Systematic Innovation

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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.

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Readers' comments and inputs are always welcome.
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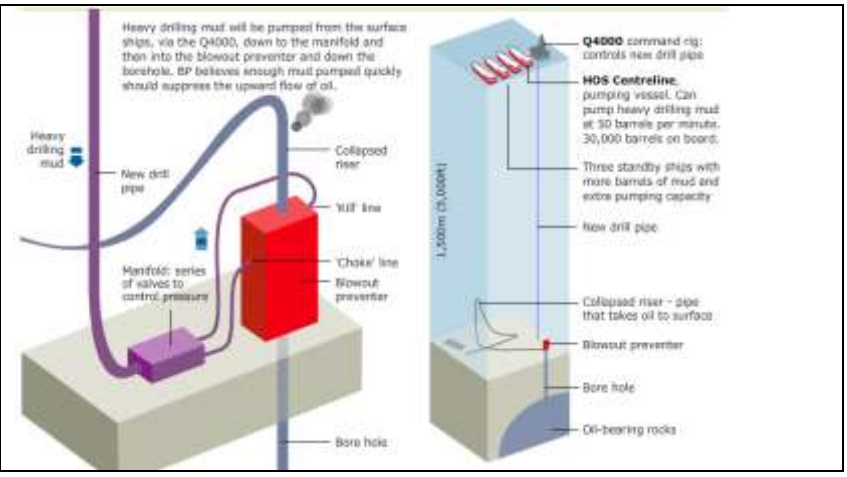
Open Innovation & The BP Oil Spill

The BP oil spill in the Gulf of Mexico oil spill has been one of the biggest man-made environmental catastrophes ever perpetrated. From the day of the accident (20 April) until 15 July when the leak was finally stopped, somewhere between 20 and 100 thousand barrels of crude per day were released into the Gulf of Mexico. The gusher originated from a deepwater wellhead 5,000 feet (1,500 m) below the ocean surface (Figure 1). The exact spill flow rate is uncertain due to the difficulty of installing measurement devices at that depth and is a matter of ongoing debate. The resulting oil slick, though, eventually came to cover a surface area of at least 2,500 square miles (6,500 km2), with the exact size and location of the slick fluctuating from day to day depending on weather conditions.

Figure 1: The Source Of The BP Oil Spill

Our interest in the incident was first aroused early in the story when it was announced that the BP engineers were using Open Innovation strategies to solicit ideas and opinions from the general public. That interest stepped up a gear when we learned that by July 1, the total number of ideas submitted had reached the staggering total of over 116,000 just focusing on the issue of sealing the leak. At this point we set about examining the ideas to see if there were any patterns. This article is a look at what we found.

What follows then is a summary of all of the different solution concepts we saw after combing through all of the 116,000 published solutions. We first analysed each individual idea based on its solution statement and the focus. We then examined these solutions to find out whether they corresponding to different TRIZ/SI solution strategies, with particular attention being paid to the 40 inventive principles. The results of our analysis are shown below:

S1.	**Solution Statement**	Top Kill: Forcing "heavy mud" into the well to overcome the rising oil and shut down the flow.	
	The corresponding TRIZ Techniques	Inventive Principle 5- Merging	

S2.	**Solution Statement**	To drill a parallel tube up to the connection to the leaking one so that effectively to make the leak controllable- then - to seal the former rupture and then- the new tube too.
	The related TRIZ Inventive Principles	The Inventive Principle 1- Segmentation

S3.	**Solution Statement**	To crush down with the big force- direct a powerful 'sealing drill'- down to the orifice, effectively ' closing on contact', so that when the drill reaches the hole it closes in and only small leakages could remain.
	The corresponding TRIZ Techniques	N/A

S4	**Solution Statement**	Drill another hole and then- detonate the device under the old one to close it on its own.
	The corresponding TRIZ Techniques	• The Inventive Principle 1- Segmentation • The Inventive Principle 7- “Nested Doll”

S5.	**Solution Statement**	Redirect the fountain
	The corresponding TRIZ Techniques	The Inventive Principle 1- Segmentation

S6.	**Solution Statement**	Tear- off/melting explosion- the powerful blast which not only tears the jet off but also introduces a temperature so high that rock melts and seals the rupture.
	The corresponding TRIZ Techniques	N/A

S7.	**Solution Statement**	Building what amounts to an inverted funnel that will be dropped over the area to trap the escaping oil and then pump it out the top into waiting ships.
	The corresponding TRIZ Techniques	The Inventive Principle 24- “Intermediary”

S8.	**Solution Statement**	Using "platelets" to plug holes from the inside.
	The corresponding TRIZ Techniques	The Inventive Principle 7- “Nested Doll”

:
(see article on our website for the full list of concepts uncovered)
:

S189.	**Solution Statement**	A make shift (constructed in 24hrs) industrial sized endovascular stent could be created that could plug the leak and divert oil at the same time. A long slender torpedo shaped tube (vents that could open at the tip) with 3 stents which are spiked (deploy at different distances along the device with inflated vulcanizied rubber) could be advanced into the leaking pipe (pipe in a pipe). The torpedo tip would divert flow around device and could be advanced easily deep into the well against the resistance of the enormous pressure of oil coming from the leaking well. The vented torpedo tip could slowly be opened as the stents begin to inflate. This would reduce pressure around the stents as they are deployed and divert oil to the center of the stent deployment tube which could be collected at the ocean surface. Once all the stents are deployed, cement could then be poured into (and behind) the stent to form a solid cap. Once inflated, the vulcanized

		rubber would push the spiked stents against the inside walls of the damaged pipe. The spikes would hold the stents in place with the inflated rubber (and cement back stop) obstructing flow.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 28- Mechanics substitution/ Another sense • The Inventive Principle 35- Parameter changes • The Inventive Principle 39- Inert atmosphere

S190.	**Solution Statement**	to create an internal valve that will allow them to stop the oil and place a new flange (also i have an idea for this item as well) that would allow them to salvage the well and huck it back to a rig for proper collection of the oil.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 28- Mechanics substitution/ Another sense • The Inventive Principle 39- Inert atmosphere

S191.	**Solution Statement**	**Construct a caisson with a beveled bottom and a remote controlled shut off on top:** when its lowered into position the beveled edges on the bottom will allow it to sink into the floor reducing escaping oil. once in place the valve can be closed containing the flow until a more permanent solution can be put into place.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 28- Mechanics substitution/ Another sense • The Inventive Principle 35- Parameter changes

S192.	**Solution Statement**	**Use barges to pump oil with an inverted funnel with numerous lines running to tanks on barges:** The lines would run to tanks on barges that would separate the oil from the sea water. The oil could then be siphoned off to other containers or ships for processing.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 28- Mechanics substitution/ Another sense

S193.	**Solution Statement**	Inject tiny molten metal beads into pipe continuously spraying against Pipe walls. Choose a sticky adhesive metal that hardens quickly. It will build up slowly similar to how a heart attack works with a clogged artery.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 39- Inert atmosphere

S194.	**Solution Statement**	**Flood the source with a coolant to form a cold, hard plug, which can be capped:** As petrol turns to a jelly-like substance at -50 Celcius, would it be possible to flood the source with a coolant to form a solid, natural plug, which could be capped.
	The corresponding TRIZ Techniques	• The Inventive Principle 24- “Intermediary” • The Inventive Principle 38- Strong oxidants

S195.	**Solution Statement**	Lower a large diameter flexible (PVC) tube over the leak and embed it into the floor. Extend the tube to the surface and siphon the oil off.
	The corresponding TRIZ Techniques	• The Inventive Principle 7- “Nested Doll” • The Inventive Principle 24- “Intermediary” • The Inventive Principle 35- Parameter changes

In all, then, 195 distinct concepts were observed. We mapped each of these concepts, as shown in this exemplar list, against each of the Inventive Principles as shown in Table 1:

