# Systematic Innovation

## e-zine

Issue 126, September 2012

In this month's issue:



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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

Readers' comments and inputs are always welcome.
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# Start-Up Ordeals

The usual first reaction after a business fails is everyone seems to want to create as much distance between themselves and the failure as quickly as possible. The thought of doing any kind of After Action Review to try and understand what went wrong tends not to fit with this desire. Which probably explains why it is very difficult to get any reliable data on precisely why a business has failed.

Somewhat easier – in theory at least – is acquiring data on failure rates. Although even here there seems to be a fair degree of dispute. Reference 1 seems to offer something that is based on a decent size pool of data. Figure 1 presents the high level summary of year-on-year survival rates of start-up companies:

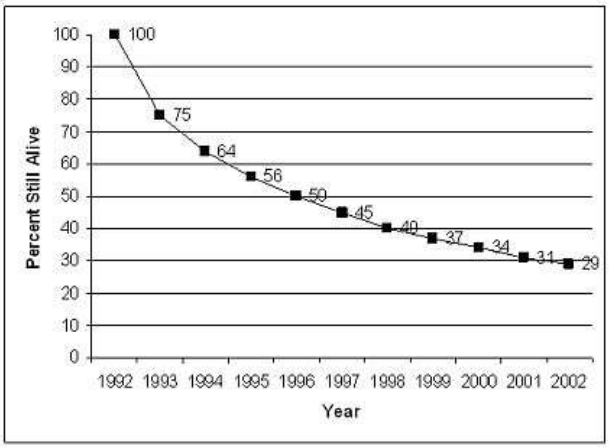



**Figure 1: Proportion of (US) New Businesses Founded in 1992 Still Alive By Year**

According to Shane's data, on average, a business set up in 1992 had a 29% likelihood of still being around in 2002. Not necessarily 'thriving', but at least surviving. Other, less scientific, data would appear to suggest that failure rates are somewhat higher. An analysis of dot.com businesses conducted more recently would appear to indicate that on average there was a 10% likelihood of a dot.com business still being in existence five years after starting. Whatever the actual failure rates are (Reference 1 does a pretty good job of breaking the data down by sector in case you're interested), the story is not a great one. If you're thinking of setting up your own business that is.

Our primary interest in this domain is to dig into the *reasons* that businesses fail. Here the waters seem to get an awful lot more murky. The key issue being that businesses fail for both 'good' reasons and 'real' reasons. The reliable old J.P. Morgan quote finds a clear relevance in this aspect of human endeavour just as it does in consumer purchase behavior. What it means in the context of business failures is that when, for example, the UK government officials tasked with collecting information on why your business failed, it is very tempting to externalize the failure ('it was the recession') rather than suggest that it was something that you might've done wrong yourself. As far as we can tell, largely due to this good/real reason discrepancy, there is little or no use-able data in the public domain… so we decided to go uncover our own. We did it through a combination of personal interviews with failed businesses as defined by UK records at Companies House, and semantic search tools trained to look for 'real' reason clues from assorted public domain printed materials. In all, our database currently comprises around 25,000 examples culled from different parts of the world.



SYSTEM·ATIC INNOVAT·ION

In keeping with our interest in the Hero's Journey (Reference 2), our main aim was to home in on the Ordeals that small businesses had to overcome. Not every small business fails at this stage, but this is the stage where we felt there were messages that could be applied generically. At this stage this belief is a working hypothesis building on the central TRIZ/SI idea of a root contradiction.

What does this mean? A look at one of the better websites describing why small businesses fail (Reference 3) reveals a 'Top 7' reasons that include 'bad management' and 'wrong location'. For two different reasons, neither of these diagnoses get us to the heart of the Ordeal we seek: 'bad management' because it is simply too generic and, worse, is unactionable in terms of being able to suggest potential remedies; 'wrong location' is more specific, but still doesn't get us to the heart of the problem. Only when we ask 'why?' was the failure caused by a poor location choice do we get ourselves to the point where we can see what the real contradiction is. In theory, choosing the location that a business sets itself up in should be one of the easier decisions that need to be made by an entrepreneur, so why is it that getting the answer wrong is such a big ('top 7') apparent killer? According to our investigations, the Ordeal that lies at the roots of this location question – and actually other similar ones relating to, for example, which forms of media to advertise in or when to launch a product, service or campaign – in a contradiction between what the entrepreneur wants to do and what their customer wants. We called this ordeal the 'I want/customer wants' Ordeal. Here's how that particular Ordeal stacks up against the other ones we found:

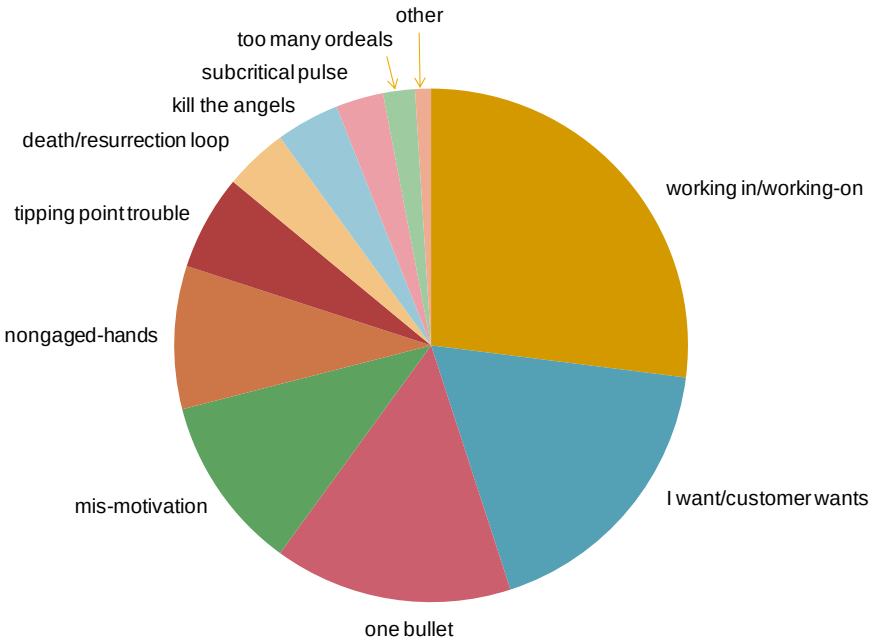



**Figure 2: Breakdown Of 'Real Reason' Ordeals That Kill Start-Up Businesses.**

The good news, if that's the right word, is that down at this root contradiction level, there aren't that many different Ordeals. This is consistent with one of the biggest findings from all of the TRIZ research: there just aren't that many different problems in the world. Let's examine each of that small number of start-up failure Ordeals we've uncovered thus far:

**Working-In/Working-On** – the biggest single Ordeal failure and very likely the reason behind the success of one of the best and most popular entrepreneur books of all time, 'The e-Myth Revisited' (Reference 4). That book describes a story that gets beautifully to the heart of this Ordeal: the hero in this story loves baking, and so they set up their own bakery. Because they love baking and get good at it, the bakery quickly builds a strong

reputation with the local community. And so the business grows. There's talk of expanding the business; taking over other bakeries and opening new outlets in nearby towns. Gradually, the baker seems to be spending more and more time dealing with annoying people and management issues and not enough time doing the thing he loves most, baking. Here's the man who wants to work *in* the business, when it actually needs him to spend his time working *on* the business. Growing the business means passing his bakery skills on to others and him to learn the critical business skills that allow the expanded operation to function as efficiently and as effectively as possible. Until the in/on Ordeal is resolved, the baker will be unhappy and the business will never grow. According to our research, close on a third of all small businesses fail because they are unable to resolve this contradiction. The success of the e-Myth book is it provides a host of solutions to the challenge. The fact that many of those solutions turn out to be unpalatable to the poor baker is why we get so many businesses falling at this hurdle.

**I-Want/Customer-Wants** – this is the problem alluded to in the 'wrong location' failure cause described earlier. The heart of this Ordeal is that many businesses become established because the entrepreneur is somehow in love with the idea of the freedom that theoretically comes with the 'running your own show' territory. Part of that freedom is freedom to choose a location that best suits my personal needs. More generally, it is about the chef that sets up a restaurant that cooks the food she loves to cook, or the art gallery that displays objet d'arts that the proprietor loves; the journalist that wants to set up a local newspaper and write what they want to write about. Any entrepreneur in the 'creative' disciplines seems to be particularly prone to failure at this hurdle. There's absolutely nothing wrong with devoting your life to what you love doing, of course, just so long as you don't expect customers to necessarily come in their masses to give you all their hard earned money to thank you for indulging in what you want to do. Businesses that successfully overcome this ordeal are the ones that recognize the customer is ultimately always right, stop doing what the entrepreneur's ego wants to do and starts meeting the needs of the payer. In the UK, the new businesses with the worst track record of sustainable success are restaurants – 95% will fail to survive beyond their third year. As with the in/on contradiction, the solutions to this problem are simultaneously easy ('stop being an ego-maniac') and unpalatable. Which is why 18% of all small businesses fail because they fail to get beyond this Ordeal.

