Systematic Innovation

e-zine

Issue 102, September 2010

In this month's issue:

Article – Mood Swings Part 1: Generational Rhythms

Article –   Innovation Dashboard: Silo Index

Humour – Merging

Patent of the Month – Semiconductor Meta-Materials

Best of The Month – The Next Evolution Of Marketing

Conference Report – First Beijing Global World City

Investments – Self-Repairing Photovoltaics

Generational Cycles – My Generation/Your Generation

Biology – Wheel Spider

Short Thort

News

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

Mood Swings
(Part 1: Generational Rhythms)

At Systematic Innovation we are constantly looking for useful pieces of research, or other such nuggets that fit in with our approach to life. We like things that uncover patterns, formulate contradictions or work back from perfection. Above all, we like things that can be shown to work and deliver results. Over the years this search has widened from the technically focused domain of TRIZ into diverse topics and disciplines.

One of our favourites is the work of historians Straus and Howe. Books such as "The Fourth Turning" (Reference 1), the culmination of many years of solid research simply remap your view of the world. Unfortunately, their later books, concentrating on the millennial generation (Reference 2) seem to be cashing in on their rise to fame. But a cursory flick through their early books makes you realise historians use an awful lot of words, and very view pictures or illustrations (Reference 3). So to get the full benefit from their incredibly insightful work, you have to be prepared to wade through a myriad of text. A picture, as we know speaks a thousand words, which is why we've spent a fair amount of time re-framing the findings to make them easier to grasp. Figure 1 seems to have become one of the more popular of these efforts.
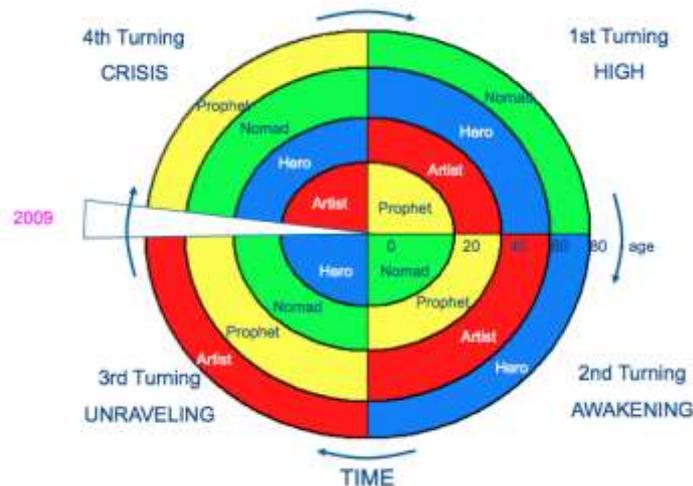

Figure 1: Four Phases Of Strauss & Howe's Generational Cycle

Faced with a rotating circle, a mechanical engineer will immediately think about hooking up a crank, to get a reciprocating piston motion. A mathematician will think about differential calculus and geometry. An electrical engineer will start thinking about phases and sine waves.

And in fact, in their 1995 book "Generations", Straus and Howe do indeed show a sine wave (page 99). So maybe within the myriad of words in the Generations books, we can distil some of the knowledge into pithy, meaningful graphics.

One of the most striking parts of the work is the characterisation of the moods of the four turnings - in part 1 chapter 4, "cycles of history". A really useful aspect is that these repeating cycles can be meaningfully applied for several decades into the future, giving a contextual framework for our work. Fortunately, Straus and Howe did summarise their work in table form :

SYSTEM·ATIC·INNOVAT·ION

| MOODS OF THE FOUR TURNINGS			
First (High)	**Second (Awakening)**	**Third (Unravelling)**	**Fourth (Crisis)**
Generation Entering :			
Elderhood — *Nomad*	*Hero*	*Artist*	*Prophet*
Midlife — *Hero*	*Artist*	*Prophet*	*Nomad*
Young Adulthood — *Artist*	*Prophet*	*Nomad*	*Hero*
Childhood — *Prophet*	*Nomad*	*Hero*	*Artist*
Families — *strong*	*weakening*	*weak*	*strengthening*
Child Nuture — *loosening*	*underprotective*	*tightening*	*overprotective*
Gap Between Gener roles — *maximum*	*narrowing*	*minimum*	*widening*
Ideals — *settled*	*discovered*	*debated*	*championed*
Institutions — *reinforced*	*attacked*	*eroded*	*founded*
Culture — *innocent*	*passionate*	*cynical*	*practical*
Social Structure — *unified*	*splintering*	*diversified*	*gravitating*
Worldview — *simple*	*complicating*	*complex*	*simplifying*
Social Priority — *maximum community*	*rising individualism*	*max individualism*	*rising community*
Social Motivator — *shame*	*conscience*	*guilt*	*stigma*
Sense of greatest need — *do what works*	*fix inner world*	*do what feels right*	*fix outer world*
Vision of future — *brightening*	*euphoric*	*darkening*	*urgent*
Wars — *restorative*	*controversial*	*inconclusive*	*total*

This is a useful overview of the research findings. So what if we were to summarise each of the relevant sections with a graphic ?

- Rising trend
- 4Top of a trend
- Falling trend
- Bottom of the trend

It seems that "ideals", "social motivator", "sense of greatest need" and "wars" are not easy to quantify as trends, but the remainder are, so let us map the symbols onto them.

MOODS OF THE FOUR TURNINGS			
First (High)	**Second (Awakening)**	**Third (Unravelling)**	**Fourth (Crisis)**
Generation Entering :			
Elderhood — *Nomad*	*Hero*	*Artist*	*Prophet*
Midlife — *Hero*	*Artist*	*Prophet*	*Nomad*
Young Adulthood — *Artist*	*Prophet*	*Nomad*	*Hero*
Childhood — *Prophet*	*Nomad*	*Hero*	*Artist*

SYSTEM·ATIC INNOVAT·ION

By joining up the graphics as they appear in each row, we can see that for each of the categories we actually have our sine waves appearing :
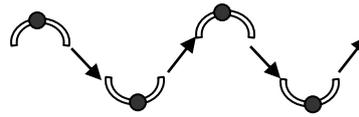

We can also see that several categories follow the same pattern and are in sync with each other - families, gender role gap, strength of institutions, social structure, and social priority (community). We could call this the core cycle. "World view" is fully out of phase with the core cycle. In electrical / mathematical terms it is 180 degrees out of phase. "Vision of the future" lags the core cycle by 90 degrees and "Child Nurture" leads by 90 deg. Straus and Howe suggest that the primary reason for the cycle is that each generation nurtures its offspring differently to the way it was itself nurtured. So lets put all this into graphical form, and concentrate the graphics on the core cycle and child nurture, and see if it makes sense:
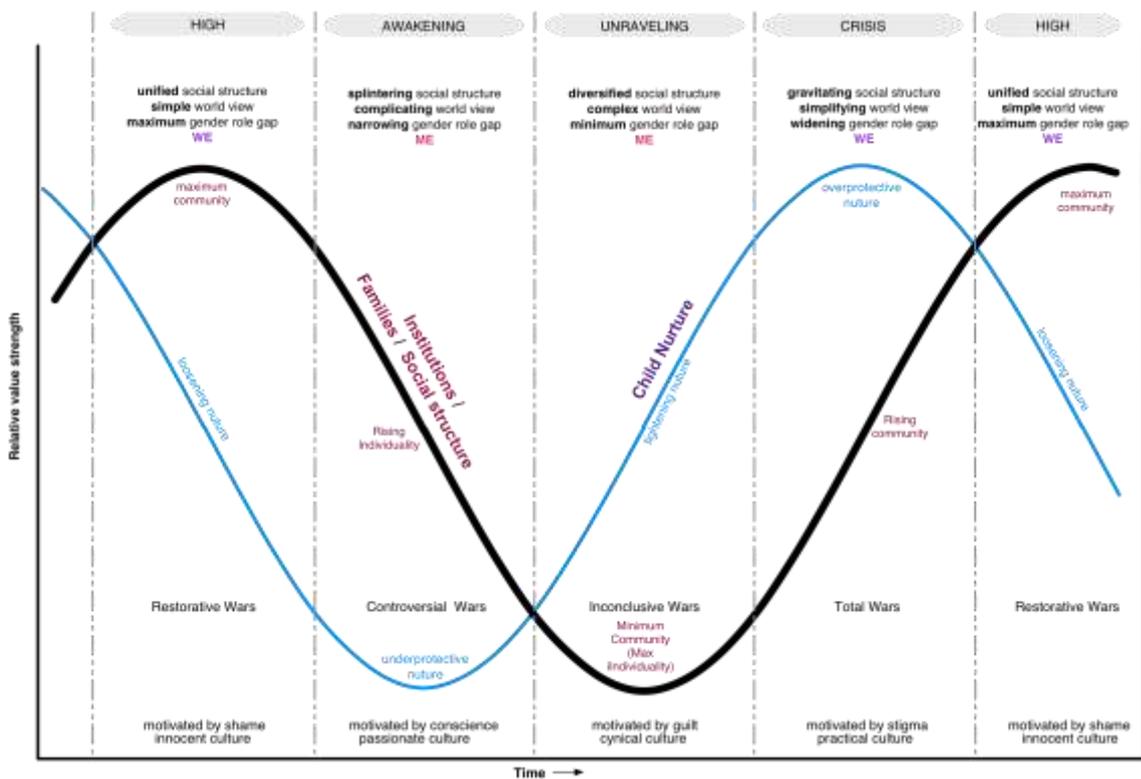
The first point to make, is that these sine waves should be thought of as very much more fuzzy than the mathematical uses to which they are normally put. It is about the trend direction, rather than some sort of absolute metric.

