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Systematic Innovation

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e-zine

Issue 55, October 2006

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

Principle-Guided Patent Searches

A common complaint surrounding the 40 Inventive Principles is that they are often too abstract. They give us 'generic solutions' to contradiction problems that demand an often considerable leap in order to get to an effective 'specific solution'. Sometimes the size of this leap successfully forces the user out of their psychological inertia. Other times, though, the leap is too great. We are experiencing this 'too great' problem when we fail to make any kind of connection between a Principle and our problem and consequently convince ourselves that the Principle is 'not relevant' or 'meaningless'. Such reactions are in many ways understandable. Every time we allow ourselves to make such conclusions, however, there is a strong likelihood that we are missing an opportunity. After all, the Matrix has recommended that Principle precisely because 'someone, somewhere has successfully used it to solve a problem like yours'.

Ironically, it is often the case that the Principles we are most likely to dismiss as 'irrelevant' turn out to be the ones that will deliver the biggest breakthroughs. We think this happens precisely because the connections are non-obvious (one of our key breakthrough tests, remember) and that therefore everyone else coming before us has also missed them.

A strategy we frequently employ when we find ourselves in this 'irrelevant Principle' situation is to go to the original knowledge source and see if we can find others who have made the non-obvious connection we are failing to make. By way of example, take the 'classic' TRIZ workshop liqueur chocolate exercise:

In the exercise the aim is to increase the speed of filling of a chocolate bottle. The bottleneck in the process, excuse the pun, turns out to be the small filling area offered by the bottleneck and the difficulty of pumping the viscous liqueur into the bottle. We can model this contradiction onto the Matrix in various ways, but given the fact that we are trying to increase speed and the viscosity of the liqueur is what is stopping us, these look like a good pair to look up. There is, of course, no direct equivalent of 'viscosity' in the Matrix and so we need to find the closest match. Using our new 'Contradiction Finder' tool (see our website homepage) we establish that 'stress/pressure' is a good correlation. Figure 1 illustrates the result of then looking up speed versus stress/pressure in the Matrix:

Improving Factor	Worsening Factor	Principles
Speed (14)	Stress/Pressure (19)	28 14 6 40 38
we wish to increase the bottle filling speed but the high viscosity prevents us		18 12 35

Figure 1: Speed Versus Viscosity In The Contradiction Matrix
(incidentally the classical TRIZ Matrix gives Principles 6, 18, 38, 40)

Several of the Principles suggested by this conflict-pair appear to have little connection to the problem at hand. It is very easy, in fact, to conclude that many have 'nothing to do with' the specific liqueur problem. Principle 18, Vibration, for example, is one that, beyond the idea of shaking the bottle to get the contents to settle faster, does not tend to make any meaningful connections for many people.

Principle 18, though, is in that speed-versus-stress box because it has been used as a strategy by others. If we can't see how, then we ought to dig a little deeper. Since this is a

technical problem, the most useful knowledge resource for us to go and explore is the patent database.

Now comes the point of this article. The words present in the Inventive Principle descriptions become the words we use to guide a search of the patent database. (This partially explains why some of the wording found in the Principles is a little unnatural – we are trying to provide the search words that will allow us to find the ‘good solutions’. Figure 2 illustrates the Advanced Search page from the US Patent Database. In the search box we have built a simple search using some of the words (‘vibration’ and ‘ultrasound’) from the Principle 18 description. We have also given the search some context by specifying that we wish to look for patents that relate to ‘viscosity’ – the root of our problem.

[USPTO PATENT FULL-TEXT AND IMAGE DATABASE](#)

[Home](#) [Quick](#) [Advanced](#) [Pat Num](#) [Help](#)
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Data current through October 31, 2006.

Query [\[Help\]](#)

abst/viscosity and abst/(vibration or ultrasound)

Select Years [\[Help\]](#)

1976 to present [full-Text]

Examples:

tfl/(tennis and (racquet or racket))

isd/1/8/2002 and motorcycle

in/newmar-july

Patents from 1790 through 1975 are searchable only by Issue Date, Patent Number, and Current US Classification.
When searching for specific numbers in the Patent Number field, patent numbers must be seven characters in length, excluding commas, which are optional.

Field Code	Field Name	Field Code	Field Name
PN	Patent Number	IN	Inventor Name
ISD	Issue Date	IC	Inventor City
TTL	Title	IS	Inventor State
ABST	Abstract	ICN	Inventor Country
ACLM	Claim(s)	LREP	Attorney or Agent
SPEC	Description/Specification	AN	Assignee Name

Figure 2: Principle 18 Guided Search Of Viscosity Related Patents On The US Patent Database

Figure 3 then illustrates the outcome of the search:

Searching US Patent Collection...