**One Bullet** – the third biggest killer is all about the limited resources that tend to be available to any start up organization. Unlike big organization that find it much easier to spread their bets when it comes to speculating on the future, very often the small organization is able to raise only sufficient funds to have one shot at the target. If that single bullet misses, then sadly the organization has insufficient alternative resources to have a second crack at the whip. This is a particularly unfortunate state of affairs when combined with the knowledge that only a very few start-up organizations get it right on their first iteration. 'Getting To Plan B' (Reference 5) – another of our most frequently recommended pieces of reading for SMEs – would go so far as to say that there are in fact almost no examples of large corporations that have successfully grown from their small initial stages by sticking to the original business plan. If that weren't enough, many SME funding agencies tend to unintentionally twist the knife by offering funding based on a business plan written at the start of the organisation's life and subsequently refuse to accept that the initial plan was 'wrong'.

**Mis-Motivation** – when asked why they decided to embark upon their chosen track a lot of potential entrepreneurs will reveal one of two main motivators. The first involves the category of people that have seen an opportunity that they have become hell-bent on

running towards. The second involves those people that are doing the opposite – they're running away from something. A difficult boss, perhaps, or a job they hate, or a stressful project. The 'mis-motivation' Ordeal failure category is all about this second cluster of people. Running away from something is rarely a good reason to set up your own business. At least if you want it to be successful. Here's one of the Ordeals where being aware of the problem is more than half of the solution: set the business up for the right reasons or don't do it at all.

**Nongaged Hands** – Scaling a business fundamentally means that at some point the entrepreneur needs to bring other people into the fold. The baker in our in/on Ordeal story only gets to grow their empire by employing other bakers. Unfortunately, those hired hands are not on the same Hero's Journey as the entrepreneur. Their expectation in life is a salary at the end of the month. And for the entrepreneur to do all of the hard work associated with keeping the business afloat. The 'nongaged hands' Ordeal is about how an entrepreneur fails to successfully get the hired hands to buy in to the vision and mission of the organization. Just short of 10% of all start-up organizations fail because they fail to get these non-engaged hands to become a resource for growth rather than a downward-spiralling drain on management time. This seems to be one of the trickiest of the Ordeals to solve, not least of the reason being that the best solutions (give the key hired hands some kind of stake in the business) get right to the heart of the control-freak tendencies of a lot of entrepreneurs. Usually the ones that would rather have 100% of nothing than a sometimes much smaller percentage of a thriving growing mega-corp.

**Tipping-Point Trouble** – this one is all about the challenge of finding a critical mass of customers to get the business up and beyond it's viability tipping point. Any organization with zero previous track record of doing what they say they can do finds it difficult to get customers. Getting the first customer is the most difficult job; getting the second is not that much easier. The problem here is not so much for the bakers and chefs of the world – a customer that decides to buy a loaf of bread or a starter is not taking that much of a risk financially – but becomes more acute the higher the amount of money the lead customer is expected to commit is. The 'tipping point-trouble' Ordeal tends, therefore, to be the potential undoing of mainly B2B organizations dealing in large capital expenditure projects. Not a large proportion in relation to the total number of SMEs out there, but frighteningly large in terms of this being the Ordeal that kills those start-ups that are expecting lead customers to dig deep into their spending pockets. Again there are few good solutions to this thorny dilemma. Some start-ups solve the problem by teaming with what we call a 'Big Friendly Giant' business partner – quite often the customer they're looking to sell to.

**Death/Resurrection Loop** – strictly speaking the death and resurrection stage of the Hero's Journey comes after the Ordeal has been successfully overcome, and so it is not in reality an ordeal at all. It can become an Ordeal, however, if, during the time and place of the Journey where/when the death is supposed to occur, the wrong thing dies and effectively the Hero finds themselves looped back to the tests, allies and enemies stage. This having happened, the real Ordeal can then become the identification of the thing or things that later on need to die. In a lot of ways this is an Ordeal type that affects certain types of business more than others. The largest business type prone to failure of this kind of Ordeal is the university spin-out organization. And especially those where the lead academic/inventor – who strictly speaking needs to 'die' both as the main technical driver of the company (what's needed for successful commercialization is fundamentally different from what's required for successful research and development) and, usually worse, their

ego drives them to want to become CEO or equivalent when the reality is they rarely if ever possess the necessary skills to take on such a role.

**Kill The Angels** – A large proportion of start-up businesses are enabled by an injection of external capital. Frequently this money comes attached to strings that involve external parties having a say in the direction and operation of the business. Many small businesses will in fact – usually quite rightly – appoint an advisory board to assist them in seeing the big picture and keeping the ship pointed in the right direction. 'Killing the Angels' is all about the emergence of an Ordeal in which these external agents stop being a useful resource and become an insurmountable problem that prevents progress. It may be an Ordeal triggered by something as trivial as overriding the recommendations of these angel advisors, or it may be a long festering chain of what seem to the entrepreneur as 'meddlings' by a group of individuals that in reality are funding the Journey but aren't actually on the boat with the Hero.

**Subcritical Pulse** – in some ways a subset of the One Bullet category, but ultimately separated out as an Ordeal in its own right because there are situations in which a business has over time become successful enough that they now possess the resources to be able to fire more than one bullet, but unfortunately they end up firing no bullets because they assume their external environment has not changed when in reality it has. The underlying idea behind pulse rates is the recognition that every industry and every market sector makes periodic step changes. Smart companies understand this and have a solid enough appreciation for the step-change pulse rate of their market that their business is able to respond quickly enough to one of these step changes that it does not kill the business. The idea of 'subcritical' relates to the business where the achievable step-change rate is lower than the critical rate determined by the pulse rate of their market.

**Too Many Ordeals** – we also thought long and hard about including this problem as an actual ordeal. Strictly speaking 'merely' having lots of things on your plate is about the Tests, Allies and Enemies stage of the overall Hero's Journey. According to Native American tradition, everyone has 83 problems – solve one of the 83 and inevitably a new one appears to maintain the total at 83. That's the way life is, get over it being the purpose of seeing the world through this type of lens. All you can do in this kind of situation is keep plugging away at the next problem. And the next. And the next. The 83 problems can become the Ordeal, however, when a sufficient quantity of them demand the immediate attention of the entrepreneur such that paralysis ensues. At this stage this Ordeal becomes an insurmountable problem that becomes very difficult indeed to surmount. As ever, of course, in true TRIZ fashion, 'someone somewhere has already solved your problem'. Which is a clue to say, the Too Many Ordeals problem is typically best solved using Principle 24 – i.e. bringing in some probably temporary resource to plug the holes in the roof.

### References


1) Shane, S.A., 'Illusions of Entrepreneurship: The Costly Myths that Entrepreneurs, Investors, and Policy Makers Live By', Yale University Press, 2008.
2) Campbell, J., 'The Hero With A Thousand Faces', NewWorld Library, 3rd Edition, 2012.
3) http://www.businessknowhow.com/startup/business-failure.htm
4) Gerber, M.E., 'The e-Myth Revisited: Why Most Small Business Don't Work And What To Do About It', HarperCollins, 3rd Edition, 1994.
5) Mullins, J., Komisar, R., 'Getting To Plan B: Breaking Through To A Better Business Model', Harvard Business School Pres, 2009.