Table 1.			
40 Inventive Principles		**Relevant Solutions**	**The Frequency**
1	Segmentation	S2, S4, S5, S10, S28, S30, S34, S81, S180,	**9**
4	Asymmetry	S172	**1**
5	Merging	S1, S12, S42, S62, S81, S85, S89, S92, S93, S112, S113, S114, S125, S135, S141, S150, S158, S160, S168, S169, S170, S181,	**22**
7	"Nested Doll"	S4, S8, S9, S11, S12, S14, S19, S20, S21, S26, S27, S28, S36, S43, S46, S47, S54, S59, S60, S65, S66, S67, S68, S69, S73, S75, S82, S87, S96, S101, S104, S106, S114, S123, S126, S127, S128, S129, S131, S136, S143, S146, S147, S153, S156, S157, S159, S160, S161, S164, S166, S173, S179, S180, S184, S185, S188, S195	**58**
22	"Blessing in Disguise"	S47, S119,	**2**
24	"Intermediary"	S7, S15, S17, S18, S19, S22, S23, S24, S25, S32, S33, S34, S35, S40, S41, S42, S43, S44, S48, S51, S52, S53, S55, S57, S59, S60, S61, S63, S65, S66, S67, S68, S69, S73, S75, S76, S77, S78, S79, S80, S81, S83, S84, S88, S89, S91, S92, S93, S94, S95, S96, S97, S99, S100, S102, S103, S104, S105, S107, S109, S110, S111, S112, S113, S115, S116, S118, S119, S120, S121, S123, S125, S126, S127, S128, S129, S131, S133, S134, S135, S136, S137, S138, S139, S141, S142, S143, S144, S145, S146, S148, S149, S150, S151, S152, S153, S154, S155, S156, S157, S158, S159, S160, S161, S162, S163, S164, S165, S166, S167, S168, S169, S170, S172, S173, S174, S175, S176, S177, S179, S180, S181, S182, S184, S185, S186, S187, S188, S189, S190, S191, S192, S193, S194, S195	**135**
28	Mechanics Substitution	S22, S23, S24, S25, S32, S33, S34, S35, S39, S40, S41, S43, S44, S45, S46, S47, S49, S57, S59, S60, S61, S62, S64, S65, S72, S74, S78, S79, S80, S84, S86, S88, S89, S96, S97, S99, S100, S103, S105, S108, S109, S112, S116, S119, S121, S123, S125, S128, S135, S136, S137, S144, S149, S150, S152, S155, S163, S168, S169, S182, S184, S186, S187, S189, S190, S191, S192,	**67**
31	Porous Materials	S123	**1**
34	Discarding and Recovering	S13, S31, S44, S144, S165, S166, S167, S178, S181,	**9**
35	Parameter Changes	S20, S21, S28, S29, S39, S44, S48, S58, S60, S62, S64, S65, S66, S71, S75, S76, S77, S79, S80, S81, S82, S83, S84, S85, S87, S88, S89, S90, S91, S92, S94, S95, S97, S102, S106, S107,	**96**

		S108, S109, S110, S111, S115, S116, S117, S118, S121, S123, S126, S127, S128, S131, S132, S133, S134, S135, S136, S138, S139, S140, S141, S142, S144, S145, S146, S147, S148, S149, S151, S156, S158, S159, S160, S161, S163, S164, S165, S166, S167, S169, S170, S171, S172, S173, S174, S175, S176, S177, S179, S180, S181, S185, S186, S187, S188, S189, S191, S195	
37	Thermal Expansion	S71, S131, S151, S179	**4**
38	Strong Oxidants	S29, S56, S95, S145, S154, S187, S194	**7**
39	Inert Atmosphere	S27, S67, S68, S69, S73, S76, S77, S79, S82, S87, S104, S106, S110, S111, S115, S120, S145, S148, S153, S159, S163, S166, S173, S175, S185, S186, S188, S189, S190, S193	**30**

After analysing these 195 public submitted solutions, we found that 192 solutions corresponded to ideas that could have been generated by the 40 Principles. The highest number of solution concepts were found to correspond to Principles:
7- "Nested Doll", 24- "Intermediary", 28- Mechanics substitution, and 35- Parameter changes.

When mapped onto the Contradiction Matrix, the oil spill problem looks something like the picture shown in Figure 2. Clearly, the 'improving factor' in the problem was the desire to stop the leak. The things preventing the solution were deemed, at root, to be the depth of the leak and the pressure of the oil:

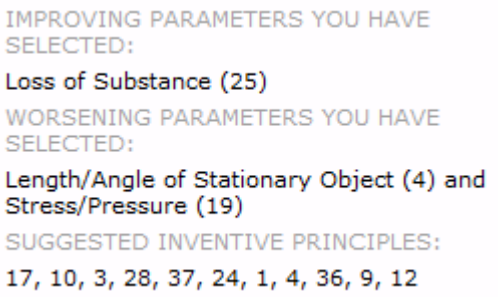


Figure 2: Mapping The BP Oil Spill Problem Onto The Contradiction Matrix

All in all, the correlation between the ideas submitted and what the Matrix recommended was relatively low.

According to Table 2, there were three of the offered solution concepts that were not readily mappable onto the Inventive Principles:

Table 2	
Non TRIZ Relevant Solutions	**The Frequency**
S3, S50, S70	**3**

We've already encountered solution S3 in the earlier list. Here are the other two solutions:

S50.	**Solution Statement**	**Use a conveyer belt of large "garbage bags" to package the leaking oil for later pick up:** A conveyer belt of large "garbage bags" traversing the cap could capture a majority of the leaking

		oil. The bags would be dispatched once they are filled with oil, and would float to the surface for later retrieval.
	The corresponded TRIZ Techniques	N/A (poor solution)

S70.	**Solution Statement**	**Put a ring of booms surrounding the area of the spill to contain oil coming to the surface:** From what I can see in pictures, there is no attempt being made to contain the spill at or near the spill site. I realize the oil may spread out as it floats to the surface but why not put a ring of booms there to try to contain it.
	The corresponded TRIZ Techniques	N/A (not a great solution)

As may be seen, neither offers anything of any real merit to the problem.

Conclusions

The first and main thing to say about the findings of the study is that the 116,000 ideas submitted to the BP team didn't contain anything useful that wasn't derivable from the 40 Principles. Great that the 'world' generated so many ideas. Not so great that so much of the content proved to be noise.

Which in turn leads to one of the most difficult problems of truly open Open Innovation – and one that has undoubtedly come to bite the BP engineers in the wake of the incident – how to keep everyone that submitted ideas from becoming upset that a) you didn't 'steal' their idea, and b) probably even worse that 'I submitted my idea but they ignored me'. All in all, massive potential for a public relations nightmare. Not helped by the thought, now, that all of the ideas could have come from a very non-open system.

Of course, there remains an issue here of not just the quantity of ideas generated, but their quality. At this point it is far from clear that the BP engineers used the most elegant of solutions to the problem – dropping a 75-tonne anything to the bottom of the ocean was never going to be classed as a 'breakthrough' solution. As such it is difficult to know which of the ideas submitted would have delivered a more elegant solution. The next problem of Open Innovation here being that a lot of ideas will never get a chance to be tried because it is too expensive to do lots of experiments.

From a purely TRIZ/SI perspective, the strongest solutions are always going to be the ones that make use of existing resources rather than fighting them. The biggest single available resource was the pressure of the escaping oil. Which in theory should mean that the most elegant solution would be the one that uses the pressure rather than fights it. For whatever reason, the 75 tonne cap solution was much more focused on a fight-pressure rather than use-pressure strategy. As such, the strongest solutions were probably most likely to come from the Principles that were all about turning a bad thing into a good thing (i.e. 9, 12, 13, or 22). Looking at the list of submitted ideas, very few seemed to fall into this category.

All in all, then, the world has done a pretty good job here of demonstrating that we're all very good at generating poor-to-mediocre solutions to tough problems. One can only wonder at what the difference might be if more people explicitly knew all of the Inventive Principles.

Mood Swings Part 2: Sine Waves And Archetypes

Welcome to the second part of our summary of the generations work of Straus and Howe.

Recap

Last month we showed how much of the generations work can be summarized onto a single page, using sine waves to represent the ebbs and flows of society. We looked at how 'sense of community', 'gender role gap', 'strength of institutions' and 'family' can be grouped together into a core cycle that repeats over four generations – approximately 80 years. We also showed (Fig 1) how child nurture leads this core cycle by one generation.