Results of Search in US Patent Collection db for:
 (ABST/viscosity AND ABST/(vibration OR ultrasound)): 169 patents.
 Hits 1 through 50 out of 169

	PAT. NO.	Title
1	7,124,610	Method for producing a torsional vibration damper housing, especially a housing for a viscosity torsional vibration damper
2	7,118,353	Fluid transport system and method therefor
3	7,114,373	Fluid monitoring
4	7,080,564	Vibratory transducer
5	7,066,583	Film forming apparatus and method of driving same, device manufacturing method, device manufacturing apparatus, and device
6	7,066,064	Method and apparatus for vibration dampening of barfeeders
7	7,017,424	Vibratory transducer
8	7,014,462	Method and instrument for introducing a dental synthetic resin into a tooth cavity
9	7,001,355	Skin care device

Figure 3: Result Of Patent Search

Immediately we learn from this search that there are 169 patents meeting our criteria. While this might sound like a surprisingly large and therefore overwhelming number, it doesn't take too much digging to discover a connection between viscosity and our Principle 18 words. Figure 4 illustrates the abstract of the unlikely sounding 'Method and instrument for introducing a dental synthetic resin into a tooth cavity'.

[USPTO PATENT FULL-TEXT AND IMAGE DATABASE](#)

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United States Patent	7,014,462
Tilse	March 21, 2006

Method and instrument for introducing a dental synthetic resin into a tooth cavity

Abstract

A method and a device for introducing a dental filling material with a synthetic resin base into a tooth cavity. The filling material has a *viscosity* which is lowered under the action of vibrations, such as when subjected to *ultrasound*. The device subjects the filling material to the action of vibrations as it is injected into the tooth cavity.

Inventors:	Tilse, Rainer (D-75172 Pforzheim, DE)
Appl. No.:	10/069,949
Filed:	September 7, 2000
PCT Filed:	September 07, 2000
PCT No.:	PCT/EP00/08723

Figure 4: Abstract From US7,014,462

Within two sentences we learn that dentists have recently discovered that ultrasound is a very good way or reducing viscosity. And so we obtain a very direct link and potential solution to our liqueur chocolate problem; instead of reducing viscosity by increasing temperature, why not replace the heating altogether with ultrasound. It is, of course, still far from clear whether this concept represents a viable solution to our specific problem - there are inevitable 'yes, but..' problems to solve it nevertheless makes the important point as far as a generally applicable search procedure is concerned.

That point made, all we need to do to conclude this article is provide the foundations of a simple table of important search words we should use when seeking to find specific technical solutions involving the 40 Inventive Principles from the patent database (for the sake of brevity we have omitted a number of synonyms):

	Inventive Principle	Patent Search Words
1	Segmentation	split, segment, multi-, constituents, divide, bi-furcate, staged, nano, micro, particle, powder
2	Taking Out/Separation	separate, extract, remove, comparator
3	Local Quality	local, rib, protrusion, groove, channel, non-homogenous, (non-)uniform, isolate, keyway, zonal, hierarchical, gradient, layer, differential, partial, window, nano, micro, (up/down)stream, logarithmic, rough, smooth, spot
4	Asymmetry	asymmetry, Poke-Yoke, ergonomic, unequal, eccentric, cam, directional
5	Merging	merge, integrate, combine, multi, mix(er), blend, bi-, tri-
6	Universality	universal, standard, ISO, BS, Def Stan, plug, socket,