# Efficiency Engine Versus Learning & Innovation Organisation Stuctures

As a part of our journey to spread the Innovation Capability Maturity Model (ICMM – Reference 1) to the myriad organizations of the world, one of the main things that has consistently struck us are the stark differences between the job of learning and innovation and the everyday activities that the organization undertakes in order to generate the lifeblood revenues and profits. A picture that seems to resonate wherever we go is the organization model illustrated in Figure 1:

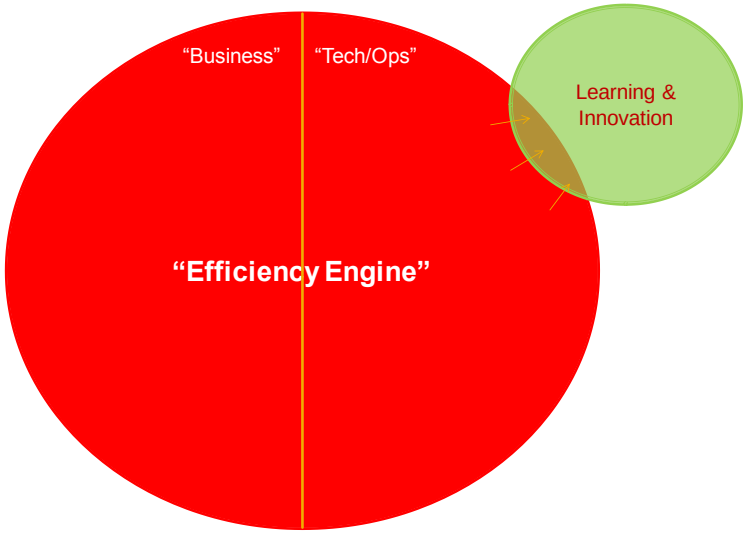



**Figure 1: Organisation As 'Efficiency Engine' And 'Learning & Innovation' Add-On**

The image represents a good model for what turn out to be the majority of ICMM Level 2 ('Championing') organizations. At this stage of their innovation capability journey, the organization has realized the need that a part of the organization is required to help identify and design the step-changes that will, in theory at least, keep the rest of the organization viable in the event of large external step-changes. The red circle represents the main, revenue generating part of the organization. While still very likely to be divided into 'business' (finance, legal, marketing, HR, etc) and 'technical/ops' (production, purchase, logistics, etc), just about everyone in the organization is expected to be contributing to the overriding efficiency engine aim of 'continuous improvement' – hence the term 'Efficiency Engine'. Probably this Engine uses Lean, SixSigma and equivalent tools, methods and strategies.

There is no absolute rule that says the 'Learning & Innovation' appendage that the Level 2 organization sticks on to the Efficiency Engine has to be attached to the tech/ops side of the business, but overwhelmingly this is seen to be the case. Most likely because in the eyes of senior leaders, 'step-change' is a job for 'R&D' people, because – traditionally – the most likely step-change threat to an organization is likely to come from a competitor or new-player that enters the market with a new product or service.

One of the big challenges of the Level 2 organisation is managing the interaction between the big red Efficiency Engine and the other-worldly Learning & Innovation engine. The difficulty stems from the fundamentally different tasks that the two entities have to perform. In s-curve terms, the Efficiency Engine operates in the 'normal world' associated with

climbing up the curve, while the Learning & Innovation engine is in effect expected to live in the 'Special World' that exists *between* curves:

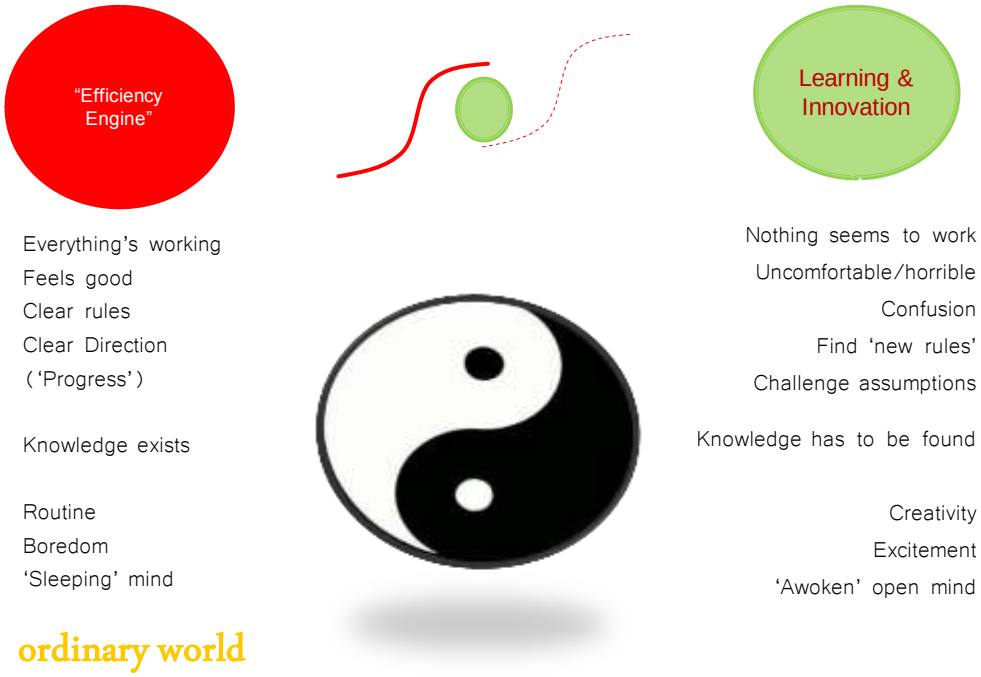



**Figure 2: Different World Inhabited By Efficiency Engine And Learning & Innovation Engine**

One of the biggest difficulties encountered in the Level 2 organization is managing the important flow of information between the two worlds. As suggested by the arrows in Figure 2, the easier of the two information flow directions is from the Efficiency Engine to the Learning & Innovation engine (LIE). This is very simply because, a) the people moved into the LIE from the Efficiency Engineand thus know what the 'old' rules were and who to go and speak to, and, b) being in 'learning' mode, the LIE is constantly expected to look beyond its boundaries to find new and better way of doing things, and the Efficiency Engine is one such (convenient) 'beyond boundary' entity.

So much for the challenges of the Level 2 organisation. Where they've come from is the Level 1 innovation capability organization. Which very likely looks like the organization structure shown in Figure 3:

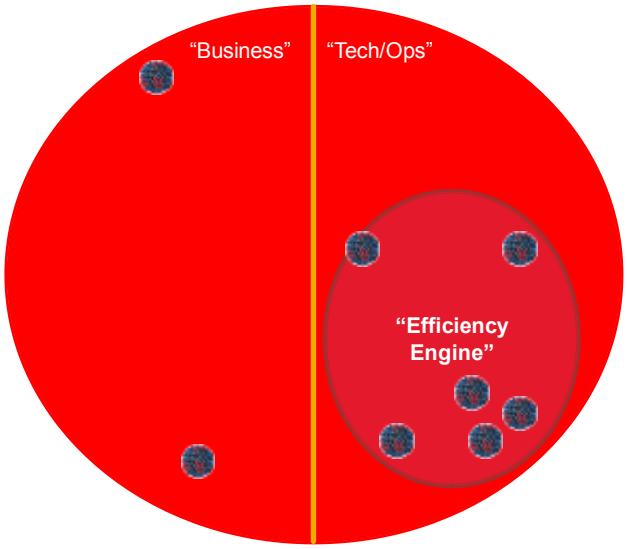



**Figure 3: Typical Level 1 ICMM Organisation Structure**

There are a number of important differences between this model and the one used to represent the Level 2 organisation. Namely:

1) the boundary between 'business' and 'tech/ops' is likely to be much more pronounced.
2) The 'Efficiency Engine' is much more likely to be found within just the 'tech/ops' part of the business, it being the case that any efficiency improvements made here have an immediate impact on the bottom-line performance of the overall operation. In other words, the 'business' part of the operation quite likely hasn't recognized they have a role to play in 'continuously improving' the overall business.
3) Any 'learning & innovation' activity is likely to be driven at an individual level. These individuals are typically seen as a troublesome virus by the rest of the business – something that the white blood cells need to try and destroy in order to restore the stable status quo the organization tends to crave.