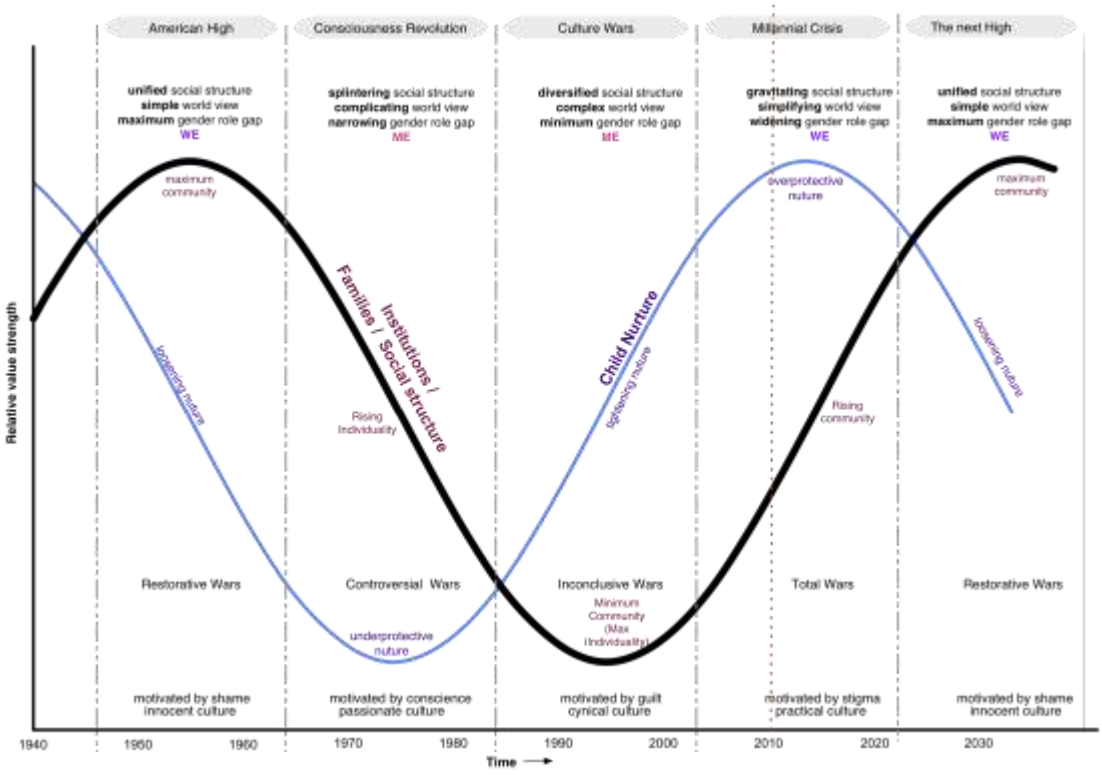


Figure 1

Finally, we looked at the perspective of generation X, and how as children of a selfish Baby boomer generation, they have re-shaped their children's upbringing. Now, as they get to grow into more powerful positions, they are also re-shaping society.

We promised that this month we would look in more detail at how the collective personalities (archetypes) of the generations influence the direction of the sine waves, and most importantly why. So here we go….

Straus and Howe chose to segment each generational life story, or passage, into four sections, youth, young adulthood, midlife adulthood and elderhood, each being slightly longer than 20 years. One word is used to sum up how history perceives each generation during that phase. It is quite amazing that this has been found to be a repeating characteristic. As we have been considering GenX so far, let us add their life story to the map, together with the child nurture sine wave :

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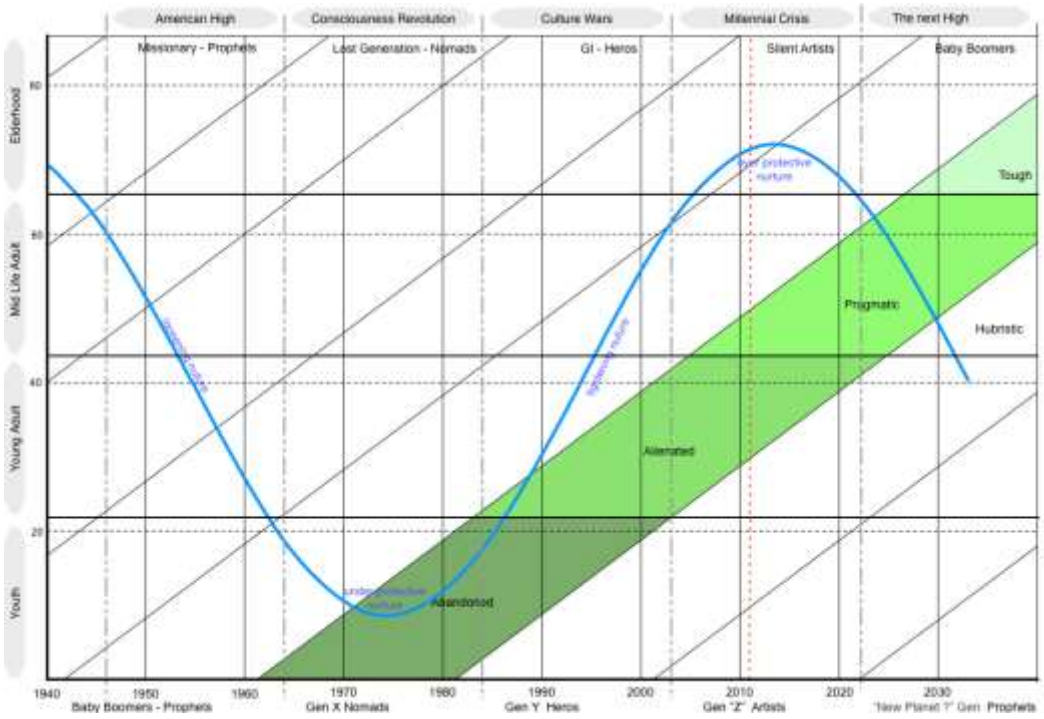

Fig 2

Here we see that right in the center the of the consciousness revolution, the trough of the child nurture cycle corresponds to the Nomad – *GenX* being "abandoned" as children. Last month we explored how this manifested itself. GenX were the first to have to run the gauntlet of abortion, they were the latch key generation who also became bargaining chips during "easy" divorce. As young parents in the late 1980's, and still being influential today, Gen X have been responsible for significantly increasing the protection and nurture of children, to the point that nurture is now over done. However, although this is undoubtedly a reaction to their upbringing, the pendulum started to swing before any *GenX* could actually become parents. So why did the pendulum swing at that time, and not when GenX were becoming parents themselves? To understand this, we need to bring the GenX parents into the story – welcome to the "Prophet" baby boomers, and "Artist" Silent in Figure 3.

Here we see that the parents of the youngest *GenX* were almost exclusively the *Silent*. During the consciousness revolution, from the early 60s to the early 80's, parenting was taken over by the boomers. In fact by around 1982, almost all child rearing was being done by the *Boomers.* As indicated by the block above the arrow in Fig 3, the swing in child nurture happened when the *baby boomers* were around 50% of the young adults alive at the time. Evidently therefore it was the influence of the *Boomers* that reversed the direction of the trend, to be continued and accelerated by their *GenX* children.

It would seem that there was something of a disagreement in society about how to bring up children in the 1960's, with the *Boomers* inevitably winning out as the *Silent* aged into mid life. The reason for this seems to be to do with the inherent selfishness of the *Boomer* generation. They were indulged as children, in the safety of post war society, and if any word sums them up, it is the word "rights". They have always fought for rights. In many cases this was a force for good - rights for ethnic minorities, workers rights or equality. But they have always fought for *their* rights, and this trait continues to this day. In the 60's, boomers campaigned for the right to decide about the life or death of their unborn children, who they wanted to bring into the world at their convenience. In a recent article on the BBC website (Ref 2) the boomers are now starting demand their right to choose their own

death, at their convenience. This article is a superb summary of the *Boomers, and well worth a read.*

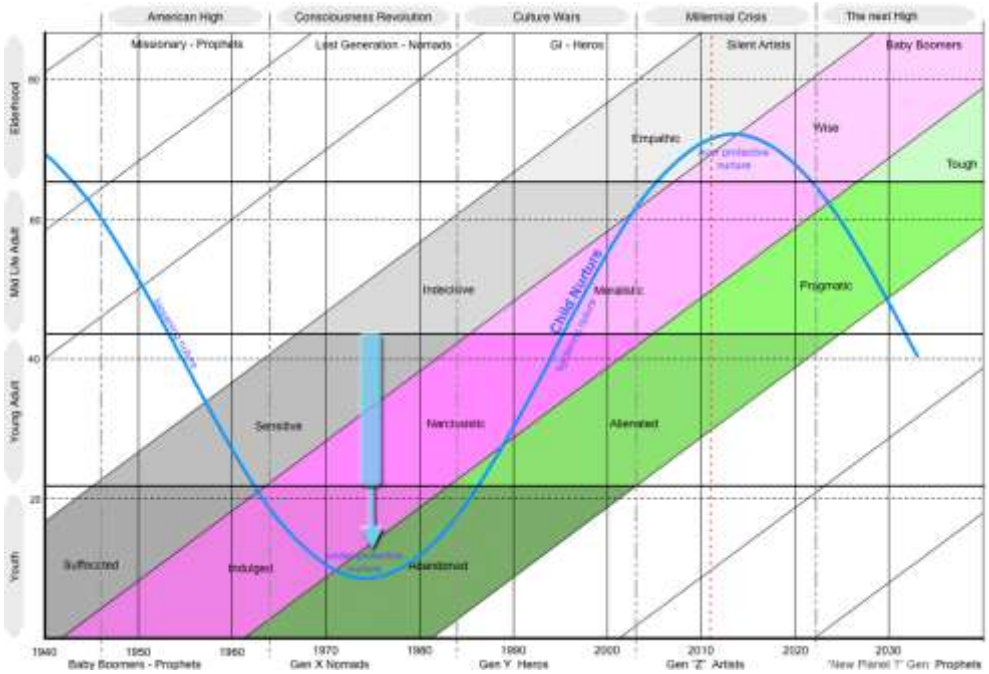

Fig 3

Citing page 365 of Generations, the positive attributes of the Prophet, Boomer generation are listed as "principled, resolute and creative", (certainly matches the image of the campuses of the late 60's). The negative aspects are that they are "ruthless, **selfish** and arrogant". With respect to their children, this selfishness seems to have manifest itself as treating offspring as possessions, a reflection on themselves. In this sense, child nurture is tied in with the consumerism of the Regan / Thatcher era.