Secondly, the research is pretty clear that the peaks of the sine curve occur at the middle of the turnings, rather than the transitions, but again this is fuzzy. There is a great deal of information in this one picture, and thanks to the rigorous background research, we can be confident that this same pattern has repeated for many centuries, except for one cycle during the American civil war.

Now let us populate the diagram according to generational boundaries where we are in the cycle right now :
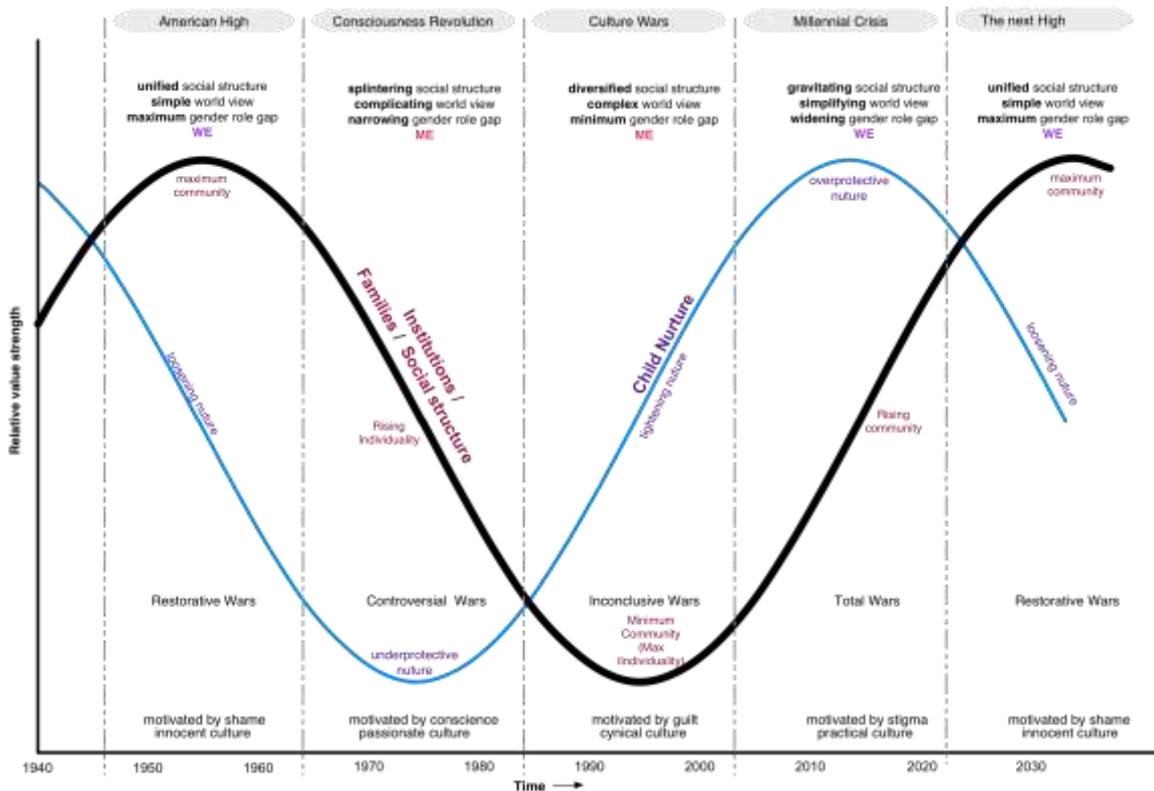
Child Nurture

Each generation deals with its children differently. Many things affect the way a generation is brought up. It is determined not only by parents – in their 20's and 30's, but by policy makers and opinion formers in their 40's and 50's – head teachers, authors, healthcare professionals, media editors, politicians, religious leaders and older parents.

We can see that the "latch key" generation X (born during the consciousness revolution) is now, almost two generations on, as today's senior teachers, older parents and even presidents / prime ministers, presiding over a child nurture environment almost alien to the one in which they came of age. From this GenX authors experience, if you visited any woodland close to populated areas in the 1970's, most easily climbable trees were decorated with initials and declarations of love or abuse carved into the bark - often at worrying altitude. Difficult to climb trees were festooned with bent over, rusty 6 inch nails. Today, urban woodlands feel more like deathly quiet wilderness – well, anyone could be lurking there, lying in wait to do unspeakable evil to defenceless children. Tree houses are bought at the local DIY store and safely erected by Dad or even contractors, not constructed from assorted planks, rope and bits of rusty bedstead. The two time periods really could not be more different.

You can probably feel the nostalgia oozing from the page / screen as you read this, and you would be absolutely correct. But this serves to demonstrate the underlying common sense of generations research. Having spent our early parenting years fiercely protecting children from whatever latest scare story the media could dream up, as maturing mid life do-ers, GenX are starting to realize that actually, we didn't actually suffer too badly from our under-protected upbringing. As so as we come into the most influential policy forming

period of our lives, GenX will be instrumental in swinging the pendulum back to where we came from.

Many people looking to the future without this cyclical pattern in mind probably see this trend as a linear progression, where in 20 years time children will be even more closely monitored, controlled and suffocated. However, the cycle says they are wrong. We are nearing the peak, and soon, society will be getting more relaxed about its children.

The Core Cycle

Today, it is thought that we are in the early stages of a "crisis" phase / turning. So if the theory holds, and looking at the diagram, we should see a social structure that is starting to gravitate, mending its splintered recent past. There should be a generally complex world view, that is starting to simplify, and a widening gap between gender roles. In short, we should be sensing a shift away from a "me" based, individualistic society. Our children should feel over protected, and our institutions should be in the midst of being re-thought and re-engineered. Wars occurring in the next 15 years or so are most likely to be fought through to a clear conclusion.

If one puts this to the test, one can sense a change of attitude, a pendulum swing away from the self focused 1980's of the Thatcher/Reagan era, to today's situation where increasing community is starting to gain traction. One gets the feeling that from banking to healthcare, social security to prisons, current institutions are being re-engineered. The sine waves tell us that we are making a transition from an individualistic "me" based society, towards a less individualistic "we" based social order. It is only now that we have passed the extreme of the peak that the new direction is becoming clear.

Let us look for instance at the health care reforms in the USA. Anyone that knows grass routes America knows in implementing healthcare reforms, the Obama administration is pulling off something that only a few years ago would be unthinkable. On this side of the Atlantic we also have David Cameron's "big society", looking to rebuild community spirit, and re-engineer the relationship between state and society. This is gaining at least some traction in sharp contrast to John Majors "back to basics" programme that spectacularly failed almost one generation earlier in 1993, despite having similarities.

It is pretty clear that despite the theory being developed in the early 1990's, the sine waves still fit today's world. What other research into the future, published in 1993 to 1997 would still be as relevant in 2010 ? The big question is WHY ?

The simple answer is "the interaction between generational archetypes at different phases of life". So we need to map that onto the diagram too, although we will have to wait until next month to have the space to do that properly.