Figure 4 illustrates what has happened to the organization by the time it hits Level 3 capability:

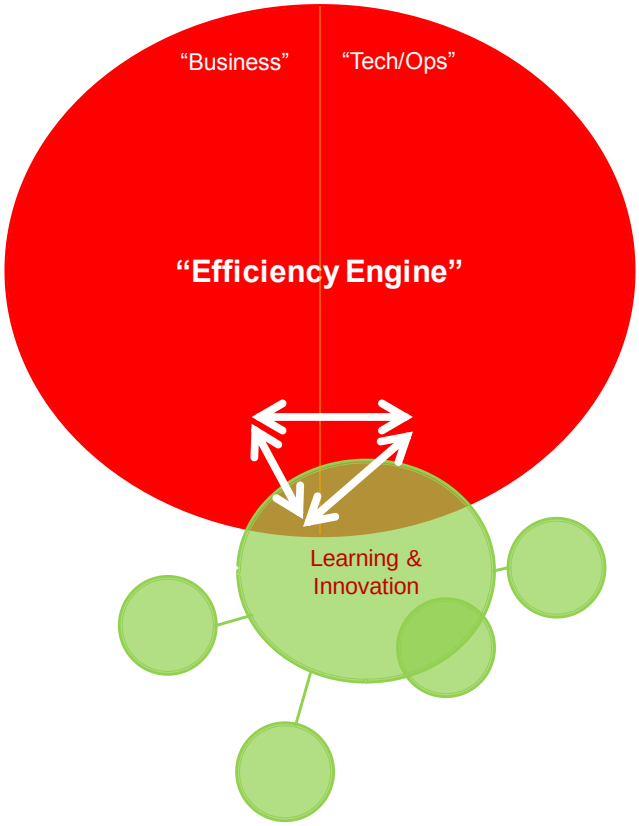



**Figure 4: Typical Level 3 ICMM Organisation Structure**

The shift from the structure found at Level 2 is less pronounced than the jump from Levels 1 to 2. The key changes found during the transition from the Level 2 'championing' stage to the Level 3, 'managed' stage are:

a) The distinction between the 'business' and 'tech/ops' silos is still present but is now much less pronounced, both sides of the wall realizing that they need to at least cooperate in the Learning and Innovation journey.
b) The LIE, recognizing that it needs to interact more fully with the outside world, has set up a number of different types of interaction activity. These might span a range from simply out-sourcing a piece of work, to – as in the case of many aerospace organization – forming formal relations with key academic institutions, to – also in

aerospace – setting up physically isolated ‘Skunkworks’ operations which possess markedly different rules, roles and operating means.

c) There is an established set of protocols (as illustrated by the white arrows) that allow the business, tech/ops efficiency engine and LIE to talk to each other in order to make sure that the step-change solutions sparked by the LIE are able to be transitioned into the mainstream Efficiency Engine. Importantly, because this step-change discussion is three-way, the organization is able to introduce not just technical innovations, but also combined business and technical innovations. When Apple introduced iPod & iTunes it represented an iconic example of what a Level 3 organization is able to repeatably and reliably do. Since the dim, distant days of iPod, Apple has now evolved their innovation capability to Level 4…

…the organization structure of which becomes much more difficult to construct and visualise. From one viewing perspective, the Level 4 organization will still have a hierarchical organization structure, very likely with some kind of matrix element such that individuals will find themselves connected to others by some solid lines on the chart and some dotted ones. If we try and look at the organization structure from the perspective of the Efficiency Engine versus Learning & Innovation Engine, however, the picture becomes more difficult to visualize. Figure 5 has what we think are the most relevant characteristics:

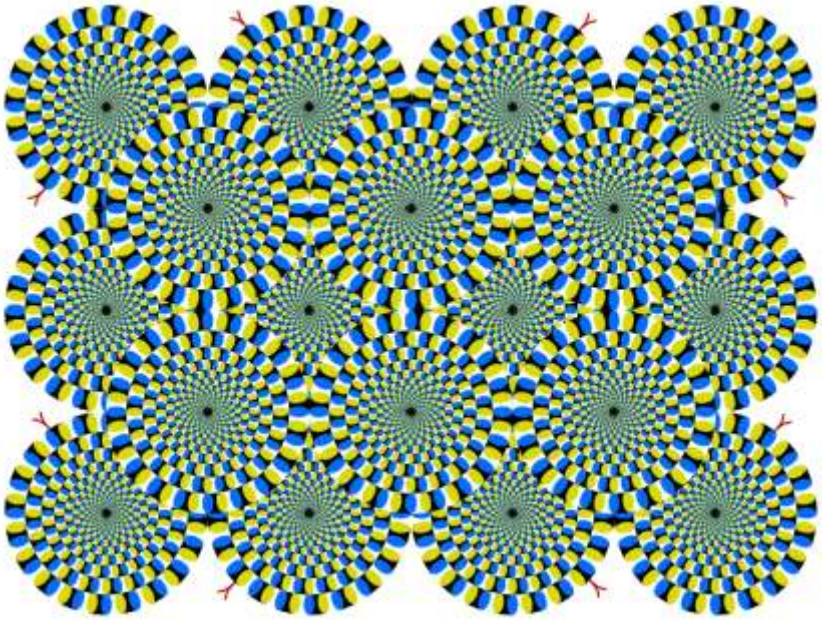


**Figure 5: Typical Level 4 ICMM Organisation Structure**

A key step-change in capability between a Level 3 (‘Managed’) and Level 4 (‘Strategic’) organization is that the bridge from seeing the world as ‘complicated’ to one that is ‘complex’ has been successfully crossed. Learning and innovation are thus – rightly – seen as tasks for every part of the business. In this sense, each business unit or project is perhaps best visualized as a series of concentric circles, with the learning and innovation sitting at the outermost portion and the Efficiency Engine at the heart.

Also, as the optical illusion used in the figure is trying to suggest, the organization is now designed in such a way that the relationships within and between different parts of the business are becoming much more dynamic. They might not be quite as ‘fluid’ as would ultimately be desirable, but the commonly used enterprise metaphor of a well-oiled machine comprising cogs and gears is beginning to look and feel out-dated…

…A problem the Level 5 organization – not that there are many of them on the planet at this moment in time – has largely managed to resolve. Drawing the model for a Level 5 organization becomes even more difficult because how do you construct a meaningful static image of a structure that is fluid and has evolved to become largely 'self-organizing'?

Consequently, you might need to bring a little imagination to bear on the Figure 6 representation of what a Level 5 ICMM organization looks like. The main bit of imagination required is to try and imagine the image as something closer to dynamic ripples in a pool: hierarchy has largely disappeared from the structure and, as much as possible, the business comprises a number of dynamic units that are ultimately tied by a shared set of over-arching business philosophies ('self-organization is a good goal' for example):

**Figure 6: Conceptual Level 5 ICMM Organisation Model**

Some of the bubbles will be growing, some not, some merging, others splitting and diverging. A key word used to describe any genuinely Level 5 ICMM organization is 'requisite': The Level 5 organization has found ways and means to understand their environment in order that they can deliver to customers the requisite types and blends of products and services in a manner that possesses the requisite levels of dynamism, stability, autonomy and size, and – perhaps most important of all – the requisite balance between Efficiency Engine and Learning & Innovation Engines.

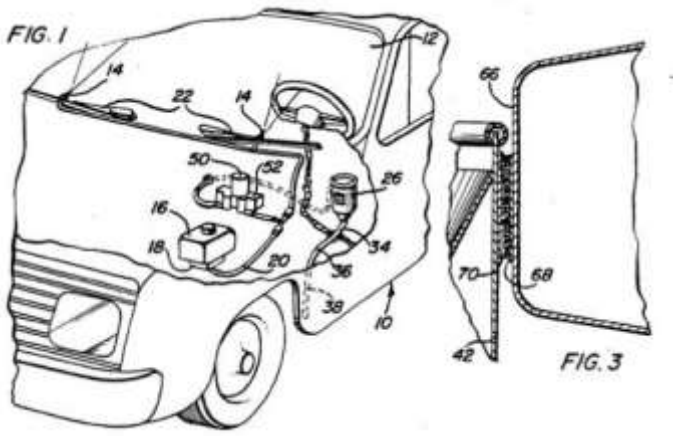
## Reference


1) Mann, D.L., 'Innovation Capability Maturity Model: An Introduction', IFR Press, September 2012.

**Quiz – Guess The Invention**

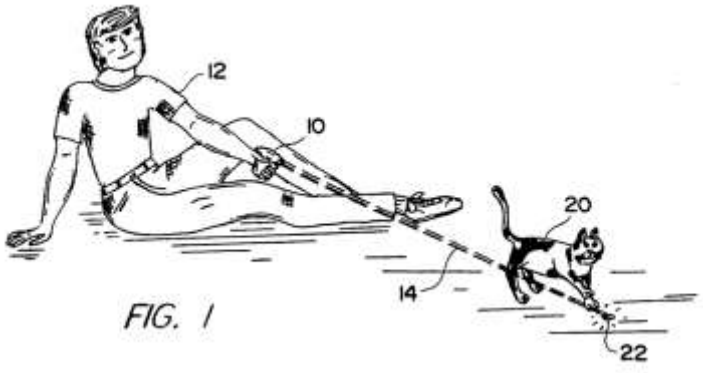
Here are a few genuine, granted patents with the text of the main Claim of the inventor. Can you guess what they are? Some are more famous than others. Answers at the back of the e-zine.