But we should also consider the parents of the *Boomers.* Despite being parents during the lowest ebb of the child nurture cycle, the *Silent* also seem to be an influence on the upslope in later life as "elders" during the mid 90's and to this day. Although very few *Artist* archetypes are elected as presidents or prime ministers, they clearly do have influence – in the courts, civil service, parliament, and also in family life. Again, citing page 365 of the Generations book, it is interesting to note that the Artist *Silent* generation in Elderhood are not only described as being empathic, but are pre-occupied with *family.* Considering that they presided over the down-slope of child nurture in the 1950's and 60's, this represents a significant change of heart.

So, on the upslope, during the 1990's, three generations are agreeing that children need to be nurtured more tightly. *GenX*, reacting to their abandoned upbringing, *Boomers* making sure that their families are successful and the *Silent* worrying about their family. But this has already started to change. Just as the *Silent* changed their view in later life, so are their children and grand children. As a result, we are already seeing the nurture pendulum starting to swing in the opposite direction.

You may be wondering why it is important to go through this in detail. Having understood the mechanism for the direction change of child nurture, we can explore the same mechanisms at work for the **core cycle**, and this is where most innovation opportunities exist. If we move forward one generation / turning, we see that the core cycle goes through the same change of direction in the 1990's. So if the causal pattern does repeat,

it is the boomers and silent that change the direction, and GenX that follow it through, as shown in the diagram below :

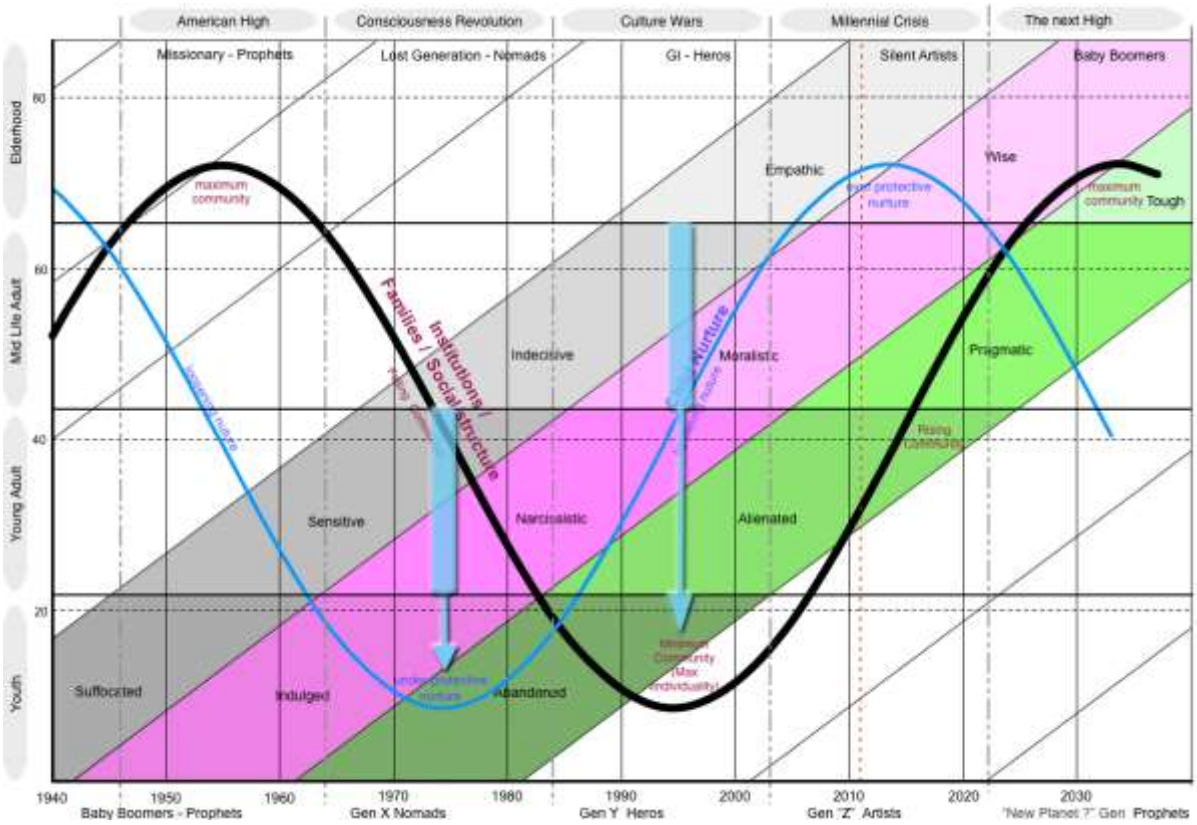

Fig 4

Here we see that indeed the same two generations are involved again, but this time at their most influential time of life. In the early 80's, most people in powerful mid-life positions were *Silent* generation, and in the early 00's they had transitioned to being a majority of *Boomers*. Right at the bottom of the trough, the tide turns when there is roughly equal influence shared between the two generations. Again it is as though there is disagreement in the direction between the two generations, with the younger one winning out as the older ones move on. To understand this we need to look at the behavior of these archetypes in mid life.

Mid Life - Prophets (*Boomers*)

The Prophet archetype is characterized as being "Idealist", and also "Dominant". These traits stay throughout life. Being pre-occupied with their "inner world" as youngsters, their transition into mid life is characterized as a move from being detached, to judgmental. As mid-life leaders, Prophet generations are moralistic, righteous and austere. (Interestingly, the *Boomers* share the same archetype as the *Puritans*). We can see that despite their reputation for the use of narcotics during their "narcissistic" early years, *Boomers* have changed their tune "There is no such thing as being too rude to a smoker" a Boomer activist is quoted as saying. They certainly have undergone something of a transformation into their 40's.

History knows the Prophets for producing "thinkers" - preachers, writers, radicals, publishers and teachers.

Mid Life - *Silent* (Artists)

The Artist archetype is characterised as being “Adaptive”, with a genteel nature. The key to understanding the Silent Generation, is that they grew up in the shadow of their parents – the *GI* generation (*Hero*). They have a tendency to be obedient, and trusting of authority. Their transition to mid-life is characterized as a move from being conformist, to experimental. (Note – on the map, the term “indecisive” which is linked to this experimental aspect – being open to change). Their strengths are to be caring, open minded and expert, but their weaknesses are to be indecisive, neurotic and ridden with guilt. As leaders, they are found to be pluralistic but indecisive, process driven “improvers”.

History remembers the Artist Archetype for producing Lawyers, Therapists, Legislators, Statisticians and of course, Artists.

It is somewhat unsurprising that Six Sigma took off in the 1990’s, when the Silent generation were at the helm. (Jack Welch, born in 1935 = *Silent* generation)

Unfortunately though, we are still missing something here. Neither the UK nor the US had any Silent generation leaders. Let us plot the terms of office of our leaders against the map during the core cycle trough :

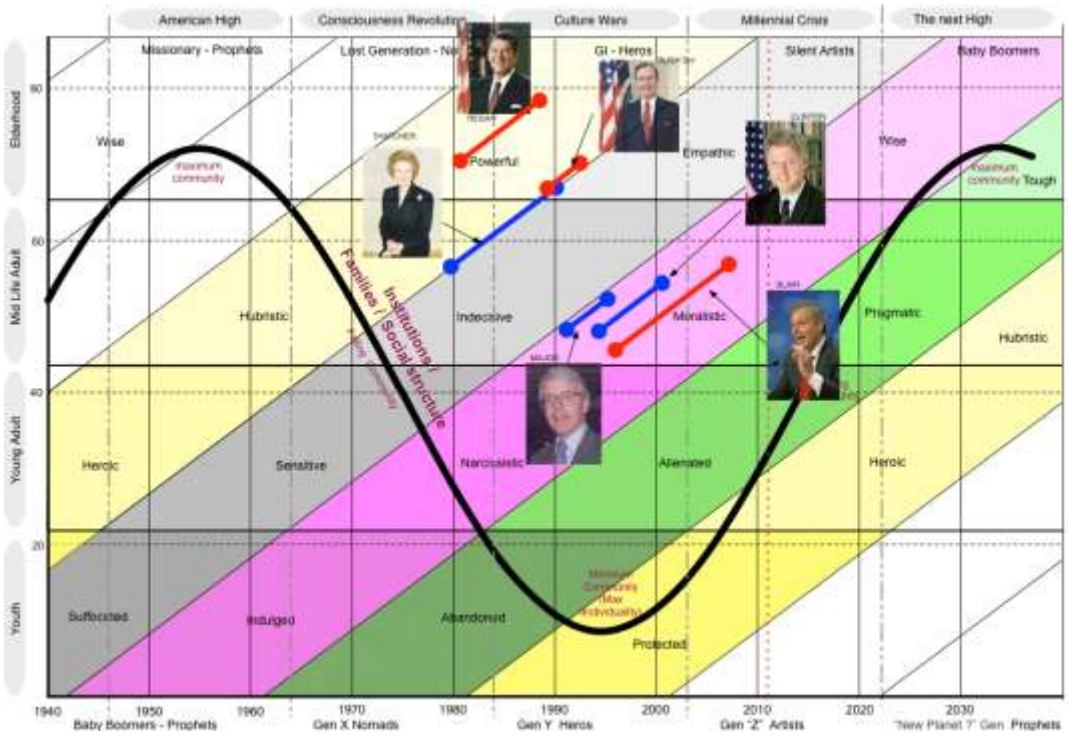

Fig 5.