But for now, let us look at just one generations perspective - obviously the most important one (at least to the author). Gen X - that of Obama / Cameron. As you already know, we grew up left very much to our own devices, risking trips to casualty climbing dangerously high things. We learned about risk taking ourselves, dangling on high branches, skate boarding without skate parks, or BMX'ing without a BMX. We rode our Raleigh Grifters without helmets - gasp. Our baby boomer parents (born didn't seem to mind - they were busy getting over finding their inner selves during the 60's. They were a generation able to play the whole field before settling down. The only consequences were from their straight laced, "square" parents - and what better way to rebel against them than to have a revolution - a consciousness / sexual revolution. A revolution that also spoke of rights -

rights for ME. Children, became a choice, rather than a duty, and if something went wrong with birth prevention, the expectant mothers became the first generation to be able to choose to safely bail out by termination. Quite a first for GenX unborns. Even having settled down, our parents felt they had the right to a perfect marriage, so if that relationship failed to live up to the dream there was a bailout option available too, easy divorce. And as we know, children generally feel that they are to blame. So many GenX children grew up with inherited guilt.

Then, when the 60's revolution memories started to fade during the 1980's our self focused parents started to focus one something else - not us of course - money. Society had entered the next turning - the Unraveling "Culture wars". Boomers elected Thatcher / Regan, and looked to fix themselves with things - with status symbols, second cars, second bathrooms, large colour TV's and soda streams. Our mothers exercised their rights to be equal to men, (minimum gender role gap) and be full time workers - earning money to be able to get the things that we wanted - and making sure that they could spend quality time with us - which they often failed to do.

We grew up abandoned, something of an inconvenience to our parents generation. But this made us independent and strong minded. As we came of age we rebelled, and we made sure everyone knew about it. We were punks, rockers, hooligans, skinheads and yobs and often rather unpleasant. Our heroes were the Sex Pistols, The Clash, AC/DC, and Motorhead and they were loud. We had to shout to be noticed. Of course, nice people could be into Abba or the Jackson Five, but the more angst driven among GenX wanted a riot, and often that's what happened. Of course there are anti-social, unsavory youngsters today, but they are mere wimps in comparison to GenX rebels. They quietly (relatively speaking) hide underneath "hoodies" and street fashion, not showing off with outrageous haircuts, piercings, and home-made paraphernalia. Yes there are still punks, rockers and skinheads, but they were far more shocking the first time, especially compared to the violence and antisocial behavior of the Mods and Teddy Boy Rockers of the 50's. (during the High turning)

But what about now? Now it is our turn to be in the power seat. Our lives so far have spanned two selfish generations, "me" based societies (awakening and unraveling). We have seen institutions become outmoded, and now unraveled. As young parents we had the opportunity to change things by firmly protecting our children from the dangerous world - and we took that opportunity Now, moving onto more influential roles we have the opportunity address the dangerous world and its discredited institutions - and we will take that opportunity too.

There is something in our conscience that gives us the conviction that it is the right thing to do - the distant, friendly voice of our grandparents. We still remember fond times spent sat on knees reminiscing about "the good old days", when they could leave their homes unlocked, everyone helped each other out, and ex servicemen were heroic WW2 fighter pilots, Colditz escapee's or Desert Rats. We have within us the subconscious notion that for all of our lives, the institutions and leaders since our grandparents (Heroes) have failed, and it is us that have largely been on the receiving end of the fallout - the abandoned children of a broken system. But our resulting rebellious, independent strong minded attitudes are exactly what are required for strong, pragmatic leadership. So, GenX style "Change is coming to America", and the UK is getting big society.

SYSTEM
ATIC
INNOVAT
ION

So, some nuggets to leave you with until next time. This is a summary of how the child nurture and core cycle waves are linked at the moment :

1. GenX are suspicious of the previous two Generations - their Boomer / late Silent generation parents.
2. As an abandoned generation, they are independent and strong minded
3. They rebelled as unpleasant (punk) teenagers, they rebelled as young parents by protecting their children from the bad world they inherited.
4. They have unwittingly created a new GenY hero archetype generation, which matches the generation that spoilt them with sweets - their grand parents - the last hero cohort
5. They will now be instrumental in building a new world, and fighting new wars to a conclusion.

And so the cycle continues - same story - different script. Our job as innovation specialists, is to use this framework to inform our work. Just presenting the information in such an accessible way is helpful, but there is a lot more to be considered, and so the story continues next month.

Conclusions

The societal trends, moods and patterns identified by Straus and Howe map as Sine Waves into the generational timeline.

Plotting these sine waves into the timeline enhances the ease of understanding how the child nurture trend leads the core cycle by one generation. It also helps us to forecast into the future.

References

1. Neil Howe, William Strauss, The Fourth Turning: An American Prophecy, 1997, ISBN 0-553-06682-X
2. Neil Howe, William Strauss, Millennials Rising: The Next Great Generation, 2000, ISBN 0-375-70719-0
3. Neil Howe, William Strauss, Generations: The History of America's Future, 1584 to 2069, 1991, ISBN 0-688-11912-3

By Paul Frobisher.

SYSTEM
·ATIC
INNOVAT·
ION

Innovation Dashboard: Silo Index

As innovation becomes a more and more important factor in the life of any organization, the desire for management to measure innovation capability increases in direct proportion. If the aphorism 'what's get measured gets done' has any meaning, in the innovation context it quite probably tells us that companies find the innovation job so difficult because they don't measure it. Or, more likely, don't know how to measure it. From a measurement perspective, innovation is still very much an 'art' rather than a 'science'.

We've been developing a number of innovation metrics in recent months (see the ICMM article in April and the Requisite Agility article from a couple of months ago), and have recently been piloting an 'innovation dashboard' with a number of client companies. Figure 1 illustrates a typical version of that dashboard:
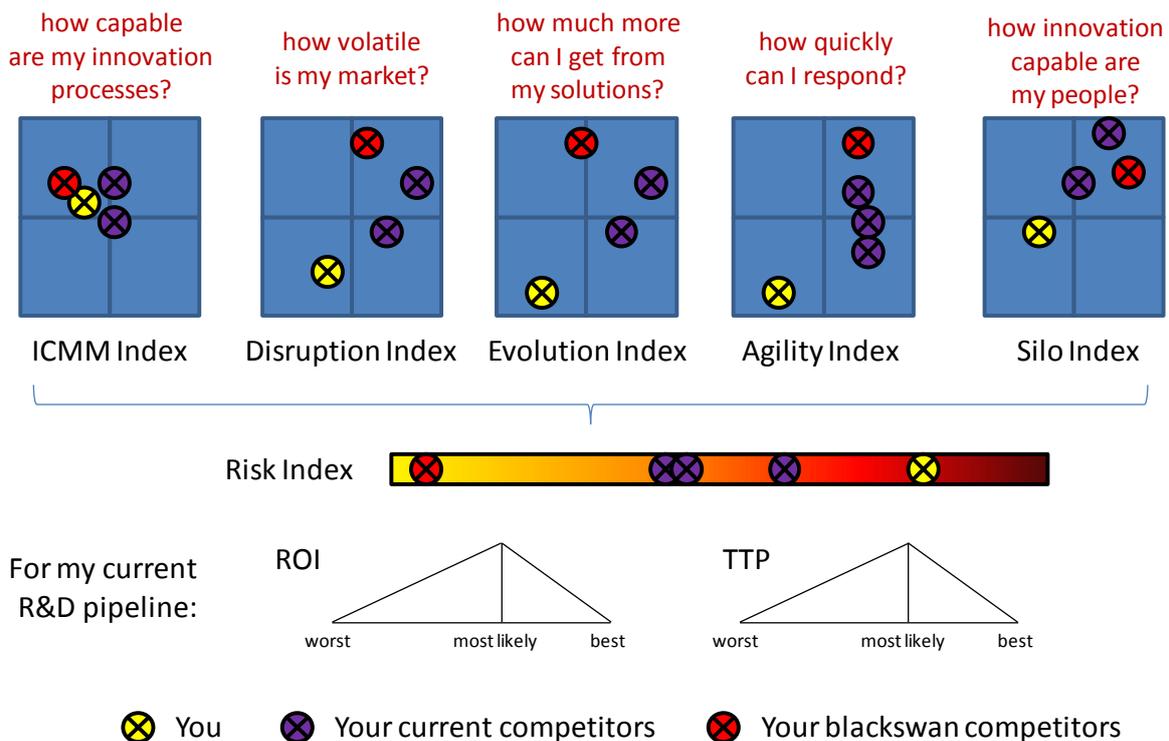

Figure 1: Typical (C-Suite Level) Innovation Dashboard

When we started to design this dashboard, we started from the premise that the job to be done was to identify the right measures and then work out how to achieve them, rather than the more usual method of measuring what was possible (read: 'easy') and expecting management to make best use of the information.