1) US4,989,275



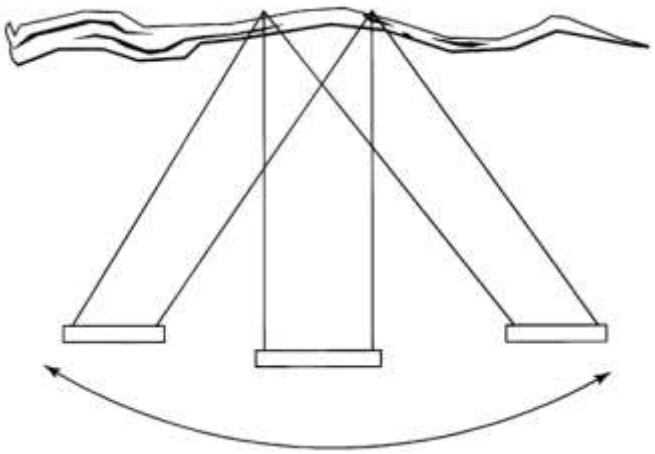

"In combination with a motor vehicle including a passenger compartment having a stationary component therein, a flushing liquid reservoir, a xxxxxxxx*, said xxxxx* including an upwardly opening receptacle incorporating a lower closure structure defining a gravity-type drain outlet opening therethrough toward which at least major portions of the upper surface of said lower closure structure are downwardly inclined, said receptacle and component including coacting support means supporting said receptacle in predetermined stationary position from said component within said compartment for ready manual release of said receptacle from said component and also subsequent ready re-support of said receptacle from said component through usage of single arms and hand movements independent of the use of tools, a flexible tubular drain line having one end operatively connected to said drain outlet for receiving liquid draining from said receptacle through said outlet, and flushing liquid delivery means operatively associated with said receptacle and reservoir for selectively pressure discharging flushing liquid from said reservoir into said receptacle, said coacting support means and flexible tubular drain line enabling single handed manual release of said receptacle from said component, manual displacement of the receptacle from an area adjacent said component to an area adjacent the head of the operator of the vehicle and subsequent manual return of the receptacle to said area adjacent said component and re-support of said receptacle from said component without requiring direct vision on the part of the operator of the vehicle."

2) US5,443,036



What is claimed is:
1. A method of inducing xxxxxxxxxx comprising the steps of:
(a) directing an intense coherent beam of invisible light produced by a hand-held laser apparatus to produce a bright highly-focused pattern of light at the intersection of the beam and an opaque surface, said pattern being of visual interest to a cat; and
(b) selectively redirecting said beam out of the cat's immediate reach to induce said cat to run and chase said beam and pattern of light around an exercise area.

3) US6,368,227



I claim:
1. A method of xxxxxx, the method comprising the steps of:
a) suspending a seat for supporting a user between only two chains that are hung from a tree branch;
b) positioning a user on the seat so that the user is facing a direction perpendicular to the tree branch;
c) having the user pull alternately on one chain to induce movement of the user and the swing toward one side, and then on the other chain to induce movement of the user and the swing toward the other side; and
d) repeating step c) to create side-to-side swinging motion, relative to the user, that is parallel to the tree branch.

4) AU2001100012

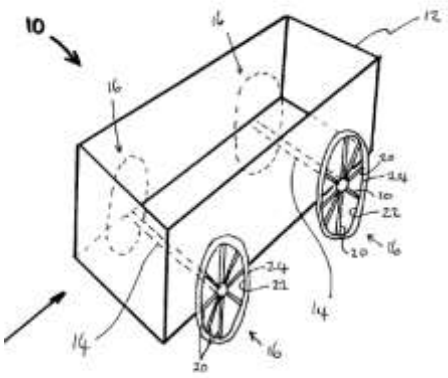



FIGURE 1

1. A transportation facilitation device including:- a circular rim; a bearing in which a hollow cylindrical member is rotatable about a rod situated within the hollow cylindrical member; and a series of connecting members connecting the circular rim with the hollow cylindrical member to

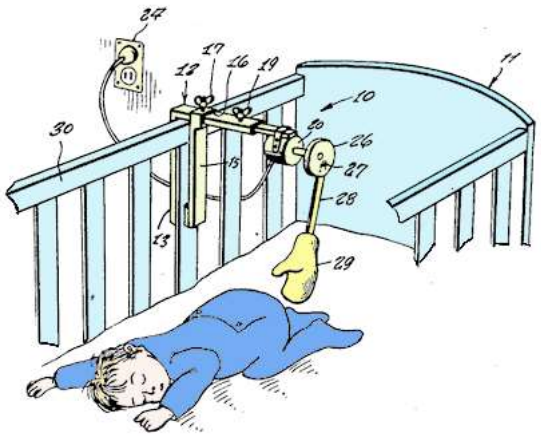
maintain the circular rim and the hollow cylindrical member in substantially fixed relation; wherein the rod is positioned on an axis perpendicular to the plane of the circular rim, and substantially central of the circular rim.

5) US*20060259306*

(no image)

1. The process of xxxxxx which comprises filing a patent application defining the novel features of the joke.

6) US3,552,388




I claim:
1. In a xxxxxx, the combination of a bracket, means for securing said bracket to a crib or couch, said bracket carrying a bar, means for longitudinal adjustment of said bar, said bar supporting an electric motor, and means connected to said motor for xxxxx.

Congratulations if you managed to get all the way to number 6. If you got three or more right, you should consider a future as a patent lawyer!

**Patent of the Month – Word Sense Disambiguation**

Patent of the month this month goes to a pair of inventors based at the University Of Houston System. US8,260,605, 'Word Sense Disambiguation' was awarded on September 4. It also features one of the more lucid descriptions of both the problem and the solution derived by the inventors. Here's the problem:

*As technology is increasingly necessary for more aspects of society, easing accessibility by lowering the technical and skill barrier for operation is vital. Humans use natural languages such as English and Spanish for communication and information processing. Technology does not. This divide is a major obstacle to lowering the technological barrier and is a long-standing problem in computational linguistics. One factor in this problem is the polysemy common in many natural languages, i.e., one word can have numerous senses. Word sense disambiguation (WSD) methods disambiguate a word's sense based on its context. How to choose a valid sense of a word with multiple senses based on context proves to be very difficult for technology even after twenty years of research in bridging the divide, but is routinely mastered by children. A solution to this problem will alter every intersection between humans and technology from a television remote to computer programming.*

*For example, when using Internet search engines, users input a few keywords that are used to form a query. Determining the senses of these keywords is essential for the quality of retrieved documents. Any mismatch between expectations and results is typically an error attributed to the user. As such, a kind of art form has developed from the ability to divine meaningful search terms. This requirement of skill is a barrier preventing adoption of technology. Considering other scenarios where technology must understand the sense of a word, in machine translation, before a sentence or phrase can be translated from one natural language to another language the machine translator needs to understand the senses of each word. Even a simple machine proofreader is likely to overlook errors of polysemy. As such, the importance of word sense disambiguation ("WSD") cannot be overemphasized.*

Here's how we can best map the WSD problem onto the IT version of the Contradiction Matrix: thing we wish to improve: the ability to select the contextually correct meaning of a word ('accuracy'). Thing that makes it difficult: one word can have multiple different meanings ('adaptability/variability'):

IMPROVING PARAMETERS YOU HAVE SELECTED:

Accuracy (6)

WORSENING PARAMETERS YOU HAVE SELECTED:

Adaptability/Versatility (12)

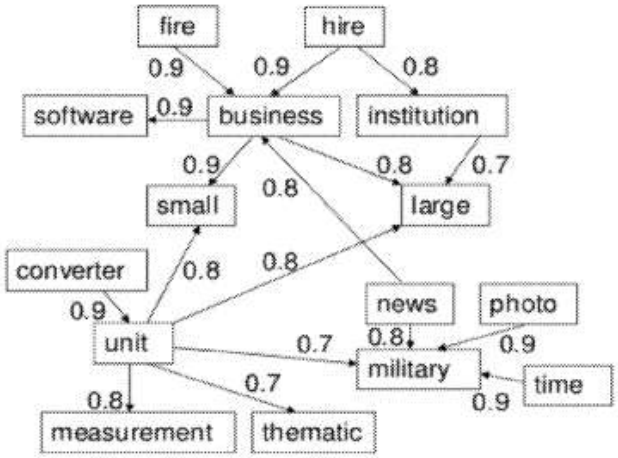
SUGGESTED INVENTIVE PRINCIPLES:

13, 10, 35, 25, 2, 24, 7

And here's the overall solution strategy claimed by the inventors:

*1. A non-transitory machine-readable storage medium comprising computer-executable instructions that, when executed by a processor, cause the processor to: receive as input a target sentence comprising a target word; retrieve a gloss of the target word; parse the target sentence and the gloss; and assign a score to the gloss based on the gloss's coherence to the target sentence, wherein assigning the score comprises assigning a first score to the gloss based on dependency weights of the gloss and a database; assigning a second score to the gloss based on dependency weights of the gloss and the target sentence; assigning a third score to a second gloss based on dependency weights of the second gloss and the database; assigning a fourth*

*score to the second gloss based on dependency weights of the second gloss and the target sentence; if the first score is higher than the third score, and the second score is higher than the fourth score, then selecting the gloss; and if the third score is higher than the first score, and the fourth score is higher than the second score, then selecting the second gloss.*




One of the clearest correlations regarding the strength of a solution is the number of Inventive Principles that can be observable in the inventive steps made by the inventors. In this particular solution, we can see at least four:
Principle 10, Prior Action – building of 'gloss' coherence values (as shown in Figure above). This is the main inventive step.
Principle 24, Intermediary – the database of coherence values.
Principle 7, Nested Doll – the sentence parsing strategy through the semantic engine…
Principle 2, Take Out - …the semantic engine separates verbs/noun from overall text.

Also in other parts of the invention disclosure:

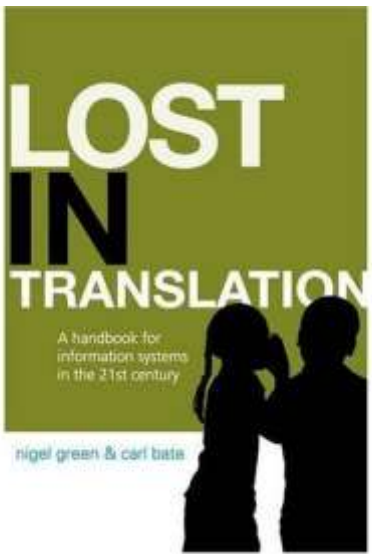
*…However, in at least one embodiment, database creation or addendum is performed "on-the-fly." For example, when a target word, for purposes of gloss retrieval, is not in the database, the target word is submitted as the target word for purposes of database addendum*
(A good illustration of Principle 25, Self-Service.)

*…an embodiment where hypernyms and hyponyms are used. A hypernym of a target word is a word that includes the target word and all the target word's referents in its own set of referents. A hypernym of a target word is sometimes called a superordinate, superclass, or superset of the target word. For example, "dog" is a hypernym of "Labrador," "Collie," and "Chihuahua."*
(A good illustration of Principle 7, Nested Doll.)

All in all, a really eloquent disclosure (worth reading for that reason alone!), a very elegant solution, and perhaps most important of all, a really good problem to have solved.

**Best of the Month – Lost In Translation**

Nothing ‘new’ to recommend this month, so we’ve decided to jump back a few of years, to 2007 in fact, and feature the ‘Lost In Translation’ book co-authored by someone we met in Hong Kong during our recent trip. If we need an excuse as to why we didn’t find the book earlier, it is because, when it was published it was largely targeted at the IT industry and specifically that part of the industry responsible for specifying big IT infra-structure systems.




The rear-cover of the book sets this scene:

*Do you speak "business" or "IT"? Perhaps you speak a little of both. In today's connected world, where business and IT are fused, chances are that if you're a business or IT executive, or someone working to transform a business, you speak a little of both. But what if there was a "third" language? A common language that was natural for both "business" and "IT," straightforward enough to use, yet sophisticated enough to work in today's connected world? What if such a language only comprised a handful of words? With such a language, the "loss in translation" between the business and IT would happen less, because both would be using the same language. With such a language, business outcomes and transformations would become much more achievable. This handbook describes what this language is- the language of Information Systems for the 21st century.*

In reality, however, we think the book does rather more than that. Here’

*“you are asked to build an IT system with two key objectives. First is to support and enhance clinical effectiveness. Second is to improve patient outcomes. The system must support data protection, patient confidentiality and medical ethics.*

*“Explain what the information system is that supports the following patient example.*
*“A woman aged 38 presents herself for fertility treatment. She has been married twice before. Both marriages broke down after failure to produce a child. Last year she met Mr Right, who wants a child as much as she does. It hasn’t happened. Her younger sister dies from breast cancer last year. There has been no history of breast cancer. She has a BMI of 32. She has black coffee, orange juice and a banana for breakfast. She has a light lunch and cooks in the evening for herself and her man. They both like fish and don’t eat red meat. She doesn’t smoke. She doesn’t snack between meals. She is a light drinker, 15 units per week. He has a child by a previous relationship but doesn’t see the child, who has moved abroad with the mother when the child was very young.”*



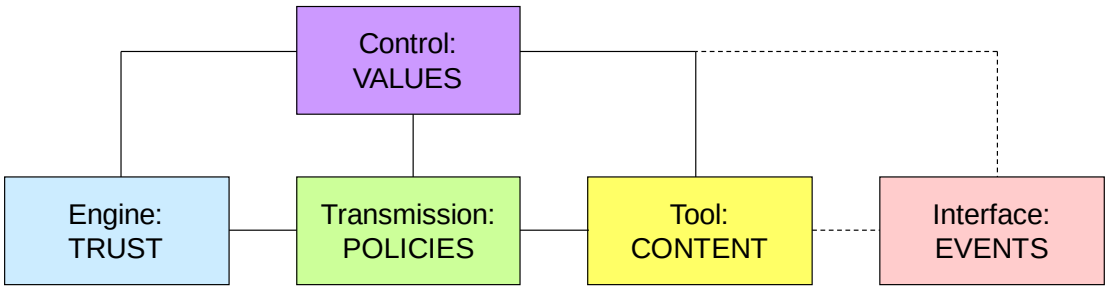
SYSTEM·ATIC INNOVAT·ION

This is a book, in other words, that goes some considerable way beyond the traditional (tangible) world of the IT system architect. In our language, it takes us very clearly into the world of people doing things for 'good' reasons and 'real' reasons and thus the parallel world of intangibles. As such its relevance goes – we think – to just about everyone that is involved in helping to create new ways of doing things.

The bulk of the book is built around a five part model, VPEC-T. Not the snappiest of acronyms perhaps, but you try making a better one from the five elements that make up the name: Values, Policies, Events, Content and Trust. By using the five elements, the authors propose that people can find new – better – ways to come together and resolve the underlying tensions within the information systems (tangible and intangible) in which they participate.

One of the first tests we tend to apply to establish the validity or otherwise of a piece of management literature, is a) what function does it help the reader achieve? And, b) does it describe the essential elements of a viable system. Most books fail the test at one or both tests. Lost In Translation doesn't. The five elements provide an early clue. Here's how we think it maps to the function delivery and the Law Of System Completeness's five element view of the world:

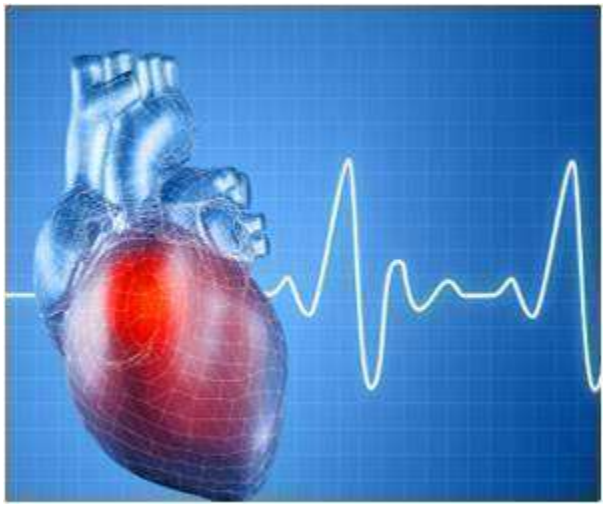
FUNCTION = 'communication between business and IT'




After describing the details of the model itself, the real heart of the book is about application of that model. This comes in a chapter titled, 'The Art of Clarity'. It is a gem of a chapter, not only because it puts forward a clear, easy to buy into, thinking framework but also because it recognises the importance of intangible factors and specifically the construction and use of stories as the very best way of getting people to engage with the overall Business/IT communication challenge VPEC-T process is trying to help solve.