Here we can see that Margaret Thatcher and George Bush Senior were born right at the boundary between GI and Silent generations. Ronald Regan was of course a fully fledged GI hero.

So, the story seems now to make sense. In the early 80’s, the policies were set by the *GI* generation, voted into power by the *Boomers*, happy with the promises of self focused personal gain. A key policy in the UK was privatisation – selling off institutions, and putting the proceeds into the pockets of masses of a new capitalist society. This was perceived at the time by some, as an attack on the sacred institutions of the country. In a

sense, it was, but part of the inevitable season of renewal – the down slope of the core cycle. One group of people see reform and improvement of bloated, inefficient institutions, others see attack on the sacred building blocks of society. However, there can be no better example of the cycle in action.

In the 1990's, with most suitable institutions privatised, it was time for the next generation to step up, to rebuild. John Major was never in a politically strong enough position to be able to do this, although clearly had the intention. It was the pairing of Clinton and Blair that started the change in earnest. In the UK, huge investment was made into schools, healthcare, transport and government systems. However, most commentators agree that the results have not matched up to the price tag. It is this authors opinion that the reason is that the old institutions were actually over protected. They needed to be reformed more radically before putting in the money. One has to remember that although politicians set policy, the civil service are the doers. Government institutions are large organizations, steeped in bureaucracy. During the early Blair years, the mechanics of government and institutions were run by the *Silent* generation, the perfect bureaucrats, who we now know were in their life period of being open to change, but only interested in "improvement" and statistics, not wholesale revolution. The result was a highly controlled, monitored, investment programme. A target based culture would make perfect sense to both *Silent* and *Boomers*. *Boomers* would connect with the idea of using financial carrots and sticks to motivate – that fits with their self centered, materialistic world view. Process orientated Silent bureaucrats would find the statistical, command and control culture the only way to operate. But we know that motivation through financial reward is counter productive, (ref: "Drive", by Daniel Pink), as too is an over reliance on targets. The revolutionary rhetoric and intention of the Blair government was diluted by the evolutionary approach of the doers.

But, despite this, the Boomers and Silent generations have succeeded in changing the direction of the core cycle. This momentum now needs to be accelerated. As we know from the Nurture cycle, we now need three generations to be working together in the same direction.

Next month we will complete the generational picture. Having an understanding of the past is all very well, but it's the future that really matters, so that is where we are heading.

Conclusion

The interaction between the generations, at different phases of life can be shown to influence the direction of both the nurture and core cycles.

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Humour – Another Type Of Merging

The official interpretation of the TRIZ 'Merging' Principle (Number 5) is '*Physically join or merge identical or related objects, operations or functions.'* It is very definitely one of the more generic of the Inventive Principles, frequently begging the question, 'how 'related' is related?'

Paradoxically, it is often the merger of two highly un-related entities that makes for some of the best solutions. We were particularly struck by this recent example of a Merging of two in many ways polar-opposite things:

The spoof ads were created by Sao Paulo ad agency Moma Propaganda as part of the "Everything Ages Fast" ad campaign for Maximidia Seminars.

Patent of the Month – Synergistic Supaerabsorbent Polymer

Rather unusually, we find ourselves in and around the world of diapers for this month's patent of the month feature. US7,820,873 was granted to inventors at Kimberly-Clark in the US on 26 October. The patent is for a modified version of the super-absorbent polymers typically used in a variety of fluid-absorption roles. The background description eloquently describes the subject and the problem:

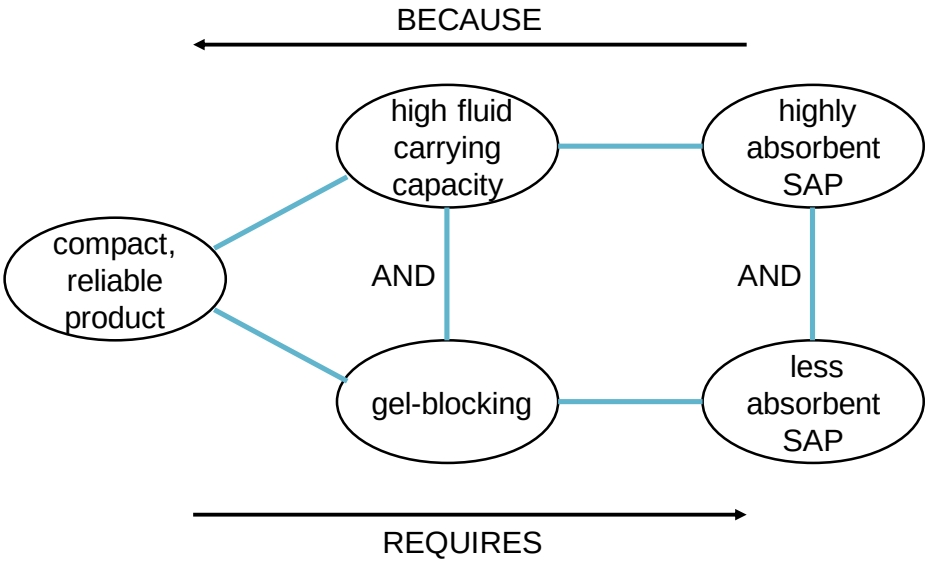
The use of water-swellable, generally water-insoluble, absorbent materials in disposable absorbent personal care products is known. Such absorbent materials are generally present in absorbent products in a fibrous matrix, such as a matrix of wood pulp fluff. A matrix of wood pulp fluff generally has an absorbent capacity of about 6 grams of liquid per gram of fluff. Some of these materials having an especially high absorbent capacity are commonly known as superabsorbents or superabsorbent polymers (SAPs). Water-swellable, water-insoluble absorbent materials have an absorbent capacity of at least about 10, desirably of about 20, and often of up to about 1000 times or more their weight in water. Incorporation of such absorbent materials in personal care products can reduce the overall bulk while increasing the absorbent capacity of such products.

A wide variety of materials have been described for use as water-swellable, water-insoluble absorbent materials in personal care products. Such materials include, but are not limited to, natural-based materials such as agar, pectin, gums, carboxyalkyl starch, and carboxyalkyl cellulose, as well as synthetic materials such as polyacrylates, polyacrylamides, and hydrolyzed polyacrylonitrile. While such natural-based absorbent materials are known for use in personal care products, they have not gained wide usage in such products, at least in part because their absorbent properties are generally considered inferior compared to that of the synthetic absorbent materials, such as the sodium polyacrylates. Specifically, many of the natural-based materials tend to form soft, gelatinous masses when swollen with a liquid. When employed in absorbent products, the presence of such soft gelatinous masses tends to prevent the transport of liquid within the fibrous matrix in which the absorbent materials are incorporated. This phenomenon is known as gel blocking. Once gel blocking occurs, the product cannot efficiently absorb subsequent insults of liquid, and the product tends to leak. Further, many of the natural-based materials exhibit poor absorption properties, particularly when subjected to external pressures.

In contrast, synthetic absorbent materials are often capable of absorbing large quantities of liquid while maintaining a generally stiff, non-mucilaginous character. Accordingly, synthetic absorbent materials can more readily be incorporated into absorbent products while minimizing the likelihood of gel blocking.

