by the crude, unmatched voices of children. Camera pans down to include:

Spire of a church. Camera continues its downward pan as the singing continues and we pass a window beyond which is the source of the singing. Camera pans off window to show--

Long shot. City. Night. Suddenly revealed--crisp and sparkling with lights. Camera pans down and over:

A lonely street full of parked cars. The singing diminishes but a thread of it remains. A car has just parked. The headlights snap off. A MAN emerges whistling the same melody and pulls some gifts from the front seat. He slams the door and starts down the street in the direction of a house with bright windows. He must pass an empty lot full of rusty grass and litter which lies in darkness between two street lights.

As the MAN walks by the lot, still whistling, a GROUP OF FIGURES rises silently from the grass, figures who have been lying in concealment until now. They step noiselessly onto the pavement and follow the MAN. At the sound of their boots the whistling stops.

The MAN glances behind him and sees the figures walking after him, filling the pavement. A street light shows them to be boys and girls and all quite young. The MAN moves on more swiftly and the sound of their pursuit increases. He begins to run toward the lighted house and the following steps run too. Suddenly he stops under the next street light and turns to face the figures. They are upon him and around him quickly. Nobody speaks for a moment, then one of the boys grins. His name is BUZZ. He is big and filled with an awareness of his own masculinity.

BUZZ
(friendly, cool)
That was pretty what you were whistling. Whistle some more.

The MAN whistles a nervous phrase, trying to make a joke of the situation which he doesn't understand.

BUZZ
(continuing; suddenly)
You got a cigarette?

MAN
Oh, I think so--

The MAN fumbles in his pocket, finds a pack and drops it in his nervousness. The FIGURES wait until he picks it up. He offers one to BUZZ.

MAN
(continuing)
Filter tips.

BUZZ
(smiling, encouraging)
You smoke it. Smoke it, Dad.

Smiling uncertainly, the MAN puts the cigarette in his mouth. BUZZ, still smiling, takes out a packet of wooden matches.

BUZZ
(continuing)
I'll light it for you, Dad.

BUZZ ignites a match and holds it near the Man's face for a second, searching it. Then he ignites the whole box under his nose. The MAN shrieks, and his packages fall. BUZZ slaps him sharply, his smile gone.

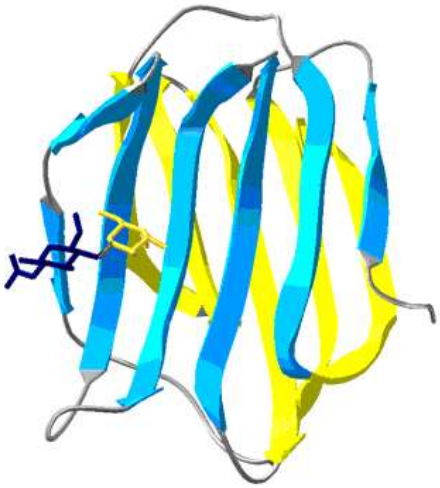
The camera pans away as the figures enclose him, and holds on a small mechanical monkey which has dropped from its wrappings. It begins to dance madly on the pavement, then runs down. The feet of the figures scatter past the unmoving monkey. Then camera rises to show that the man has disappeared. There is a moment of awful stillness, then we see a boy coming down the street alone. He is quite drunk, and he slips once. This is JIM, a good-looking kid of seventeen with a crew-cut and wearing a good suit. The spilled packages on the pavement stop him. He bends down to see what they are and picks up the mechanical monkey from the wreckage. He smiles and winds it up. He sets it on the sidewalk and sits down. He watches it dance for a moment, happily. A siren is heard distantly, growing louder. JIM pays no attention to it as he winds the monkey again and releases it for its dance.

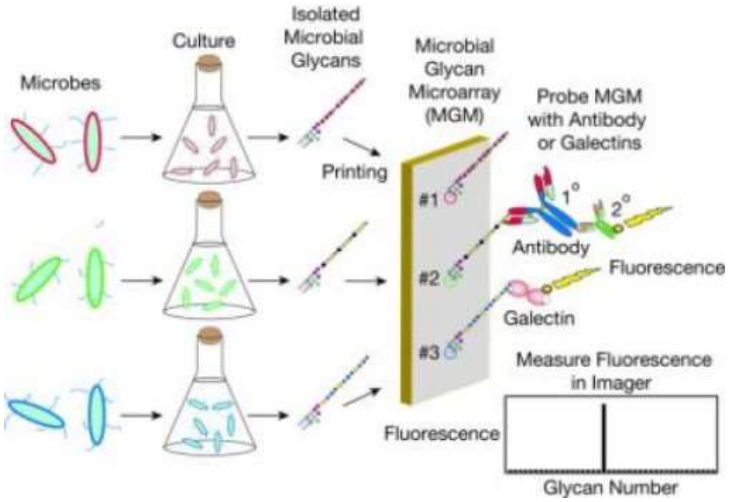
SUPERIMPOSE TITLE: "REBEL WITHOUT A CAUSE" STARRING ____ as siren rises piercingly close, and JIM looks up, we:

DISSOLVE TO:

Close shot. Throbbing light of police car. Night. The siren screaming wildly, then dying. The sound of brakes. Camera moves to reveal the police car stopped at the entrance of a Precinct Station. Two officers dismount, bearing between them the struggling JIM. They bear him up the steps and in through the double doors. …

Biology – Galectins





Our bodies produce a family of proteins that recognize and kill bacteria whose carbohydrate coatings resemble those of our own cells too closely, scientists have discovered.

Called galectins, these proteins recognize carbohydrates from a broad range of disease-causing bacteria, and could potentially be deployed as antibiotics to treat certain infections.

Researchers at Emory University School of Medicine made the discovery with the aid of glass slides coated with an array of over 300 different glycans (carbohydrates found on the surfaces of cells) derived from bacteria, many of which are found in the intestine. One can think of these slides -- called microbial glycan microarrays -- as wardrobes displaying a variety of clothes worn by gut bacteria.

"Many microbes cover themselves with glycans that somewhat resemble our own cells," says Richard D. Cummings, PhD, professor and chair of the Department of Biochemistry at Emory University School of Medicine. "That limits how well the immune system can use antibodies to respond to those microbes."

To prevent auto-immune attack, our bodies usually don't make antibodies against molecules found on our own cells. That leaves gaps in our defenses that bacteria could exploit. Several of those gaps are filled by galectins, the researchers found.
The discovery expands upon an initial finding, published in Nature Medicine in 2010, describing galectins that recognize and kill bacteria that express the human blood group B antigen.

In contrast to antibodies, the galectins kill the bacteria directly, without needing other parts of the immune system to pile on. The researchers identified several varieties of bacteria (Pseudomonas aeruginosa, Providencia alcalifaciens, Klebsiella pneumoniae, and Serratia marcescens, for example) targeted for killing by galectins. In some cases, only certain strains of a given bacteria were vulnerable, because only those strains carried the target glycan.

"These studies have opened the way to understanding the ways in which adaptive or antibody-based factors work together with innate or galectin-based factors to give us immunity against a broad range of microbes," Cummings says.

In addition, the microarray technology provides tools to study glycan-binding antibodies and galectins in populations, he says.

"These studies use tiny amounts of blood -- just a few drops -- and show how glycan microarrays could supersede previous technology," he says. "Using these tools, investigators could identify developmental- and age-specific differences in anti-microbial glycan antibodies in humans, which may predict susceptibility to disease."

From a contradiction-resolving perspective, there are at least two evolutionary jumps at play here, in what we might see as a classic ‘arms-race’. Firstly, the bacteria have solved the problem of detection by our anti-bodies by cloaking themselves inside glycans (Productivity-versus-Ability To Detect, and Principle 24, Intermediary, as a solution strategy). Secondly, the Emory discovery reveals, our bodies have made their own evolutionary jump through the evolution of the galectins. Here’s how we might best map that problem onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Stability (21)

WORSENING PARAMETERS YOU HAVE SELECTED:

Ability to Detect/Measure (49)

SUGGESTED INVENTIVE PRINCIPLES:

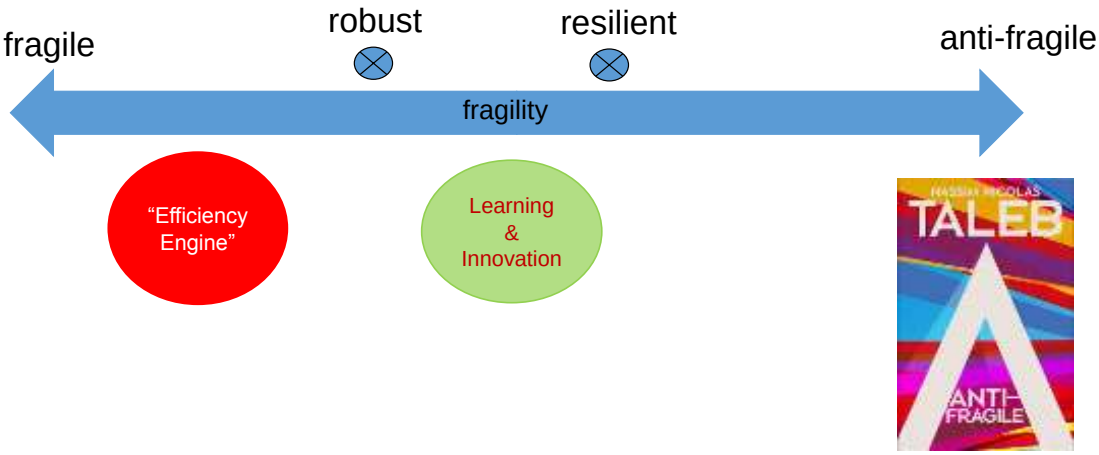
7, 24, 17, 35, 9, 37, 32, 28

The switch from antibodies to proteins (or rather the additional use of proteins) can be seen as a classical illustration of Principle 35, Parameter Changes in action. With more than a shade of assistance from Principles 24 and 17.