All in all then, irrespective of your interest in IT systems, we're all in the communication business, and as such you should take a look at Lost In Translation and what it has to say on the subject. Not least of which because I picked up my copy for 1p from Amazon. And if that's not deal of the year, I don't know what is.

**Investments – Wireless Cardiac Device**



A team of engineers at Stanford has demonstrated the feasibility of a super-small, implantable cardiac device that gets its power not from batteries, but from radio waves transmitted from outside the body. The implanted device is contained in a cube just eight-tenths of a millimeter in radius. It could fit on the head of pin.

The findings were published in the journal *Applied Physics Letters* recently. In their paper, the researchers demonstrated wireless power transfer to a millimeter-sized device implanted five centimeters inside the chest on the surface of the heart -- a depth once thought out of reach for wireless power transmission.

The paper's senior author was Ada Poon, a professor of electrical engineering at Stanford. Sanghoek Kim and John Ho, both doctoral candidates in Poon's lab, were first authors. The engineers say the research is a major step toward a day when all implants are driven wirelessly. Beyond the heart, they believe such devices might include swallowable endoscopes -- so-called "pillcams" that travel the digestive tract -- permanent pacemakers and precision brain stimulators; virtually any medical applications where device size and power matter.

**A revolution in the body**

Implantable medical devices in the human body have revolutionized medicine. Hundreds of thousands if not millions of pacemakers, cochlear implants and drug pumps are today helping people live relatively normal lives, but these devices are not without engineering challenges.

First off, they require power, which means batteries, and batteries are bulky. In a device like a pacemaker, the battery alone accounts for as much as half the volume of the device it drives. Second, batteries have finite lives. New surgery is needed when they wane. "Wireless power solves both challenges," said Poon.

Last year, Poon made headlines when she demonstrated a wirelessly powered, self-propelled device capable of swimming through the bloodstream. To get there she needed to overturn some long-held assumptions about delivery of wireless power through the human body.

Her device works by a combination inductive and radiative transmission of power. Both are types of electromagnetic transfer in which a transmitter sends radio waves to a coil of

wire inside the body. The radio waves produce an electrical current in the coil sufficient to operate a small device.

There is an indirect relationship between the frequency of the transmitted radio waves and the size of the receive antenna. That is, to deliver a desired level of power, lower frequency waves require bigger coils. Higher frequency waves can work with smaller coils. "For implantable medical devices, therefore, the goal is a high-frequency transmitter and a small receiver, but there is one big hurdle," explained Kim.

**Ignoring consensus**

Existing mathematical models have held that high frequency radio waves do not penetrate far enough into human tissue, necessitating the use of low-frequency transmitters and large antennas -- too large to be practical for implantable devices.

Ignoring the consensus, Poon proved the models wrong. Human tissue dissipates electric fields quickly, it is true, but radio waves can travel in a different way -- as alternating waves of electric and magnetic fields. With the correct equations in hand, she discovered that high-frequency signals travel much deeper than anyone suspected.

"In fact, to achieve greater power efficiency, it is actually advantageous that human tissue is a very poor electrical conductor," said Kim. "If it were a good conductor, it would absorb energy, create heating and prevent sufficient power from reaching the implant."
According to their revised models, the researchers found that the maximum power transfer through human tissue occurs at about 1.7 billion cycles per second.

"In this high-frequency range, we can increase power transfer by about ten times over earlier devices," said Ho, who honed the mathematical models.

The discovery meant that the team could shrink the receive antenna by a factor of ten as well, to a scale that makes wireless implantable devices feasible. At that the optimal frequency, a millimeter-radius coil is capable of harvesting more than 50 microwatts of power, well in excess of the needs of a recently demonstrated eight-microwatt pacemaker.

**Additional challenges**

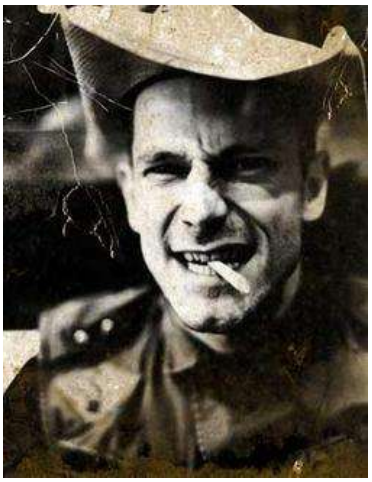
With the dimensional challenges solved, the team found themselves bound in by other engineering constraints. First, electronic medical devices must meet stringent health standards established by the IEEE, particularly with regard to tissue heating. Second, the team found that receive and transmit antennas had to be optimally oriented to achieve maximum efficiency. Differences in alignment of just a few degrees could produce troubling drops in power.

"This can't happen medical devices," said Poon. "As the human heart and body are in constant motion, solving this issue was critical to the success of our research."
The team responded by designing an innovative slotted transmit antenna structure. It resembles a swastika, but delivers consistent power efficiency regardless of orientation of the two antennas.

The new design serves additionally to focus the radio waves precisely at the point inside the body where the implanted device rests on the surface of the heart, increasing the electric field where it is needed most, but canceling it elsewhere. This helps reduce overall tissue heating to levels well within the IEEE standards. Poon has applied for a patent for the antenna structure.

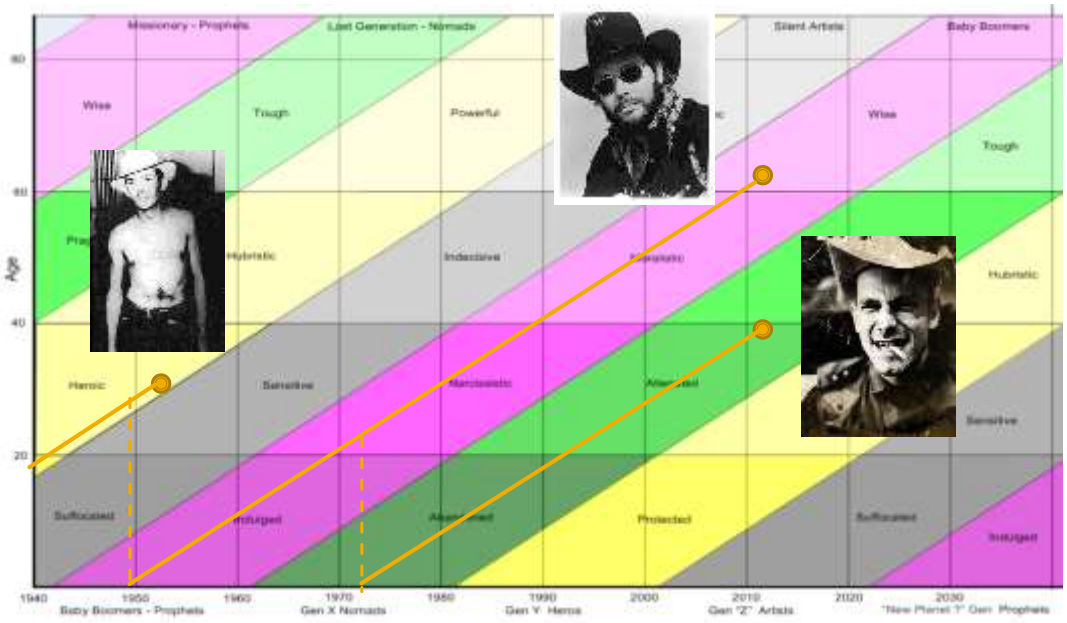
**Generational Cycles – The Three Hanks**





There has been a strong recent trend of popular music performers that have spawned offspring that have gone on to have their own career in music (the Thompsons, Wainwrights, Dylans, Buckleys, Carter/Cash's, etc). Rarely, though, has there been a case of three successive generations of musician. Perhaps the most famous musical dynasty are Hank Williams, Hank Williams Jr, and Hank Williams III (shown left to right above).

As it turns out, the trio represent a pretty good illustration of the traits of three of the four generation archetypes. Here's how they appear on the generations map:




Let's take a snapshot view of each Hank:

**Hank Williams** (September 17, 1923 – January 1, 1953), was an American singer-songwriter and musician regarded as one of the most important country music artists of all time. During his short life he recorded 35 hit singles and 11 number ones and posthumously became the inspiration to a host of other musicians and recording artists. In true Hero generation manner, he died at age 29 having lived a life consuming heroic levels



SYSTEM·ATIC INNOVAT·ION

of alcohol, morphine and other painkillers.  His lifestyle severely compromised his professional and personal life - he divorced his wife and was dismissed by the Grand Ole Opry due to frequent drunkenness – all of which ultimately combined to create a certain heroic aura around him. Williams died suddenly in the early morning hours of New Years Day in 1953 from heart failure brought on by pills and alcohol.