One property of many available water-swellable, water-insoluble materials, especially superabsorbent materials, is that such materials typically very rapidly absorb the liquid that comes into contact with the superabsorbent material. While such quick absorbency of the liquid may be desirable in many applications, there are certain applications in which it is not desirable. For example, in an absorbent structure that is insulted with a liquid at only a very localized location, it would generally be desirable to have the liquid distributed throughout the entire volume of the absorbent structure so that the absorbent capacity of the entire absorbent structure is utilized. However, if the superabsorbent material located near the localized insult location absorbs the liquid very quickly, this superabsorbent material may swell and restrict the flow of the liquid throughout the rest of the absorbent structure, possibly resulting in the liquid leaking out of the absorbent structure in the area of the localized insult location. Accordingly, it is often desirable to employ a superabsorbent material in the localized insult location that actually absorbs the liquid at a reduced rate. This allows the liquid to be distributed throughout the absorbent structure first and then be subsequently absorbed by the superabsorbent material.

From a contradiction perspective, what we seem to have here is the following situation:



This seems like a classic physical contradiction story – we want absorbency, but too much absorbency (locally) prevents the product from working (globally). If we take the central conflict pair shown in the picture, the story looks something like this:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Amount of Substance (10)

WORSENING PARAMETERS YOU HAVE SELECTED:

Volume of Stationary Object (8) and Speed (14)

SUGGESTED INVENTIVE PRINCIPLES:

35, 38, 28, 2, 29, 25, 24, 30, 34, 31, 3, 1

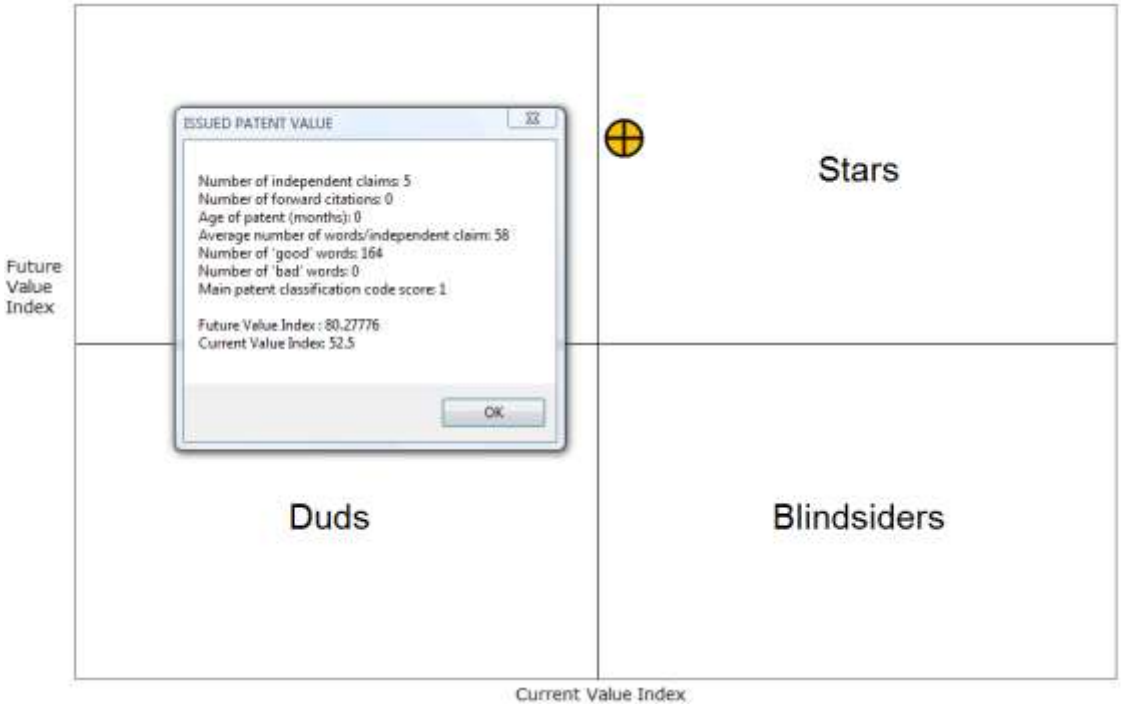
And here's what the inventors have done to resolve the problem:

The present invention is directed to absorbent structures that form superabsorbent polymers in situ. The structures include an absorbent material and a fibrous material containing an activating agent. The activating agent is contained upon or within one or more fibers of the fibrous material. The fibrous material releases the activating agent, which causes the polymer to have a greater capacity for water absorption. In some embodiments, the polymer becomes a superabsorbent polymer (SAP). The absorbent component is desirably a water-swellable, water-insoluble polymer. In some embodiments, the polymer has acid or base groups on one or more monomers of the polymer. In those embodiments, the presence of these non-neutralized acid or base groups limits the ability of the polymer to absorb water, and the activating agent includes acid or base functional groups that will neutralize the acid or base groups of the polymer upon coming into contact with the polymer, thus forming salts on the polymer and thereby increasing the absorbent capacity of the polymeric material.

What we like most about this invention is how the inventors have, instead of asking the usual incremental-type research question have allowed themselves to think about some big, tough challenges. Like 'wouldn't it be great if we could form the SAPs in-situ?'

What we also like is the match between what they did and the recommendations emerging from the Contradiction Matrix, with a very direct connection to (unusual) Principle 38 (Enriched Atmosphere/Strong Oxidants), to Principle 25, Self-Service and to Principle 3, Local Quality.

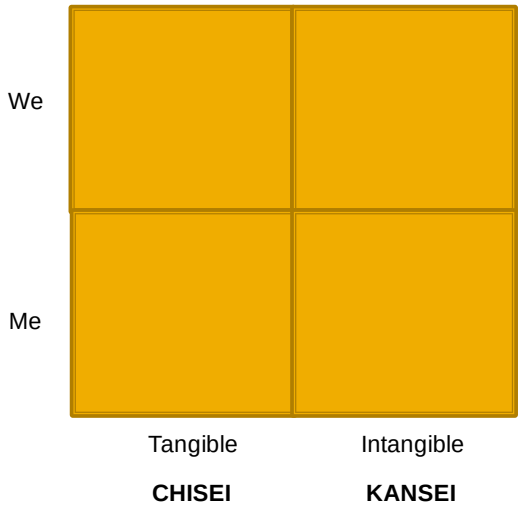
We also quite like what ApolloSigma has to say about the invention:



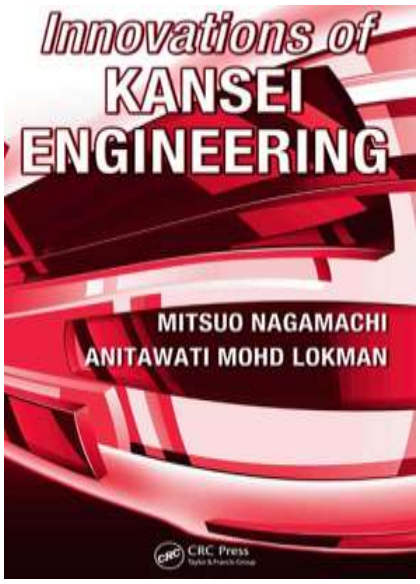
Highly unusual for a newly granted patent to emerge as a ‘Star’, but that’s exactly what we have here. Keep your eyes open for this one!

Best of the Month – Innovations Of Kansei Engineering

We've had half an eye focused on progress in and around the world of Kansei Engineering for well over a decade now. Kansei is all about the design of emotional factors into consumer products. As such the subject has strong parallels with all of the work we have been publishing on the 'Science of Intangibles' in recent times. In the same way that we are encouraging clients to examine both tangible and intangible worlds when working out the functions and outcomes desired by customers, Kansei Engineering divides the world into Chisei and Kansei:



The newly published (and – sadly – rather expensive) book Innovations Of Kansei Engineering, written by the founder of this technology, represents a solid first step into unraveling the emotion-design story from the Japanese perspective.



The book reveals some intriguing strategies for eliciting unspoken consumer feelings, wants, and needs. Including an intriguing connection to computerized design strategies involving genetic algorithms and fuzzy logic. There are certainly things to be learned from these aspects of the book. Although, it has to be said that the learnings are best combined with elements of TRIZ and Systematic Innovation. In particular, Kansei is revealed to be a

way of thinking that still very much revolves around trade-off and compromise. Take some of the Kansei ideas and combine them with ‘eliminate the contradictions’ however, and the prospect of some very powerful ways of looking at the emotional design challenge begin to emerge.

Kansei often uses a process of varying the form of an entity and asking which form consumers prefer (a very trade-off oriented question). Take that idea and combine it with the concept of taking the either/or preferences to a higher both/and level and that’s when the magic has the opportunity to happen. Especially, to further complicate the picture, some of the insights of architect, Christopher Alexander, are also brought into the picture.