The most difficult of the indices to measure, particularly when we're typically standing outside an organization, is the Silo Index. We know that the presence or otherwise of silos in an organization is strongly connected to the innovation success story since, to a large extent, innovation in today's organizations is very largely controlled by the ability to transcend silos. We know, too, from TRIZ that it is highly likely that the major innovation will come from outside your domain. But then, how do we measure how silo'd a company is?

The silos of primary concern exist in two main areas: firstly the silos that separate different technical disciplines (e.g. chemists don't know how to talk to mechanical engineers), and secondly the silos that separate the different business disciplines (e.g. Marketing speak a different language to Engineering). In order to show both of these silo problems, the dashboard picture we configured is typically presented as a 2x2 matrix as shown in Figure 2:
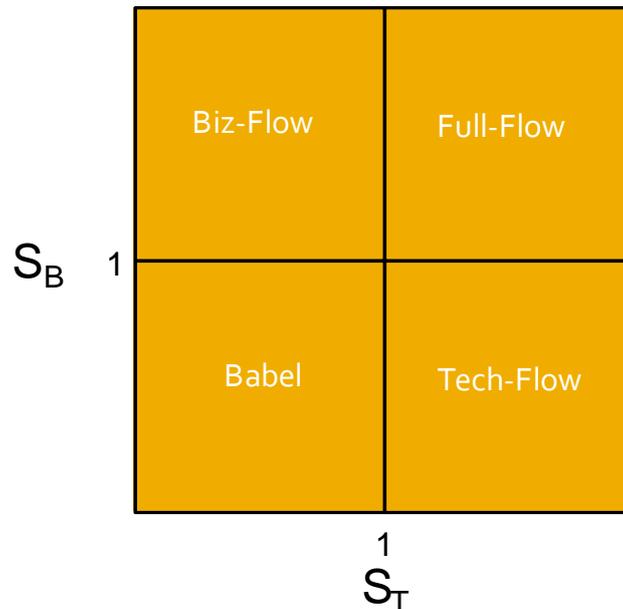

$$S_B \quad 1$$

Biz-Flow	Full-Flow
Babel	Tech-Flow

$$1$$
$$S_T$$

Figure 2: 2x2 Silo Index Measurement Instrument

The two axes are calculated as follows:

Technical Silo Index (S_T) = $\dfrac{\text{technical silo rating for company}}{\text{global average technical silo rating}}$

Business Silo Index (S_B) = $\dfrac{\text{business silo rating for company}}{\text{global average business silo rating}}$

So far so good. The next problem then is what factors can be measured that enable the global and local silo ratings to be calculated? In essence, the answer to this question came from a hunt for resources within and around an organisation. And preferably resources that were available in the public domain. Or as close to public domain as possible.

Here's the list of possible correlating factors we assembled and have been experimenting with in when looking at the technical aspects of the story:
- number of patent classification codes spanned by company IP
- number of codes spanned by individual inventors IP
  (average number of codes spanned per inventor)
- rate of change of codes used by top inventors
- evolution potential of company
- evolution potential of top inventors
- rate of change of evolution potential of top inventors
- average number of inventors per invention
- average number of remote geographic locations per invention
- average number of different function delivery solutions deployed by inventor
- number of citations to patents outside your industry

SYSTEM
·ATIC
INNOVAT·
ION

All of these measures are possible by analysing the patent portfolios of an organisation. The immediate new problem, of course, is that not every company uses patenting as a core strategy. On the other hand, our analyses to date have given us confidence that it is possible to at least gain 'the gist' of how silo-bound an organisation's technical functions are. This is an acceptable state of affairs since our intention is to be able to conduct a 'gisting' analysis of an organisation before we talk to them (that way we get to work out which companies can most benefit from our services!), and we can turn the 'gist' into an actual measure once we are able to speak directly to the people within the organisation.

The task of analysing the above correlation measures is made largely automated thanks to the use of bulk data analysis search tools and semantic algorithms. Figure 3, for example, shows the output of the patent portfolio of the most prolific inventor in one of the least silo-bound organisations around, WL Gore:
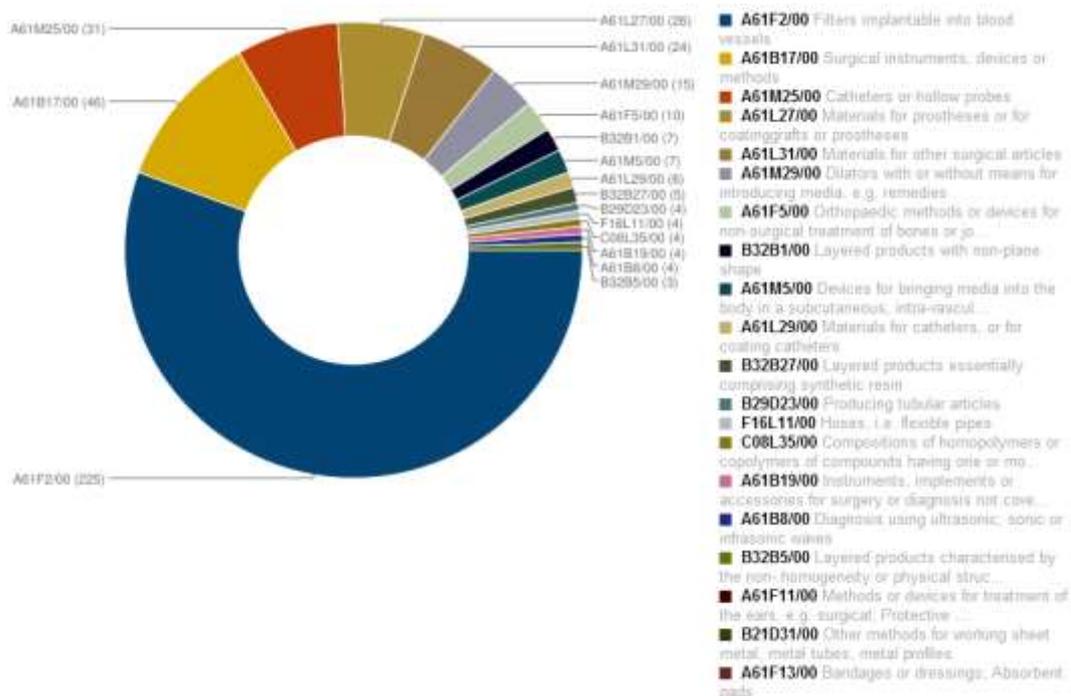

**Figure 3: IP Classification Codes of Inventions of WL Gore Inventor, Edward Cully**

This picture is taken from the latest version of the CREAX Creation Suite, a mostly very effective 'gisting' tool. What the Figure 3 picture reveals is how well an individual inventor is able to transcend different disciplines. Dr Cully's portfolio is largely biased in favour of filter design, but interestingly, he is also an inventor of orthopedic methods, diagnostic techniques and metal-forming (!) – i.e. he is very definitely a man largely unbound by silos.

Okay, so much for being able to assess technical silos. The enormity of the patent databases of the world give rise to an ability to interpret large amounts of data very easily. What, then, about creating an ability to measure silos in the business side of an organization?