**Hank Williams Jr** (born May 26, 1949), barely knew his father, but nevertheless followed him into the music business. Williams began his career by following in his famed father's footsteps, singing his father's songs and imitating his father's style. Williams Jrs' own style slowly evolved as he struggled to find his own voice and place within the country music industry. This trend was interrupted by a near-fatal fall off the side of Ajax Mountain in Montana on August 8, 1975. After an extended recovery, he challenged the country music establishment with a blend of country, rock, and blues. Williams enjoyed much success in the 1980s, from which he earned considerable recognition and popularity both inside and outside the country music industry. From a generational archetype perspective, Jr didn't have the typical Prophet generation, Baby Boomer start in life, and so it was really only after he'd escaped from the shadows of his father's legacy that he really took on what we know as the classic Prophet generation characteristics – i.e. the desire to challenge the status quo and re-invent the world. Essentially through organized protest. An interesting segment from his Wikipedia page is perhaps telling:

In an October 3, 2011, interview with Fox News Channel, Williams referred to a June golf game in which President Barack Obama and Republican House Speaker John Boehner had teamed against Vice President Joe Biden and Ohio Governor John Kasich, saying that match was "one of the biggest political mistakes ever".

Asked about why that golf game disturbed him, Williams said, "Come on. That'd be like Hitler playing golf with Netanyahu ... In the country this shape is in ... I mean, in the shape this country is in?" He also stated the President and Vice President are "the enemy" and compared them to "the Three Stooges". When anchor Gretchen Carlson later said to him, "You used the name of one of the most hated people in all of the world to describe, I think, the president." Williams replied, "Well, that is true. But I'm telling you like it is." As a result of his statements, ESPN dropped Williams' opening musical number from its *Monday Night Football* broadcast of the Tampa Bay Buccaneers versus the Indianapolis Colts and replaced it with the national anthem.

Later, Williams stated his analogy was "extreme – but it was to make a point", and "Some of us have strong opinions and are often misunderstood ... I was simply trying to explain how stupid it seemed to me – how ludicrous that pairing was. They're polar opposites, and it made no sense. They don't see eye-to-eye and never will."

Williams went on to claim he has "always respected the office of the president" despite having called the commander-in-chief "the enemy" and in context continued with, "Every time the media brings up the Tea Party, it's painted as racist and extremists – but there's never a backlash, no outrage to those comparisons ... Working-class people are hurting – and it doesn't seem like anybody cares. When both sides are high-fiving it on the ninth hole when everybody else is without a job – it makes a whole lot of us angry. Something has to change. The policies have to change." ESPN later announced they were "extremely disappointed" in Williams' comments, and pulled his opening from that night's broadcast.

Three days later, ESPN released a statement announcing Williams and his song would not return to *Monday Night Football*, ending the use of the song that had been part of the broadcast on both ABC and ESPN since 1991. Williams has further expressed defiance and indifference on his website, and said he was the one who made the decision. "After reading hundreds of e-mails, I have made MY decision," he wrote. "By pulling my opening Oct 3rd, You (ESPN) stepped on the Toes of The First Amendment Freedom of Speech, so therefore Me, My Song, and All My Rowdy Friends are OUT OF HERE. It's been a great run."

**Hank Williams III** ((born December 12, 1972) – in classic alienated Nomad generation mode also went into the music business, but rather than respecting the tradition of his father, his chosen musical style alternates between country, punk and metal. He is the principal member of the punk metal band Assjack, the drummer for the Southern hardcore punk band Arson Anthem, and was the bassist for Pantera singer Phil Anselmo's band Superjoint Ritual. On more than one occasion he has seemingly sabotaged his career by not acceding to his record company wishes, to the extent, ultimately that he decided the only course of action was to set up his own independent label. On June 23, 2011, it was then revealed through Williams' personal Facebook that he would be releasing four new CDs on September 6, 2011. In, again true (alienated, do it my-way) Nomad manner, said to expect country, doom-rock, speed metal with cattle callin' on the releases. Poor restless soul. Regarding his father's Prophet-like political ambitions, Hank III:

"stayed neutral in the debate, telling the media that most musicians, including his dad, are "not worthy" of a political discussion."

**Biology – Red-Legged Salamander** (Plethodon shermani)

What's an amorous male salamander supposed to do? You find what you think is your ideal future mate (photograph above), do your best to woo her only to find that she's much more interested in eating the forest floor invertebrate population than getting it on with you. Hmm. A problem perhaps all of us males have encountered at some point or other.

Well, fortunately you need worry no more. The sly red-legged salamander has worked out a pretty nifty answer. Without even using the Contradiction Matrix… although here's what he would've discovered if he had:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE SELECTED:

Trainability/Operability/Controllability (34)

SUGGESTED INVENTIVE PRINCIPLES:

28, 7, 26, 24, 10, 1, 35, 25, 15

Not such an easy problem to map onto the tool of course, but the basic problem is he's trying to improve his chances of mating ('Productivity' – a fairly common link in nature), and what's preventing him is his lack of control over her desire to eat.

As it turns out the most frequently used Principle for solving this kind of problem, 28, 'Mechanics Substitution/Another Sense' is precisely the solution that the cunning male has evolved. He's discovered a rather wonderful pheromone that manages to suppress her appetite and thus makes her more inclined to accept his advances.

We're currently in negotiations to have it bottled. Details in the SI on-line shop ☺



SYSTEM ·ATIC INNOVAT· ION

## Short Thort

*"The real trouble with this world of ours is not that it is an unreasonable world, nor even that it is a reasonable one. The commonest kind of trouble is that it is nearly reasonable, but not quite. Life is not an illogicality; yet it is a trap for logicians. It looks just a little more mathematical and regular than it is."*
G.K.Chesterton

*"The difference between the right word and the almost right word is the difference between lightning and a lightning bug."*
Mark Twain

## News

**Hong Kong Knowledge Management Society**
Probably too late by the time you read this, but just in case, we are giving a 2 hour address to the Innovation Research Centre of the HK Polytechnic University on 11 September. The subject will be 'What If 99% Of Knowledge Was Noise?' We will in any event put a copy of the slides onto the 'Free Downloads' page of the website.

**ICMM Introduction workshop**
We will be running our first public UK Innovation Capability Maturity Model workshop at our Clevedon HQ on 27 November. More details and bookings at the usual web address.

**The Hero's (Start-Up) Journey**
Amazing how these things appear from nowhere sometimes. Having decided that the Innovation Capability Maturity Model needed a 'Level 0', we found some amazing co-author resources and, six weeks after we started, already have what looks something like a complete manuscript for a book. In the race to complete the whole series of ICMM Journey books, the one we started last, looks set to cross the finishing line first. Details on the website 'Products' page shortly.

**Congratulations!**
Anyone that contacts our office will know Hannah. For anyone old enough to know the US TV series M*A*S*H, they will know the character 'Radar' O'Reilly – the corporal that

actually runs the whole unit. Hannah is our Radar. She got married on 8 September. Everyone at SI Towers wishes her well. And hopes that her organization skills don't get diluted when she finds she also has a husband as well as a bunch of random SI people to manage ☺.

**Teacher's Day**

5 September was Teacher's Day in India. I know this because I received a host of 'Happy Teacher's Day' emails from Indian friends. A big thank you to all that made the effort. I was not only flattered, but also somewhat humbled by the experience. Given that I often feel like I learn far more from these people than I'm sure they learn from me, I also have a sneaking suspicion I might actually be the worst teacher in the world.

**New Projects**

This month's new projects from around the Network:

FMCG – technical problem solving project
Energy – Eyes on the World study
Medical Devices – IP strategy project
Healthcare – Innovation Culture workshops
Legal – TrenDNA marketing strategy project
Mining – problem-solving workshops
FMCG – Anthropology study
Government – R&D strategy study
Consulting – Training programme

Answers to Patent Quiz

1) Flushable Vehicle Spittoon
2) Method Of Exercising A Cat (famous invention made by patent lawyer trying to demonstrate the patent system was dysfunctional)
3) Method Of Swinging On A Swing (ditto)
4) Wheel (ditto)
5) "Business Method Protecting Jokes"
6) "Baby Patting Machine"