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		protocol, language
7	Nested Doll	nest, telescopic, sleeve, hierarchical, retract, stack, tunnel
8	Counter-Weight	(counter-)balance, lift, buoyancy, aero-, hydro-
9	Prior Counter-Action	sequence, buffer, pre-, prior, preliminary, partial, mask, reverse, retard, expend, deform, surge, choke
10	Prior Action	prior, preliminary, partial, pre-, early, late, sequence, reverse, post, store, temporary
11	Beforehand Cushioning	emergency, back-up, relief, spare, temporary, (non-)linear, fail, graceful, benign
12	Equi-Potentiality	equal, balance, tension, spring, pre-, flow, compress, release
13	Other Way Around	reverse, opposite, unconventional, surprising, unexpected, upside-down, inside-out,
14	Curvature	curve, spiral, rotary, circular, twist, centrifugal, fillet, radius, helical, parabolic, hyperbolic, screw, sphere, orbital, ball, arch, dome, conical, flare, spin, vortex, cyclone, coil
15	Dynamize	dynamic, stationary, design-point, optimize, variable, flexible, rigid, stiff, relax, free, adapt
16	Slightly Less/Slightly More	over-, under-
17	Another Dimension	non-planar, conical, frusto, serrate, scallop, stack, (re-)orient,
18	Vibration	vibrate, ultrasound, resonance, hammer, piezo-, sono-, oscillate
19	Periodic Action	pulse, pendulum, timer, frequency, variable, rhythm, mode
20	Continuity Of Useful Action	template, constant, pace, continuous, optimum
21	Skipping/Hurrying	Instant, flash, drop, critical, explode, shock, accelerate
22	Blessing In Disguise	waste, vaccine, unexpected, surprising, explode
23	Feedback	feedback, sensor, control, Fourier, monitor, proportional, integral, differential, adapt, intelligent, damp
24	Intermediary	intermediary, liner, guard, layer, (inter-)connect
25	Self-Service	self, auto(matic), intelligent, waste
26	Copying	optical, virtual, shadow, reflect(ion), UV, IR
27	Cheap Disposable	disposable, cheap, replace
28	Mechanics Substitution/Another Sense	electrical, magnetic, laser, nuclear, optical, wireless, scent, aural, acoustic, visual, kinaesthetic, gastric, (micro)wave, field
29	Fluids & Pneumatics	fluid, hydraulic, pneumatic, gel, plasma
30	Flexible Shells & Thin Films	film, shell, coating, sheath, inflatable, liner, leaf, web, sail, thread, fibre
31	Holes/Porous Materials	hole, pore, void, foam, cavity, transpiration
32	Colour Change	colour, emissivity, pattern, camouflage, IR, UV, transparent, -chromic
33	Homogeneity	homogeneous
34	Discarding & Recovering	discard, recover, dissolve, retrieve, lost
35	Parameter Changes	pressure, temperature, concentration, viscosity (think

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		of any parameter relevant to the subject you are interested in)
36	Phase Transition	phase, melt, boil, freeze, vapour, latent
37	Thermal Expansion/Relative Change	thermal, bi-metallic, relative
38	Strong Oxidants	oxidise, oxygen, reduction, ozone, ionize, radiate
39	Inert Atmosphere	inert, vacuum, isolate, flash, damp, absorb, retard
40	Composite Materials	composite, multi, filler, fibre, hierarchical, (inter-)layer, grid, pattern, ratio

Accentuating The Positive

TRIZ And Appreciative Inquiry

The sense of wonder, that is our sixth sense.
D.H. Lawrence

The world of psychology offers many examples of the power of positive thinking. The Placebo Effect, for example, offers clear and demonstrable evidence that when patients think they are being treated for an illness they will display reduced symptoms even if their treatment contains no actual medication. Similarly, the Pygmalion Effect shows that pupils that are treated as intelligent by their teachers will do appreciably better in their studies than pupils treated as if they are not so intelligent. Then there is the work of Liam Hudson who's experiments with school children, asking them questions like 'how would a creative person solve this problem?' and thus putting them into a positive mind-state, sees the production of a significant improvement in output.

Appreciative Inquiry (AI) is a problem solving approach who's history goes back to 1980 (see Reference 1 for a summary time-line). As can be observed by examining its roots and development, the success of AI builds considerably on the findings of these kinds of psychological Effects. AI is described by its founders as:

*"An exciting new paradigm for human development and social innovation.
By asking positive questions, we can generate new images of the future
... images evoked by the best of the past and present.
These powerful images ... of ourselves, our organizations, and the world ...
can inspire action and innovation.
Philanthropy, as the concrete expression of our "love of humanity,"
can provide an ideal vehicle."*

In somewhat simpler terms, it is about, to quote lyricist Johnny Mercer, accentuating the positive. The last 'love of humanity' sentence of the above definition probably serves to highlight one of the potential problems when trying to describe AI to others. Alas, as in so many other methods, this kind of statement tends to get picked up by the political-correctness quackery parts of society. Alas, again, this is unfortunate as the AI approach contains some useful elements.

Based on our research, Reference 2 seems to offer one of the better texts on the subject. It contains far too much padding (about 75% counting the numerous non-informative 'case studies') but it does at least manage to distill the important elements. Based on the philosophy-method-tool lens we have used to examine other approaches, Figure 1 represents an attempt to translate the Reference 2 description into terms that allow us to connect to our earlier analysis of TRIZ and Systematic Innovation.

Before exploring possible synergies with TRIZ, it is worth exploring the four philosophical elements of AI in a little more detail:

Positivity: based on Placebo, Pygmalion, Hudson and other psychological research Effects, when we accentuate the positive, positive outcomes are far more likely to occur.

Momentum for change inside organizations requires a critical mass of positive energy; without it any attempted change initiative will fail.