It was easy enough to identify potential correlating factors:
- number of industries connected to through social networks per manager
- proportion of cross-disciplinary email traffic
- average number of cross-disciplinary affiliations
- average number of industries worked in by executive team

But then more difficult to work out how to actually measure some of these things. Enter Innovation Ecosystems Networks, a Stanford MediaXled Research Initiative, and some of their impressive work on, again crunching lots of internet based data to produce the sorts of picture shown in Figure 4:
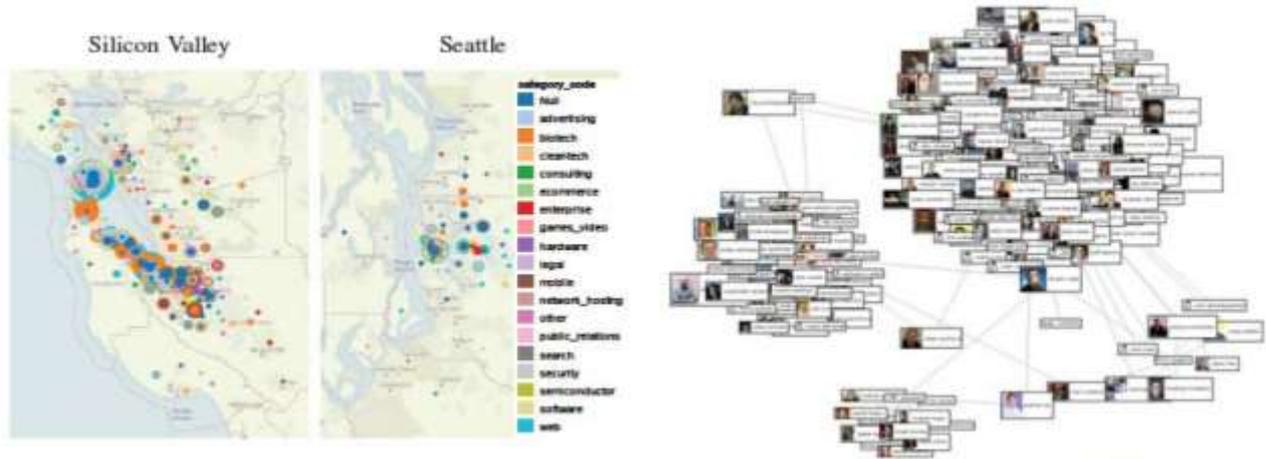
And suddenly the impossible starts to look very possible indeed. By monitoring (with permission!) email traffic and places like FaceBook, LinkedIn, etc it becomes a fairly trivial task to see how well individuals are breaking out of their domains to network with people in other industries and with other skillsets.

It is still early days in the life of the Silo Index. Initial client results are highlighting some fascinating results and are beginning to shed light on the key differences between organizations that do the innovation job well and those that don't. We think that by asking the right questions and finding the right tools, an 'impossible' job has not only become possible, but also largely automatable. The science of silo management and silo deconstruction, just maybe, starts here.

Humour – Merging

It was great to be back in Taiwan earlier this month. As ever, my hosts were very gracious and accommodating, and the whole experience was very pleasurable. I knew things were going to go well the moment I walked up to the front of my Hsinchu hotel:

Classy hotel for classy people, hey? I'm definitely moving up in the world. Thank you Berkeley Hotel! Thank you, too, for this excellent example of Inventive Principle 5, Merging, in action. This is the sign found at the main door to the hotel:


Imagine that, a hotel with its own dental clinic. On the second floor no less, so every patient gets to walk through the (classy) reception area. And every hotel guest gets to wonder, exactly what *are* they serving at breakfast?

SYSTEM
ATIC
INNOVAT
ION

Patent of the Month - Semiconductor Meta-Materials

We travel to Southampton in England for our patent of the month this month. US7,799,663 was granted to inventors at the University on 21 September. Here's what the abstract tells us:

A method of fabricating a semiconductor metamaterial is provided, comprising providing a sample of engineered microstructured material that is transparent to electromagnetic radiation and comprises one or more elongate, high aspect ratio voids, passing through the voids a high pressure fluid comprising a semiconductor material carried in a carrier fluid, and causing the semiconductor material to deposit onto the surface of the one or more voids of the engineered microstructured material to form the metamaterial. Many microstructured materials and semiconductor materials can be used, together with various techniques for controlling the location, spatial extent, and thickness of the deposition of the semiconductor within the microstructured material, so that a wide range of different metamaterials can be produced.

And here's what it looks like:
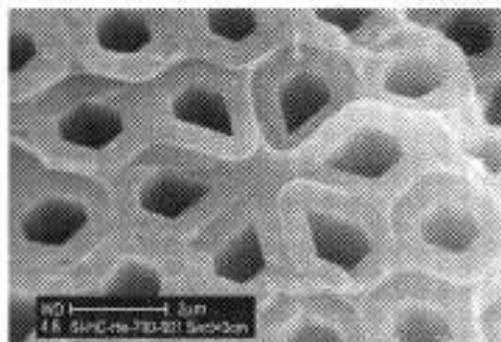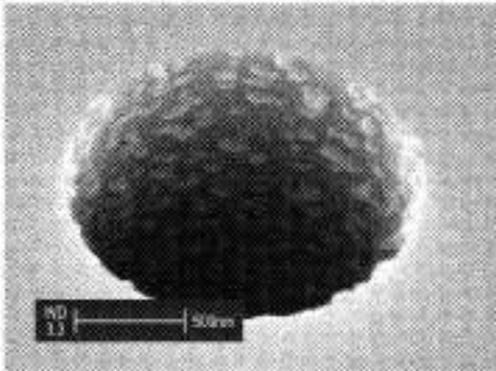
Metamaterials are very much in vogue right now. Quite rightly in light of the benefits they look set to deliver in the construction of physical entities of all kinds. Metamaterials are periodically repeating, synthetic composite structures that are specifically engineered to circumvent inconvenient bulk material properties. The exceptional characteristics and response functions of metamaterials are not observed in the individual constituent materials of the composite, and these phenomena arise as a direct result of the periodic inclusion of functional materials such as metals, semiconductors or polymers embedded within the composite. However, the fabrication of such structures is a serious experimental challenge as this full three-dimensional deposition and patterning requirement is extremely difficult to satisfy using conventional techniques such as chemical vapour deposition and photolithography.

Holey optical fibres exploit the concept of using a periodic array of air holes to define the transverse refractive index profile of the fibre. These fibres have exhibited exceptional optical properties that significantly outperform conventional fibre structures in key areas, and can guide light either by a modified form of total internal reflection or by exploiting photonic bandgap effects. This has generated enormous interest both within the academic and industrial communities due to novel optical properties that include endlessly single-mode guidance, anomalous dispersion, and mode area tailoring over three orders of magnitude that have many potential applications.

The inclusion of semiconductor materials into holey fibres and other engineered

microstructured material to provide specifically tailored metamaterials is of significant technological interest as this allows easy integration into existing optoelectronic systems and devices.

The problem, however, as reported by the inventors is, *'the inability to fabricate long lengths of material, poor quality semiconductor deposition, and applicability to only a limited range of materials.'* Given the importance of photonic materials, in particular holey fibres, and their many potential applications, there is, therefore, a need for an improved fabrication technique.

Here's what the inventors go on to describe in their summary of the invention:

Accordingly, a first aspect of the present invention is directed to a method of fabricating a metamaterial comprising: providing a sample of elongate engineered microstructured material comprising one or more elongate voids running substantially the length of the sample, the sample configured to transmit electromagnetic radiation; providing a high pressure fluid comprising at least one semiconductor carried in at least one carrier fluid; passing the high pressure fluid through the one or more voids; and causing the semiconductor to deposit onto one or more surfaces of the one or more voids to form the metamaterial.

This is a highly advantageous and beneficial way of combining desirable semiconductor materials with engineered microstructured materials to create metamaterials from which highly specialized devices with novel functionality and which can provide miniaturisation, robustness and other desirable features can be fabricated. That this should be possible using high pressure fluid is surprising, and, results from the fact that high pressure fluids, many of which have low viscosity, high diffusivity and low or zero surface tension, can penetrate into the elongate microstructured voids with great efficiency but at the same time carry the semiconductor and deposit it into the microstructured material in an even and uniform manner. The generally greater extent and particular uniformity of voids in engineered microstructured material (as opposed to self-assembled materials) means that the expected result is that the semiconductor would be unevenly deposited within the voids, not be carried throughout the whole extent of the voids, and be deposited in greater quantities at the void openings so that the voids would become blocked, which is undesirable in that further semiconductor material cannot be carried to the rest of the void, and also in that the voids are often essential for the light transmitting properties of the engineered material and hence need to remain open. However, in practice this has not been observed, and instead it has been found that semiconductor can be deposited with great accuracy and controllability, leading to high quality metamaterials.