Spending over 40GBP on a book (we know!) is a big decision for most of us. At just 152 pages, the cost-benefit argument starts to look pretty weak. On balance, our view is that the investment is ‘just’ worth it. But only, if you’re prepared to put in the thinking necessary to integrate the ideas contained within the book with other things. Rather than leave the story here, we strongly recommend that readers take a quick look at a free Kansei reference, ‘Pleasure with Products: Design based on Kansei’, a recent paper produced from a piece of joint Dutch-Japanese research, in order to assist in their decision to buy the book or not.

http://studiolab.io.tudelft.nl/static/gems/publications/00Lee_PWPPlea.pdf

Ultimately, it’s always nice to get the story behind a method from the founder. As we know from TRIZ, however, the founder doesn’t always get everything completely right. Or tell the story in a readily absorbed way. Forewarned is hopefully forearmed.

Conference Report – Dublin Innovation Forum

Does Ireland have the gusto to grab European innovation, drive it effectively and execute a global transformation?

As the media dwells heavily on the condition of the Irish economy, something extraordinary is brewing.

Ireland has a proven track record in progressive and significant change. Once known to have a strictly agricultural focus, Ireland diversified, sped up and took their slice of the modern industry pie.

Does this ability to quickly evolve as a country make Ireland a perfect leader and part of the solution to the European Union innovation paradox?

Can Ireland take the reins of a European Union innovation revolution?

On the 27th of September 2010 leading authorities on innovation and business from industry and academia met in Dublin and thrashed it out at the 'Making Ireland the innovation capital of Europe' private forum sponsored by HP, Avaya, Rio Tinto and blackswan.

blackswan, global leaders in business and innovation transformation, hosted the forum attended by over 50 representatives from the Irish government, major business leaders and members of the European Union. Maurice Duffy, CEO blackswan, moderated the debate and the attendees heard keynote speeches from:

- Ian Vance MBE, former President of Nortel Networks
- Darrell Mann, CTO blackswan
- Dr Liz Mellon, Executive Director of Duke Corporate Education
- Professor Frank Gannon, Director General of Science Foundation Ireland.

Several videos from the event can be found at:
http://www.globalblackswan.com/articles/can-ireland-be-innovation-centre-europe

If you don't want to look at the whole thing (worth it!), Darrell's presentation on Systematic Innovation and Ireland's ranking against global innovation statistics can be found at:

http://www.globalblackswan.com/articles/can-ireland-be-innovation-centre-europe?page=0,3

Investments – Plastics & Nanoparticles

These days, plastic components are vital to many fields of industry - lightweight construction, automobile manufacturing and electrical engineering, to name but a few. Researchers at the Fraunhofer Institute reported this month to have found ingenious ways to combine plastics with nanoparticles and endow them with new properties. One of the first (high value) of what look set to by a myriad range of possibilities is aircraft lightning strike protection.

Picture the scene: Pitch-black clouds gathering on the horizon, an aircraft winging its way towards the storm … and suddenly a flash of white-hot lightning splits the sky. It is by no means a rare occurrence for aircraft to have to pass through bad weather fronts, but when they do, there is always one major danger - lightning. Naturally, aircraft manufacturers do everything they can to protect their machines against strikes, but even aircraft made of aluminum do not always escape entirely unscathed. And when polymer components - usually carbon fiber reinforced plastics (CFRPs) - are incorporated into the design as a weight-saving measure, the situation becomes even more problematic, because they do not conduct electrical current as well as aluminum.

At the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM in Bremen, researchers have now developed a process for manufacturing new materials that should afford aircraft better protection against lightning strikes. They have been focusing on the unique material properties of carbon nanotubes (CNTs). CNTs are among the stiffest and strongest fibers known, and have particularly high electrical conductivity. In order to transfer their properties to CFRPs, the scientists have been combining these nanoparticles with plastics. "By mixing nanoparticles with plastics, we've been able to significantly enhance the material properties of the latter," states Dr. Uwe Lommatzsch, project manager at the IFAM. To give just two examples, CNTs are being used to optimize the electrical conductivity of plastics, and their heat dissipation properties are likewise being improved by the addition of metal particles.

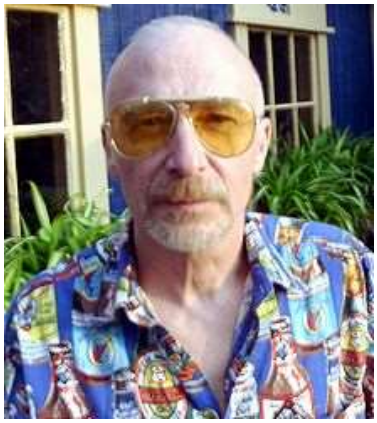
The trick is in the mixing process, says Lommatzsch: "The micro- or nanoparticles must be highly homogeneous, and sometimes very closely bound to the polymer." To do this, the scientists employ plasma technology. They use an atmospheric plasma to alter the surface of the particles in such a way that they can be more readily chemically bound with

the polymer. A pulsed discharge in a reaction chamber creates a reactive gas. Lommatzsch's colleague, Dr. Jörg Ihde, explains: "We spray the particles - i.e. the nanotubes - into this atmospheric plasma." They immediately fall into the selected solvent, which can then be used to further process the polymer. The whole procedure takes just a few seconds - a huge advantage over the old method, in which CNTs were generally prepared in an acid bath using a wet chemical process. (Note the predictable shift from liquid to plasma as described by the Object Segmentation trend!) That took several hours or days, required considerably more chemicals, and generated significantly more waste. In addition to improved carbon fiber reinforced plastics for use in aircraft manufacturing, the IFAM researchers have several other potential applications in mind. Ihde outlines an example: "We can increase the heat dissipation properties of electrical components by giving metal particles of copper or aluminum an electrically insulating coating in the plasma and then mixing them into a polymer." This can be pressed onto an electronic component so heat is dissipated directly. "Overheating of elements is a major problem in the electronics industry," he adds. The researchers have also devised a way to reduce electromagnetic losses by using this plasma process to coat soft magnetic particles such as iron and then combining them with plastics. Built into electric motors, they cut eddy current losses, thus improving efficiency and lengthening service life.

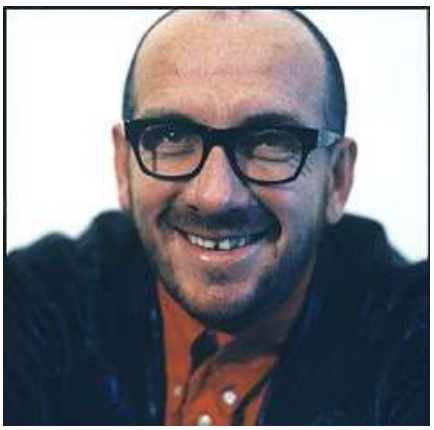
We've known for some time now that carbon nanotubes have the potential to transform a wide range of industries. As is so often the case, the next problem once the basic capability has been demonstrated is to achieve the ability to manufacture in an economically viable manner. This Fraunhofer story has all the hallmarks of a technology development that has achieved exactly that.

Generational Cycles – Battle Of The Bands Pt 1 – Graham Parker v Elvis Costello

Graham Parker b1950



Elvis Costello b1954



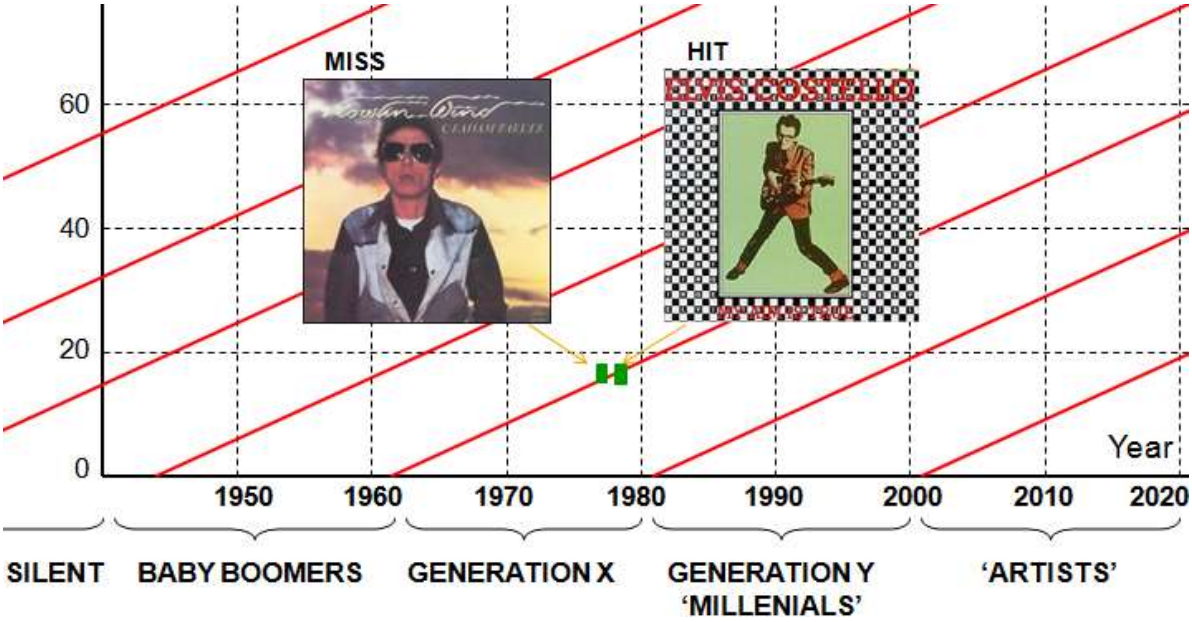
Sometimes life can be decided on the roll of some apparently pretty random dice. Nowhere more so than in the world of popular music. Take two of rock music's bitterest of rivals Graham Parker and Elvis Costello. Despite their slightly different ages, both started at the same time and first came to public attention in the UK at the same time during the height of the pub-rock scene in the mid 1970s. Pub-rock turned out to be one of the precursors for the emergence of punk rock in late 1976.