Emergence: distinct common ground with the business applications of TRIZ, the AI researchers have built a large part of their work on complexity theory. In the Reference 2 text, this pillar of AI is actually described as two separate elements – a ‘Constructionist Principle’ (‘knowledge about an organization and the destiny of that organization are interwoven’, ‘the way we know is fateful’), and a ‘Poetic Principle’ (an organization’s story is continually being co-authored by the people within the organization as well as those outside who interact with it’). This AI language made us feel a little queasy hence the translation into the more tangible language of emergent systems.

Simultaneity: ‘inquiry and change are not separate but simultaneous. Inquiry is intervention’. Close again to emergence, but adding elements of Heisenberg’s Uncertainty Principle – any examination of a system intrinsically affects that system. Therefore we should be extremely careful in making any kind of initial inquiry into a system – the question we ask at the beginning can and will have a big impact on the answer we achieve at the end.

Collective Imagination: (called the ‘Anticipatory Principle’ in the AI text, for no immediately apparent reason), this is a principle relating to the human attraction to stories and the idea that a well-constructed story fires a collective imagination and produces meanings and actions which, in the organizational context, represent the ability to generate constructive change.

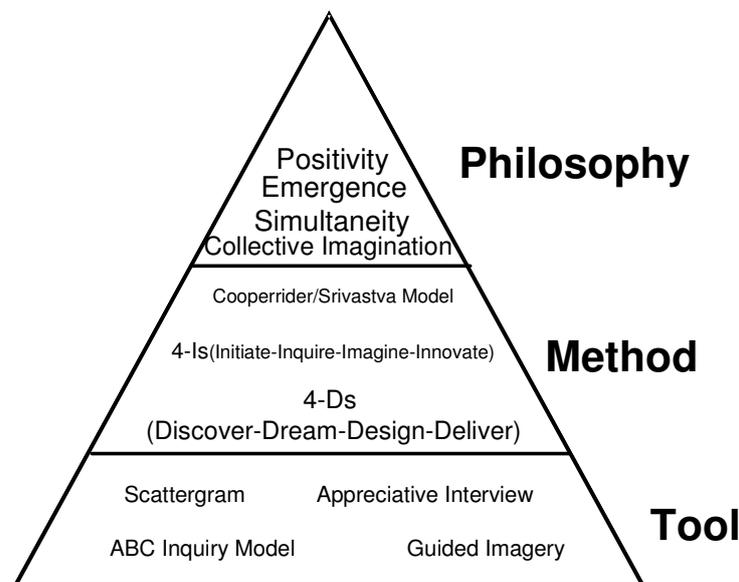


Figure 1: Appreciative Inquiry – Philosophy-Method-Toolkit

At the method and tool levels, AI starts to stumble a little, although to be fair to the originators, they have focused their efforts largely at the higher philosophical level. Compared to other problem solving approaches, it appears to have little to offer that can’t be found better described and defined elsewhere. We refer interested readers to Reference 2 if they want to make up their own minds.

From our side, the biggest value of AI comes when we start applying the philosophical ideas to the methods and tools of Systematic Innovation. We shall briefly consider two aspects here, with the aim of planting a few seeds that might germinate into something bigger for readers at some point in the future:

- 1) accentuating the positive
- 2) making use of stories

Accentuating The Positive

Putting aside all of the political correctness associated with how bad it is to call a problem a problem, the psychological impact of positive thinking is well proven. There are several places in and around the Systematic Innovation toolkit where the user has a choice to express their intent in either positive or negative terms. The increasingly popular Perception Mapping tool, for example, starts from a 'what we would like to improve' type question: 'staff become de-motivated because...'. It could just as easily, then, start from a question expressed in a positive sense: 'staff come to work highly motivated when...'. Each time we have conducted exercises from such a positive start point there has been a consistent improvement in the quality and buy-in to the output. Not sufficient yet, admittedly, for us to be able to offer any kind of proof. But certainly enough to recommend it as a strategy for readers to try in their own sessions.

In fact, our only reservation about always working from the positive angle is that it can come across as very false to groups. Particularly if they have been exposed (or, more likely, 'been made to endure') previous 'think positive' sessions. Here is a very definite link to Heisenberg; prior bad experiences with a subject conditions a person to be wary whenever it happens in the future. A difficult balancing act indeed for a session facilitator; a desire to get people just far enough out of their comfort zone to spark their creative juices, but not so far that they start fighting against the process. The AI recommendation for such scenarios ('someone, somewhere already solved your problem') is to get delegates thinking about sessions that worked well in the past and then reproducing some of those positive experiences in the current session.

Positive thinking is, of course, also a crucial aspect of successful use of the Ideal Final Result tool. Defining what 'ideal' looks like is – as per the design of the process – aimed very specifically about getting people out of their normal way of thinking. The IFR tool again is one that needs careful use – get people too far out of their normal state ('the engine delivers 400hp, without consuming any fuel') and the facilitator is in for a difficult time. Pitch it at an acceptable stretch ('the piston seals itself') and great thoughts can and frequently do happen.