The main reasons for selecting this as patent of the month are, first and foremost its potential importance in a lot of semiconductor applications. But then also, it was ApolloSigma that first indicated the strength of the patent:

SYSTEM
·ATIC
INNOVAT·
ION
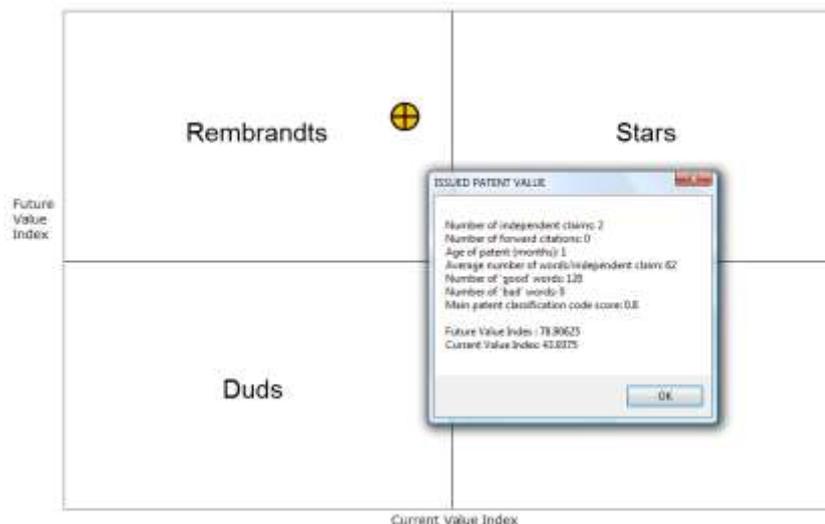
From a learning perspective, the conflict resolved by the invention is quite a general one – we want more functionality and we can't get it because it's difficult to manufacture. Here's what that problem looks like when mapped onto the Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Function Efficiency (24) and Adaptability/Versatility (32)

WORSENING PARAMETERS YOU HAVE SELECTED:

Manufacturability (41) and Manufacturing Precision/Consistency (42)

SUGGESTED INVENTIVE PRINCIPLES:

3, 29, 35, 28, 1, 25, 2, 4, 37, 24, 10, 40, 13, 15, 31, 16, 5

Principle 3, Local Quality is starting to emerge as a short-cut pointer towards any and all metamaterials – tailor the material properties to suit local needs in local regions of the material. Stepping back a little, it is also intriguing to see that Principle 29, Fluids has appeared so high in the list of recommendations – this being the primary strategy used during the manufacture process.

Keep your eye out for this one. With a following wind, it could see the light of day in a number of important roles.

Best of the Month - The Next Evolution Of Marketing

Well, it's not the greatest book ever. Or even of this year, but it is the best thing we laid our hands on this month, and hence the reason it finds itself in this spot. The Next Evolution Of Marketing is, all about 'meaning'. Ex P&G marketing and brand manager person (always a pretty good sign), Bob Gilbreath has put together an elegantly structured story of what many readers of this e-zine might see as a fairly obvious thing. Particularly if you've been paying attention to what we've been saying in our TrenDNA work. Or in the work of Edward Matchett we've been re-publishing. Meaning lies at the very heart of Matchett's worldview, and Gilbreath predicts it will soon lie at the heart of all advertising and promotion of the world's brands. The days of 'interruptive' marketing, Gilbreath declares, are over: when people get bombarded by close to 3000 advertising messages a day, they begin to become not just numb, but resentful. Marketing with meaning is all about creating advertising that people actively welcome into their lives. In this regard, Gilbreath is describing a trend jump beyond not just 'interruptive' marketing, but also the 'permission marketing' foretold by Seth Godin (a person who makes an endorsing appearance on the cover of the book).

"Ten years after *Permission Marketing*, Gilbreath takes the idea to a new level.
Must reading for anyone who buys a lot of advertising."
—SETH GODIN

THE NEXT
Connect with
your customers by
**marketing with
meaning**

EVOLUTION OF MARKETING

Bob Gilbreath, Chief Marketing Strategist, Bridge Worldwide

In mapping 'marketing with meaning' against Maslow's hierarchy of needs, Gilbreath describes three distinctly different stages of evolution of this new form of marketing:

Solution Marketing (provide valuable information, incentives and services)	→	Connection Marketing (create entertaining experiences that I can share with others)	→	Achievement Marketing (help me improve myself, my family and the world)

The first of the three stages, Solution Marketing, is aligned with the lowest (physiological and safety needs) levels of Maslow's hierarchy. This kind of marketing is about things like giving away free samples and corporate transparency. People, Gilbreath suggests, welcome this kind of marketing into their lives because they receive a tangible win.

SYSTEM
·ATIC·
INNOVAT·
ION

In the second stage, Connection Marketing, the emphasis shifts to social intangible needs, where the emphasis is on making advertising that is entertaining enough that people will seek it out over other forms of entertainment. Gilreath cites the viral Blendtec 'will it blend' YouTube video campaign as a classic of the form. AppleStore takes the connection idea a in another emotional direction by creating an ambience which is both very cool (to those who are turned on by such things) and very aspirational.

The third stage of the evolution, then, relates advertising and marketing messages to Maslow's 'self-actualization' needs. Examples to be found in this category include Home Depot's DIY courses and Land Rover's very successful all-terrain driving schools. 'Achievement Marketing' is all about people receiving new skills and capabilities or feeling good because they get to contribute in some way to society and the lives of others. Another way of putting it might be that this is a type of marketing that enables people to 'make a difference' and as such is something they are likely to welcome with open arms into their life. Great if the provider is also able to sell more of their products or services, but often the 'wins' received by the consumer are becoming the most valuable part of the transaction.

For the most part, it is the case studies and description of what the three levels of Marketing with Meaning are all about that justify the price of the book. Alas it falls over somewhat when it comes to describing 'processes' for creating actual advertising solutions. In fact to describe them as 'processes' is probably overstating what Gilbreath has done. Too often here he resorts to platitudes. And worse, leaves some horrible 'insert miracle here' gaps. Those familiar with SI will know how to overcome these problems, but anyone starting from scratch is likely to be holding their hands up in despair by step two ('now go brainstorm some good ideas'). A pity, but not nearly such a big pity as the results achieved by whoever was commissioned to create the text boxes and standout headlines. Almost without exception the statements chosen to feature in these boxes are read as extremely trite statements of the obvious. In the context of the main text they are fine, but they certainly aren't worthy of making into special features. Anyone flicking through the book prior to purchase be warned: the book is way better than the highlighted text would suggest.

Buy it for the case studies and the three evolution stages, and try to ignore the rest.

Conference Report – First Beijing Global World City Conference

Well, I'm not quite sure how I managed to get an invite to this one, never mind an invite to give a keynote address on the opening morning. Strange world. The conference was held at the highly impressive Beijing Conference Centre on 18 and 19 September (i.e. the weekend), and attended by an even more impressive 500 people. The theme of the event was 'what does Beijing have to do to become a 'Global World City'?' or, how does Beijing reach the same global standing as London and New York. Quite a long way away from the world of TRIZ and Systematic Innovation. Or so I thought before I arrived at the conference. It now seems as though Systematic Innovation is seen as having quite a role to play. Along with (looking at the themes of the other sessions during the conference) the creative arts and a strong emphasis on playing the intellectual property game.

The morning session was made up of keynote addresses on the three main topic areas and an open question and answer session. The latter was probably the most entertaining. Especially when one of the delegates asked about 'the piracy problem'…. A question that prompted a 20 minute diatribe from the IP expert speaker. Followed by five minutes from me essentially saying everything he'd said was precisely the wrong direction. Solving the piracy problem by adding more and more legislation cannot be the answer: the offenders don't read it and a point is reached where the officials in charge of administering the system can't know all that they're expected to know. More important than any of that, there is a bizarre paradox happening right now; the people complaining most about piracy being the people who's fore-fathers had earned their way in life by being pirates themselves (i.e. the US grew as world leaders by 'acquiring' many of the innovations emerging in Europe during the Industrial Revolution). In my view, piracy is one of the primary engines of innovation. Mediocre companies complain about piracy: smart companies turn the piracy to their advantage…

…a set of words words that prophetically came back to bite me later in the day when the conference divided into three parallel streams. I was in the 'TRIZ and Innovation' stream, which turned out to be the best attended of the subject areas. There were close to 180 people in this session as we sat through six papers on how TRIZ was being used (or could be used) in China. The third paper in the session was given by 'The Chinese Darrell Mann' (pity the person lumbered with that moniker!). What this turned out to mean was 70 year-old Professor Zhang Wucheng and his 'Matrix 2009', the 'only other major event in TRIZ since Matrix 2003'. In his words. Initially intrigued, Matrix 2009 turns out to be a copy of

Matrix 2003 with the physical contradiction diagonal line filled in with (as far as I could tell, random) numbers. All in all a wonderful example of piracy, albeit one I am still trying to turn to my advantage. The good Professor was very nice though, so I figured best to see him as an ally than someone potentially destroying credibility of the research. It turned out my best way to do this was to have my picture taken with him:

If nothing else, hopefully it offers the potential for an excellent caption competition (free copy of Matrix 2010 to the best entry).