Both performers were viewed by the music press as highly talented songwriters and performers. For many, Parker had the edge. But Costello is the only one who has gone on to be world famous, with a discography of over 30 albums, a sack-full of hit singles and overall record sales measurable in the tens of millions. Not that Parker disappeared completely: he too has managed to sustain a career to the present day and has released almost as many albums, it's just that they're mostly released on his own label and almost never chart. Perhaps not surprising that Parker has little love for Costello even today.

The root of the problem for Parker most likely started in April 1976 when his debut album, Howlin' Wind was released. Still today the album is viewed by critics as one of the best debut albums of all time, and rarely will you see a review of it that gives it less than a 5* rating. The problem was April 1976. Punk was barely more than a twinkle in Malcolm McLaren's eye, and so the public and more importantly the record companies were living in a world dominated by Bruce Springsteen, Van Morrison other Boomer idols. It made obvious sense to promote Howlin' Wind as a record to compete with Springsteen's classic 'Born To Run'. Indeed, no doubt Parker himself would have been proud of the comparison.

Spool the clock forward to July 1977 and the release of Elvis Costello's debut 'My Aim Is True', and the music world had changed forever. Punk and 'New Wave' were now the rage and as such Costello had the benefit of being promoted as a very punk-like, nerdy outsider. No matter that the music on the record was much more like Springsteen than the Sex Pistols and very, very similar indeed to the tone and theme of Parker's debut. Image proved to be everything. My Aim Is True caught the punk zeitgeist and turned Costello into a star. Leaving Parker with a pre-punk 'new-Springsteen' image that he never was able to shake off, and a growing reputation as the bitterest man in music, with a penchant for on-stage diatribes against Costello.

Here's what the difference between April 1976 and July 1977 looks like in terms of our generation map of the Western world:



Life can feel cruel sometimes. Time for a Graham Parker resurrection society I think. Parker's 1979 album Squeezing Out Sparks has to be one of the best albums ever made, irrespective of what generation you're a member of. Problem is, the generational stigma tends not to go away. Go tell your friends.

Biology – Cuttlefish Hypnosis

Cuttlefish are not actually fish; these sea animals are mollusks. They are amongst the most intelligent species on the planet. These are very clever when it comes to changing their color and patterns to suit the environment. The cuttlefish is found in areas of the English Channel, along the West coast of Africa to the Southern tip of the continent and also in the Mediterranean Sea. The cuttlefish belongs to the Sepiida class which also includes the Squids, the Octopus and the Nautiluses.

The cuttlefish has tentacles along with a mantle that had a calcium based 'cuttlebone' which forms the shape of the body. The cuttlefish also has two fins, which wrap around the mantle. This starts just behind the head, on each side of the body, and ends up on the back of the mantle. The eyes of the cuttlefish jut out from the front of the face. They have eight arms and two tentacles, which consist of denticulated suckers. Between the tentacles, one can find a beak-like mouth.

The cuttlefish are also called the chameleon of the sea. They have a very great ability to change their pattern for various purposes. The change of coloration is due to the special cells called chromatophores. The cells change colors when the individual cells expand or contract. Therefore, the cuttlefish are known to blend into many backgrounds with ease. The cuttlefish can therefore change into colors of gold, green, silver, blue etc.

The colour-change capability has obvious benefits when it comes to hiding itself from potential predators, but perhaps much more impressive, the cuttlefish has evolved another more attack-oriented use. Hypnotism. Cuttlefish regularly catch their fast-moving prey by rapidly flashing different colours. Here, they point the tips of the arms towards the potential victims and run skinny bands of color from the back of the body and towards the tips of the tentacles. This gives an appearance of concentric circles that flow towards the onlooker.

This is classic predator-prey arms-race territory: prey gets better at avoiding capture by predators; predators devise better strategies for catching prey. For the cuttlefish, the basic conflict is that between the desire to catch prey efficiently and the superior speed of the prey. Here's what the problem looks like when mapped onto the Contradiction.

IMPROVING PARAMETERS YOU HAVE SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE SELECTED:

Speed (14)

SUGGESTED INVENTIVE PRINCIPLES:

35, 3, 24, 5, 4, 12, 13, 19

SYSTEM ATIC INNOVAT ION

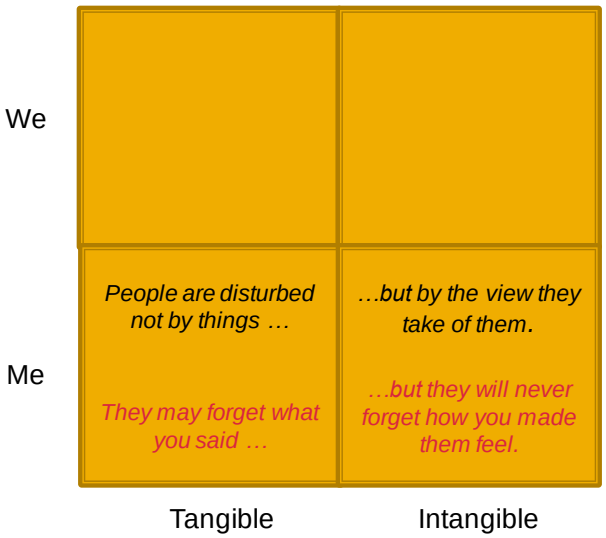
The hypnosis solution is not the easiest thing to map onto the Inventive Principles. Probably Principle 19, Periodic Action is the closest we might get. Looking at the problem more generally, what the hypnosis solution is doing is in effect solving the inferior speed problem by encouraging the moving thing (the prey) into a stationary thing… which sounds quite a bit like Inventive Principle 13, The Other Way Around.

Static images of a cuttlefish hypnosis trick in action are never going to work that well. Fortunately YouTube features several neat videos. We like the one at:

http://www.youtube.com/watch?v=JBOiDV3kRXo

Short Thort

"People are disturbed not by things
but by the view they take of them.
They may forget what you said
but they will never forget how you made them feel."
Carl W. Buechner.



News

Puebla TRIZ Conference

With a following wind, we should be presenting at the 5th Iberian and Latin American Congress on Technological Innovation taking place in Puebla at the beginning of December. Our paper and accompanying workshop are entitled, 'Beyond TRIZ: The Science Of Business Innovation, The Science of Intangibles'.

Windows 7

Well, it took rather longer than we expected, but happy to say that all of our software tools now work on Windows 7. Thanks to Microsoft (not!) for making life so easy for us. Anyone wishing to download the new version, contact paul@systematic-innovation.com.

Creative Action

The new exact-replica, hard-back edition of Edward Matchett's classic book is now in stock. Details as ever on the Products page of the website. The Road To True Professionalism (featuring a (long) foreword by Darrell) is following close behind… hopefully more news on that next month).

QFD Conference

We will be presenting a paper at the big QFD conference next year. The 2011 event will happen in Germany in September. Regular readers of the e-zine will know that we have been highly critical of QFD (or rather the poor application of the method) in the past. Our

paper explores the reasons for the problems of using QFD effectively and some of the synergies with the SI toolkit and thinking processes.

20/20 Foresight

The inaugural version of our new strategic foresight workshop will be held at a public event in Kuala Lumpur in November. It seems already that we have hit some kind of a nerve – with over 20 company CEOs signing up for the event within a week of the announcement going out. Or maybe it was the endorsement we received from the Malaysian government? Either way, assuming all goes well, we'll be bringing a version of the workshop to Europe and North America during 2011.

New Projects

This month's new projects from around the Network:

Financial Services – next generation product conception workshops
FMCG – consumer-insight-to-product-concept session
Pharma – TrenDNA workshop
Automotive – Strategic study
FMCG – packaging concept design study
Hardware – strategic study
Education – training programme
Government – foresight studies
Entertainment – new product concept design study
Retail – training workshops