Making Use Of Stories

This is an area where TRIZ appears to have really missed an important trick. There is no story in 'someone, somewhere solved your problem'. There is no story in 'the answer came from Inventive Principle 19'. No hero. No quest. No peril. No victory grasped from the jaws of defeat. In many ways, in other words, TRIZ has been guilty of taking the greatest of mankind's achievements – uncovering the dynamics of how the world works - and making it sound as dull as ditchwater. In getting others to buy into your great idea, it can't just be a great idea. Give the idea a story and you give it a life that will carry it further and longer than the best planned change initiative. Good stories, AI tells us, are the very essence of successful innovation inside the organization and in the world at large.

References

- 1) <http://appreciativeinquiry.case.edu/intro/timeline.cfm>.
- 2) Magruder-Watkins, J., Mohr, B.J., 'Appreciative Inquiry: Change At The Speed Of Imagination', Jossey-Bass Pfeiffer (a John Wiley company), 2001.

Humour: Mono-Bi-Poly Bra

Lingerie maker, Triumph, recently announced the arrival of its latest underwear innovation: a bra that cunningly converts into a shopping bag. A classic (or maybe not) example of the Mono-Bi-Poly evolution trend. It was surely just a matter of time before the connection between containing delicate parts of the female anatomy and shopping was made. And surely enough, here it is.



There is, of course (!) a serious point behind the invention. The design is a bid to discourage Japanese from using plastic bags. Triumph has regularly designed bras aimed at drawing attention to social issues and to raise its own profile. Last year it unveiled a bra that can be heated in a microwave so as to help save on indoor heating costs.

The "Bra Rangers" -- named in a nod to the television characters that morph into superheroes -- sees the shopping bag unfold out of the cup padding. The bra comes with matching underwear whose pocket has the inscribed message, "No more plastic bags!"

Hmm. While we can probably imagine one or two potential advantages of adding padding to the bra cups, it seems less clear why padding in the bottom half of the set. Perhaps best to leave that one to your imagination.

The bra-turned-bag is made of polyester fibre created through recycling. The bra straps can be tied onto the bag as ribbons.

Japanese shops hand out some 30 billion plastic bags per year, of which nearly a third of them are thrown away without being reused, said Triumph.

Few businesses, faced with tough competition, will risk alienating customers by not handing out bags, Triumph International Japan Ltd. said.

"In this context, what deserves the most attention is the significance of each and every customer understanding the importance of not using plastic bags," it said in a statement.

Triumph said it had sought a patent for the eco-bra, although it has no plans for now to put it on general sale.

Patent of the Month - Compressible Hearing Aid

Patent of the month this month is US7,130,437 granted to Beltone Electronics Corporation in Chicago. The patent was granted on October 31. The abstract reads as follows:

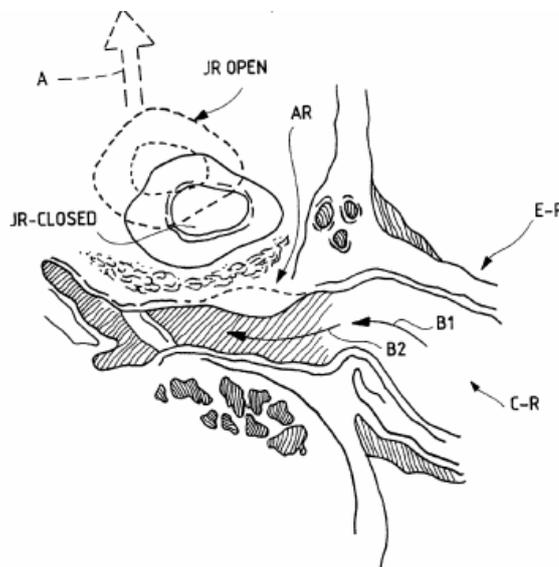
A compressible hearing aid includes an exterior deformable skin which bounds an internal region which is filled, at least in part, with an open-cell foam, the foam can be wrapped around or molded to contain an audio output transducer. The skin is not self-supporting and in response to applied forces from user's ear canal, the skin and the foam both deform and readily compress exhibiting a reduced volume. Though compressed, the foam exerts an outward force against the skin thereby continuing to form an elongated seal between the skin and the external periphery of the user's dynamically changing ear canal. As the volume of the ear canal increases, the skin and open-cell foam expand, exhibiting an increased internal volume, while maintaining a comfortable seal with the ear canal. A plurality of external ribs carried on the skin not only reduces feedback but promotes drying of the ear canal and promotes retention of the hearing aid in the ear canal.