Taken all together, there could be little doubting that there is a very clear intent to deploy TRIZ and Systematic Innovation in China. We heard it in Harbin last year; this event gave the clear message that whatever Harbin could do, Beijing was going to do a lot bigger and better. I sense an unstoppable force has been set in motion. Everyone is still talking about the OEM-ODM-OBM trend too. Except now they've added an OSM stage at the end: 'we're not just going to manufacture, design and brand, we're also going to take over the service business too. Simultaneously very frightening and invigorating. May we live in interesting times indeed.

Investments – 'Self-Repairing' Photovoltaics

Researchers at the Massachusetts Institute of Technology have fabricated the first synthetic photovoltaic cell capable of repairing itself. The cell mimics the self-repair system naturally found in plants, which capture sunlight and convert it into energy during photosynthesis. The device could be 40% efficient at converting solar power into energy – a value that is two times better than the best commercial photovoltaic cells on the market today.

During photosynthesis, plants harness solar radiation and convert it into energy. Scientists have been trying to mimic this process in synthetic materials, but this has proved difficult because the Sun's rays damage and gradually destroy solar-cell components over time. Naturally occurring plants have developed a highly elaborate self-repair mechanism to overcome this problem that involves constantly breaking down and reassembling photo-damaged light-harvesting proteins. The process ensures that these molecules are continually being refreshed, and so always work like "new".

Michael Strano and colleagues have now succeeded in mimicking this process for the first time by creating self-assembling complexes that convert light into electricity. The complexes can be repeatedly broken down and reassembled by simply adding a surfactant (a solution of soap molecules). The researchers found that they can indefinitely cycle between assembled and disassembled states by adding and removing the surfactant, but the complexes are only photoactive in the assembled state.

Light reaction centre
The complexes are made up of light-harvesting proteins, single-walled nano-tubes and disc-shaped lipids. The proteins (which are isolated from a purple bacterium, *Rhodobacter sphaeroides*) contain a light reaction centre (carried by the lipids) comprising bacterio-chlorophylls and other molecules. When the centre is exposed to solar radiation, it converts the sunlight into electron-hole pairs (excitons).

The excitons then shuttle across the reaction centre and subsequently separate back out again into electrons and holes. The nano-tubes – which act as wires – channel the electrons, so producing a current. The nano-tubes also serve to align the lipid discs in neat rows, ensuring that the reaction centres are uniformly exposed to sunlight.

"The beauty of this system is that a jumbled solution of components can spontaneously arrange itself into highly organized structures, containing thousands of molecules in a

specific arrangement, by simply removing the surfactant," team member Ardemis Boghossian explained.

Apples and oranges

"Using the regeneration process, we are able to prolong the lifetime of our solar cell indefinitely, increasing our efficiencies by more than 300% over 164 hours of continuous illumination compared to a non-regenerated cell," added Boghossian. "If we were to increase the concentration of these complexes to make a completely stacked, highly packed formation, we could approach the theoretical limit of 40% – which is well beyond the efficiencies we see in commercial solar cells on the market today."

Comparing the MIT complexes to existing solar cells is like "comparing apples to oranges" though, she insists. "Most solar cells are static because they are made of solid slabs of silicon or thin films. Our solar cells are dynamic, just like plant leaves that can recycle their proteins as often as every 45 minutes on a really sunny day."

"We're basically imitating tricks that nature has discovered over millions of years – in particular 'reversibility', the ability to break apart and reassemble," added Strano.

The work was reported in Nature Chemistry, where more details can be found for anyone looking for a pretty big clue as to how the solar energy world might just have made a significant leap forward.

Generational Cycles – My Generation/Your Generation

Occasionally, the mood of a generation gets captured in highly succinct forms. One of these is the three-minute pop song. Some generations create these iconic generation anthems better than others. In modern times, probably the most influential generational war cry came in 1965 when Pete Townsend of The Who penned 'My Generation'. Townsend was the first of a new breed of growing-up Prophets. The lyrics of My Generation captured the mood of the moment with these words:

People try to put us d-down (Talkin' 'bout my generation)
Just because we get around (Talkin' 'bout my generation)
Things they do look awful c-c-cold (Talkin' 'bout my generation)
I hope I die before I get old (Talkin' 'bout my generation)

This is my generation
This is my generation, baby

Why don't you all f-fade away (Talkin' 'bout my generation)
And don't try to dig what we all s-s-say (Talkin' 'bout my generation)
I'm not trying to cause a big s-s-sensation (Talkin' 'bout my generation)
I'm just talkin' 'bout my g-g-g-generation (Talkin' 'bout my generation)

This is my generation
This is my generation, baby

The song served as a tremendous rallying cry to a generation raised in the wake of the Second World War. It was seen at the time as a heartfelt rejection of the efforts of the previous (Silent) generation. The iconic line 'I hope I die before I get old' encapsulated the feelings of the new youth and is an ethos still being lived out by many Boomers – 'we won't die because we won't ever allow ourselves to become old'. Even today, 'My Generation' is regularly voted as one of the Top Ten most influential songs of the 20th Century.

Of course, the feelings of one generation are often rejected by the next. And by 1977, the Prophet revolution was beginning to look positively unwell. A message captured slightly less eloquently by the band Generation X. Their debut single, titled 'Your Generation' went something like this tirade:

Trying to forget your generation.
You know all the ways when it's up to you.
The ends must justify the means.
I say your generation don't mean a thing to me.

It might take a bit of violence,
But violence ain't our only stance.
It might make our friends enemies,
But we gotta take that chance.

Ain't no time for substitutes.
Ain't no time for idle threats.
Actions rather hard to place,
Cause what you give is what you get.

So, your generation!
It's your generation!
Well it's your generation!
It's your generation!

SYSTEM
·ATIC·
INNOVAT·
ION

Again, if you're looking for a few lines to summarise the core differences between the Boomers and Generation X, these two songs together probably do the job as well as every academic paper written on the subject:

Here's what the two songs look like when plotted on the generational time-line:
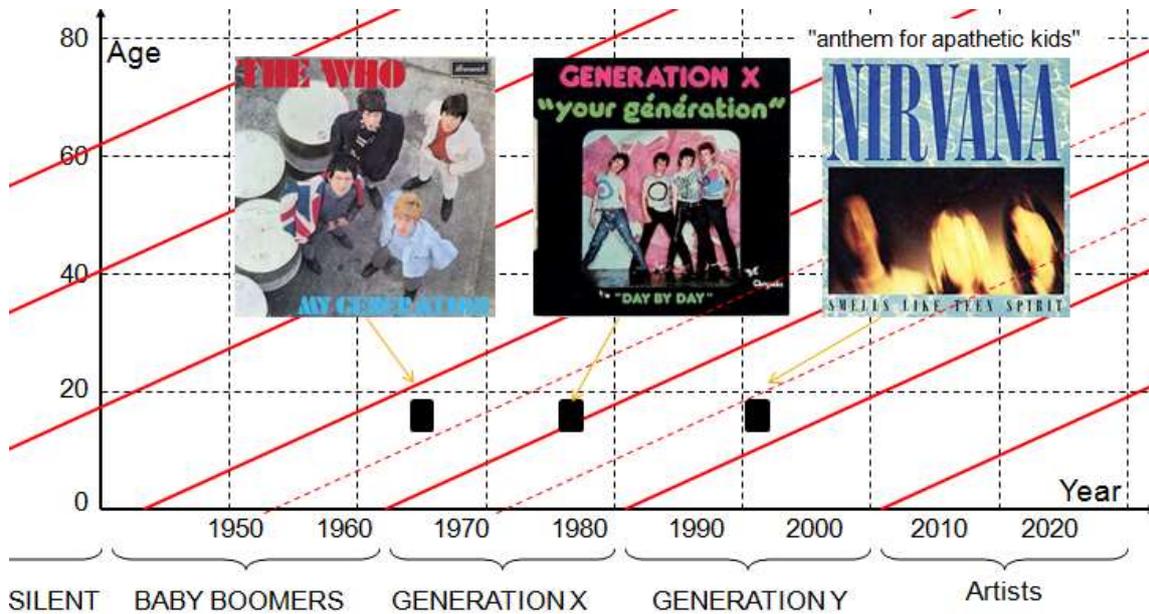
The Generation X song is the less well known of the two songs. Most likely – as shown in the picture – because it came slightly too early to catch the real start of the Generation X Nomads. The next 'real' anthem of the Nomads (unless you count The Smiths song 'Heaven Knows I'm Miserable Now' in 1985!) had to wait until 1991, when generation-archetype-of-archetypes, Kurt Cobain penned Smells Like Teen Spirit with his band Nirvana. If 'Your Generation' started the nihilist ball rolling, Smells Like Teen Spirit took it to the top of the hill and let it tumble uncontrollably down the other side. Never would things get so anti-society again in popular music. Well, for at least the next 50 years or so.