For more details, check out:

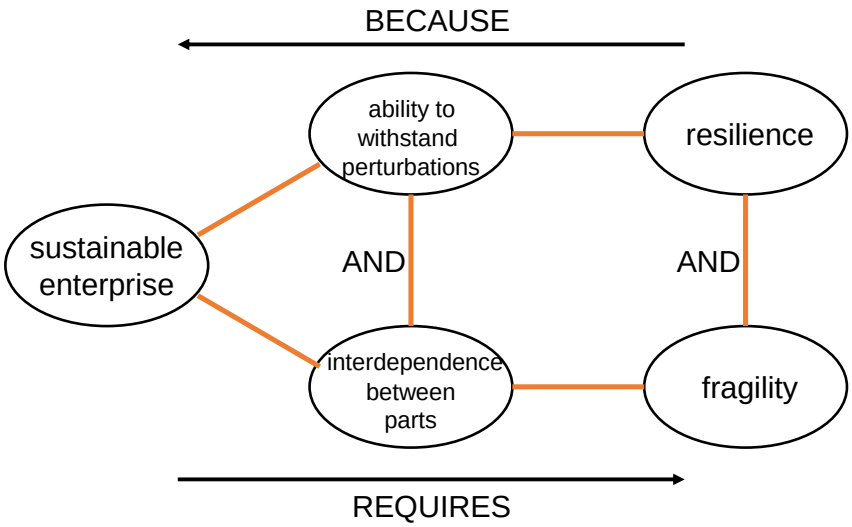
Sean R Stowell, Connie M Arthur, Ryan McBride, Oren Berger, Nahid Razi, Jamie Heimburg-Molinaro, Lilian C Rodrigues, Jean-Philippe Gourdine, Alexander J Noll, Stephan von Gunten, David F Smith, Yuriy A Knirel, James C Paulson, Richard D Cummings. **Microbial glycan microarrays define key features of host-microbial interactions**. *Nature Chemical Biology*, 2014; DOI: 10.1038/nchembio.1525

Short Thort



Step-change internal or external perturbations…
Fragile: …will break the system
Robust: …will not break the system
Resilient: …will not break the system; the system will adapt to better withstand future perturbations
Anti-Fragile: …will make the system stronger

The heart of the organisation design problem:
The resilience of the whole is proportional to the fragility of the parts.



News

China Workshops

We are happy to announce the commencement of a state-wide deployment of Systematic Innovation capability building in ShunDe GuangDong. The first round of workshops will take place in August of this year

Czech Republic

Following our successful visit to Brno earlier this year, we will be back – this time to Prague – in early September to conduct a pair of follow-up workshops. We're hoping to be able to coordinate the workshops so they connect with the MATRIZ conference.

Michala Techau
We're very happy to welcome Michala to the UK SI team this month. Michala brings a mass of knowledge of innovation in the FMCG and pharmaceutical industry worlds to bear on our steadily growing roster of projects in these and adjacent areas, and a very strong cat-herding instinct when it comes to keeping everyone inside the SI team on track. Expect to hear from her soon!

University Of Buckingham
We're in the process of assembling a new series of lean/innovation related short-courses and a whole new MSc programme at the moment. Expect the first of the short courses to be announced for the fourth quarter of the year.

Japanese Matrix 2010
We are happy to announce the publication of the Japanese edition of Matrix 2010: Re-updating the TRIZ Contradiction Matrix. The book forms the second volume in the "TRIZ Practices and Benefits" series, produced by good friend, Toru Nakagawa of OGU and CrePS Institute. Order details from the TRIZ Home Page in Japan.

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

FMCG – NPD fuzzy-front end project
FMCG – PanSensic consumer insight study
Healthcare – innovation-leadership workshop series
O&G – business-innovation strategy definition study
Aerospace – problem-solving workshop
Apparel – scenario-mapping study
Construction – 'Invent to Order' IP generation study
Transport – ICMM Journey implementation
Transport – Bespoke SI software tools
Financial Services – innovation project facilitation
Government – GenerationDNA workshop
Music – Design-make project