While at first seeming like a fairly obvious solution (in itself a solid test of a good design), and one that – surely – the world must have solved before October 31 2006. Here's what we learn by reading the invention background:

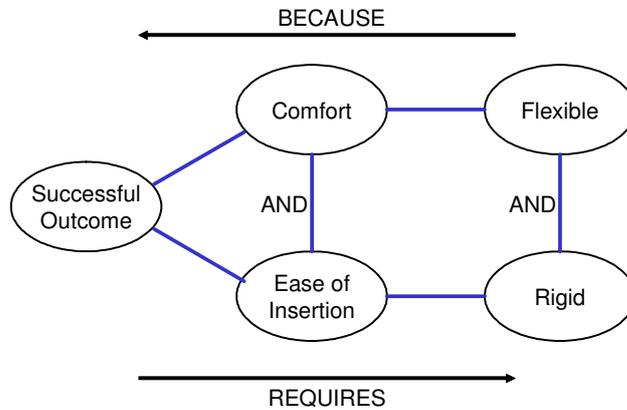
Hearing aid housings have long been molded using acrylic resins which when cured are rigid, and hard. These housings often require extensive after the fact adjusting in response to user complaints of poor fit and/or poor performance. Complaints with this type of housing substantially increase overall production costs. Each unsatisfactory hearing aid must be reworked, replaced or the charge refunded to the user.

One of the disadvantages of rigid shell aids is that they are non-compliant and may force the user's ear canal to assume an unnatural shape in the cartilaginous region of the canal in order to achieve a seal. This in time can cause user discomfort and discourage usage of the aid.

It has now been recognized that dynamic changes in the shape of a user's ear canal as the user talks, breaths or swallows (see figure below) produce a situation where a rigid hearing aid housing conforms to the shape of the user's ear canal in only one state. This is the state the ear canal was in when an ear impression was taken. All other states will produce an uncomfortable fit or one that does not seal properly thereby producing feedback.



A variety of solutions, the disclosure reports, have seemingly attempted to address the fitting problem. The big issue, however, seems to be the large degree of variation in not only the size and shape of different people's ear canal, but also the amount of change to both during the day. The unsolved problem at this point then appears to be that in order to achieve an acceptable amount of variation in the shape of the device, the high degree of flexibility required makes it difficult to insert the hearing-aid into the ear. If this seems like classic physical contradiction territory, it probably looks like this:



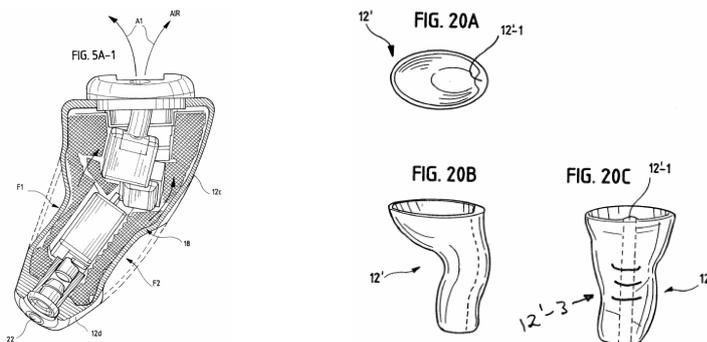
This picture shows how we can also express the 'flexible and rigid' physical contradiction as a technical conflict. If we chose to examine the problem as a conflict, the result looks like this:

Improving Factor	Worsening Factor	Principles
Stress/Pressure (19)	Trainability/Operability/Controllability (34)	17 3 19 28 26
we wish to improve wearer comfort but making the device more flexible makes it difficult to insert		1 14

Looking at it from the physical contradiction point of view, we have a number of separation strategies available to us. The first of which is to separate in space. The recommended Inventive Principles associated with this strategy are 1, 13, 3, 2, 24, 17, 4, 14, 26, 7, 30.

Both approaches include mention of Principle 3, Local Quality, which turns out to be the simple – and 'obvious' again – strategies used by the inventors. This from the claims part of the invention disclosure:

1. A hearing aid comprising: a deformable skin which bounds an internal region and wherein the skin does not exhibit sufficient rigidity to be insertable into a user's ear canal; at least one spine which extends axially along an interior surface of the skin and is attached thereto sufficiently so as to provide insertion rigidity when the skin is inserted into the user's ear canal and which includes a deformable matrix in the region wherein the matrix applies expansive forces to the skin.