Biology – Wheel Spider

The Wheel spider, Golden Wheel spider, or Dancing White lady spider (*Carparachne aureoflava*), is native to the Namib Desert of Southern Africa. The spider, look most other small lifeforms, suffers from a fairly lowly position in the food chain. Lots of things, in other words, see it as lunch. Consequently, the spider has evolved certain strategies to avoid parasitic pompilid wasps and other predators. The big problem is that the spider is relatively small (less than 20mm in overall diameter) and therefore finds it difficult to outrun anything chasing it. Enter the strategy of flipping onto its side and cartwheeling down sand dunes. At speeds of up to 44 turns per second.

Also helping solve the predation threat, the wheel spider is nocturnal, and, while it does not produce a web, does bury itself in a silk-lined burrow extending 40–50 cm deep. During the process of digging its burrow, the spider can shift up to 10 liters, or 80,000 times its body weight, of sand. It is during the initial stages of building a burrow that the spider is vulnerable to pompilid wasps, which will sting and paralyze the spider before planting eggs in its body. If the spider is unable to fight a wasp off, and if it is on a sloped dune (which typically it seems to be – if you're going to dig a burrow, best dig it on a slope!), it will use its rolling speed of 1 meter per second to escape.

Spider turns into wheel and rolls away

From a conflict resolution strategy, the wheel spider has had to challenge a classic safety/vulnerability versus speed tussle. It's 'turn on side and roll away' strategy represents a clear illustration of, first, Inventive Principle 17, Another Dimension, and then second, Inventive Principle 14, Curvature. Actually, Principle 14C, 'switch between linear and rotary motion. Perhaps interestingly, the other strategies of digging an underground hole and operating nocturnally can also be seen as inventive strategies – respectively 17,

Another Dimension (or 31, 'holes'; or 7, 'nesting') and 13, The Other Way Around. Interestingly, too, here's what the Contradiction Matrix has to say about the safety-versus-speed conflict:
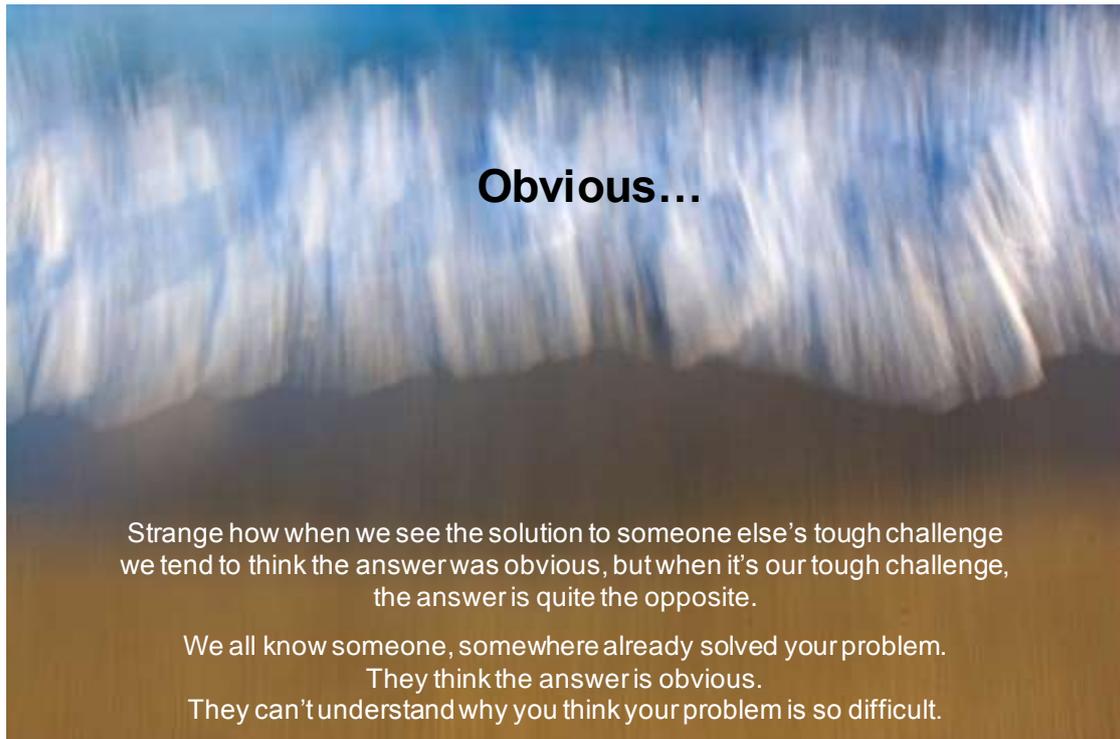
IMPROVING PARAMETERS YOU HAVE SELECTED:

Safety/Vulnerability (38)

WORSENING PARAMETERS YOU HAVE SELECTED:

Speed (14)

SUGGESTED INVENTIVE PRINCIPLES:

14, 31, 13, 3, 17, 19, 7

Makes you wonder why we spend so much time studying patents – the wheel spider did nearly all the work for us!

Meanwhile, if you want to see what moving 10litres of sand and what 44 turns per second looks like in real life, there's a great video at:
http://xmb.stuffucanuse.com/xmb/viewthread.php?tid=6465

SYSTEM·ATIC INNOVAT·ION

Short Thort

Obvious…

Strange how when we see the solution to someone else's tough challenge
we tend to think the answer was obvious, but when it's our tough challenge,
the answer is quite the opposite.

We all know someone, somewhere already solved your problem.
They think the answer is obvious.
They can't understand why you think your problem is so difficult.

News

MYForesight
The Malaysian government Ministry of Science and Technology is launching a new magazine aimed at helping spark entrepreneurial skills in the country. We're happy to announce that we are one of the lead contributors to the launch issue to be published in October. The article is called 'What Customers Really Want'. A copy will be made available on the website after publication in MYForesight.

Innovation Capability Maturity Model
Following the receipt of support from big-hitters like Procter & Gamble, Rio Tinto, MIT and Duke University, we are happy to announce the creation of a global innovation capability assessment and certification programme. The primary aim of the Model is to create the innovation equivalent of what Carnegie-Mellon did for the professionalisation of the software industry. Formal invitations to founding members will be going out in October, with the intention of having a formal launch in January 2011.

ETRIA
Although Darrell won't be there, we will be presenting a TrenDNA-based paper at the ETRIA conference in Italy at the beginning of November. German edition co-author, Viktoria Zinner will be doing the honours. She will also be running two one-day TrenDNA seminars in Hannover – the first on October 17; the second on 16 November.

SYSTEM
·ATIC
INNOVAT·
ION

Certification Workshops
A new round of SI Certification workshops has been announced for the UK. The Level 1 workshop will be held on 20-21 January; Level 2 on 17-18 February; and Level 3 on 29 and 30 March. Details, as ever, on the Diary page of the website.

New Projects
This month's new projects from around the Network:
> Automotive – Technical problem solving challenge
> FMCG – Evolution Potential study
> Financial Services – breakthrough new product concept design
> Medical Devices – turnkey product development
> FMCG – New product development study
> Industrial – Certification training
> Industrial – Manufacture process evolution project
> Automotive – White Space analysis
> Chemical – Creative thinking workshops
> Medical Devices – ApolloSigma IP strategic study

SYSTEM
·ATIC
INNOVAT·
ION