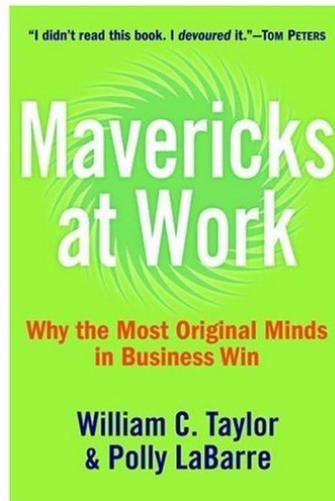
Inventing? Sometimes it's that easy.

Best of the Month – Mavericks At Work

A quote from the 'Mavericks Manifesto, the core theme from October-published business book 'Mavericks At Work' by William Taylor and Polly LaBarre:

"Business needs a breath of fresh air. We are, at last, coming out of a dark and trying period in our economy and society - an era of slow growth and dashed expectations, of criminal wrong-doing and ethical misconduct at some of the world's best-known companies. But NASDAQ nuttiness already feels like time-capsule fodder, the white-collar perp walk has become as routine as an annual meeting, and the triumphant return of me-first moguls like Donald Trump feels like a bad nostalgia trip, the corporate equivalent of a hair-band reunion. We've seen the face of business at its worst, and it hasn't been a pretty sight. It's time to rediscover the power of business at its best and to develop a better way to lead, compete, and succeed."

Although giving an initial impression of being yet another book on the subject of the importance of rebels and individuals inside organisations – complete with the Tom Peters endorsement plastered over the book's cover – this turns out to be a particularly fine read. The book stays close to its maverick theme throughout, covering a range from 'no-one is as smart as everyone' (where have we heard that before we wonder?) to 'why the company with the smartest customer wins', the book is divided into four main 're-designing' sections; competition, innovation, re-connecting with customers and work.

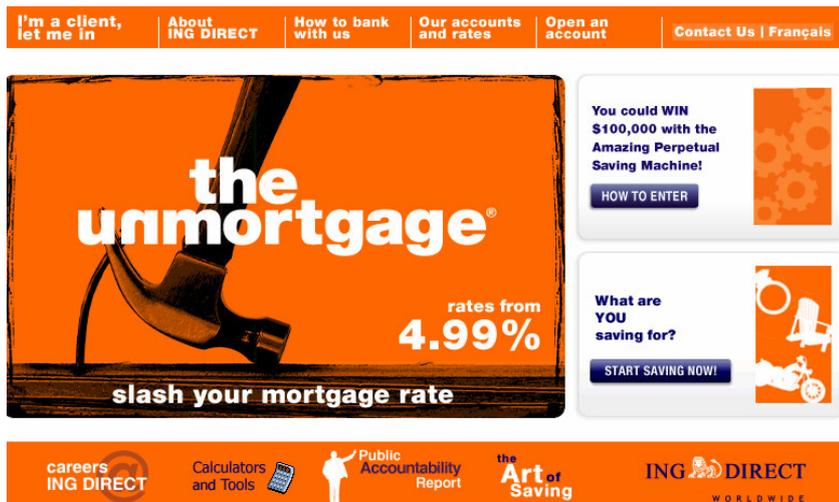


All four are well worth a look; each containing a number of useful real-life examples. Quite astonishing is the correlation between the stated examples and the presence and resolution of some kind of a contradiction. The authors rarely don't actually make a connection to this contradiction-solving theme which somehow makes the pleasure of making the connection even greater. Or at least it did for this reader.

Case studies range from Wikipedia to Commerce Bank, the Edinburgh fringe festival to Pixar University, P&G to DPR Construction. Here, by way of a taster, are a couple of examples that have fed into our business contradiction database. The first ING Direct and a quotation from their CEO, Arkadi Kuhlman:

"Everything we do starts with our big idea, which is to bring back some fundamental values: self-reliance, independence, having a grubstake. One way or another, most financial companies are telling you to spend more. we're showing you how to save more."

This ING Direct business philosophy represents a 180degree turnaround (Principle 13!) relative to the prevailing logic in the financial services sector.



Or how about TopCoder? If you haven't heard of TopCoder you should take a look at topcoder.com. Essentially what this company does is gets the world's best software engineers competing to write code for real problems presented by client companies. 'Open source meets capitalism' is the ethos described by company founder Jack Hughes. The company has reportedly dished out over 2 million dollars in rewards to winning programmers. What TopCoder appears to do so well is to get the software community not just competing with itself, but also to create a powerful learning forum whereby programmers can see what other (i.e. the best) programmers are doing to win competitions. If there is ever going to be a 'self-organising' software quality improvement system it is highly likely to be based on a TopCoder-like model. Jack Hughes thus represents another very good example of both maverick behaviour and unconscious contradiction solving.

Top 10 Lists		
Algorithm		
View all		
Rank	Handle	Rating
1	Petr	3543
2	tomek	3338
3	SnapDragon	3230
4	ACRush	3223
5	reid	3099
6	Eryx	3087
7	zhuzeyuan	3067
8	krijgertje	3066
9	John Dethridge	3011
10	misof	3008
Designers		
View all		
leaderboard RDTY		
Rank	Handle	Rating
1	Pops	2614
2	aubergine@node	2517

All in all, the book is probably worth the price by the time you've read to the fifth or sixth case study example. You should take a look we think.

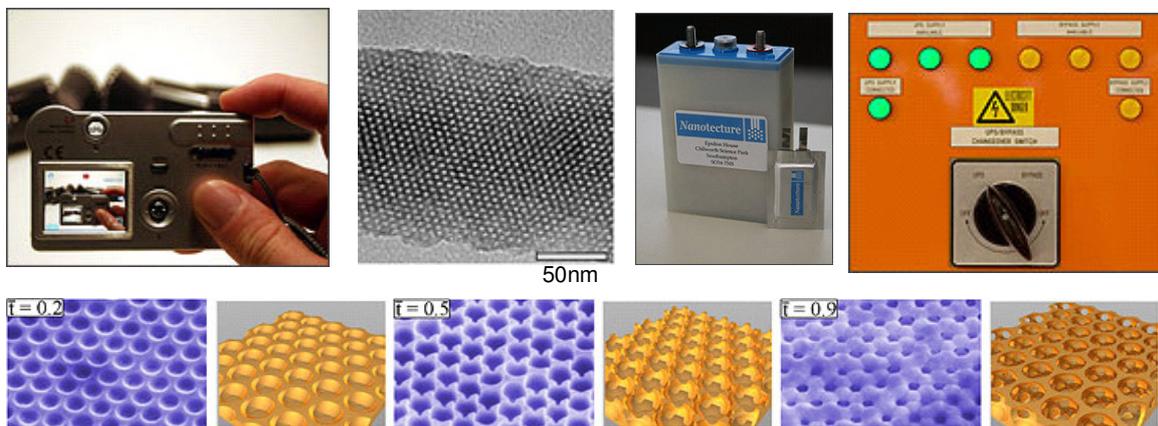
As is increasingly the case these days, the book comes with its own website. So, if this review hasn't convinced you to acquire a copy, at the very least it should prompt you to take a look at the website - <http://www.mavericksatwork.com/>.

Investments – Nanotecture Super-Capacitors

Nanotecture, a university spin-off company based in Southampton in the UK, recently won the Shell Energy Award for its novel work on super-capacitors.

Super-capacitors are electrical energy storage devices. The current state of the art sees them placed in things like cord-less drills. The basic limitations on the devices involve an inability to hold large amounts of energy and the classic storage capacity versus size conflict. The first part of the Nanotecture innovation involves patented nano-porous nickel capable of creating a step change advance in power capability and also energy cycling. The second part involves the development of a manufacturing technology capable of making the electrodes at a sufficiently low cost.

Nanotecture's technology is based on the output of research programmes, conducted by the University of Southampton into the use of soft condensed matter (eg surfactants and polymer dispersions) as templates to create well controlled nano-scale architectures in materials of commercial importance.



The company has thus far been targeting consumer products (where the increasing power requirements of, for example, new generation cell-phones will increasingly cause energy density problems for users) and high value, higher power stationary and vehicular applications.

The company won its Energy Award for a super-capacitor system for diesel engines in trucks. Recent US legislation changes will prevent truck drivers from idling their engines in urban areas for more than a few minutes. The energy storage capability of the latest Nanotecture 'Truck Start' device not only contain sufficient energy to run all of the vehicles electrical systems during an overnight stop, but also provides sufficient energy density to re-start the engine when required. According to the company's press release, the new capability could save around 4 billion litres of diesel fuel a year.

Check out the Nanotecture website at <http://www.nanotecture.co.uk/index.htm>.

Subscription 080:

Biology – Fishing Bat (*Noctilio leporinus*)

The fishing bat, *Noctilio leporinus*, lives in the new world region. It is one of six bats that have evolved an ability to fish. The bat typically fishes over ponds, rivers, and at the edge of ocean surf. They can fish in either fresh or salt water, but need fairly calm conditions (flat surfaces) because they use echolocation to detect ripples made by fish feeding just beneath the surface of the water. Small groups of the bats typically fly within 20 to 50 cm of the water surface in a zig-zagging pattern. This is termed 'high search' flight. When a bat detects a disturbance in the water that may indicate the presence of small fish, it descends to the water surface. In this 'low search' flight, the bat's body is parallel to the water and only 2 to 10 cm above it. The bat then rakes its enormous taloned feet, like two grappling hooks, through the water, trying to 'gaff' fish. If able to impale an unsuspecting victim, the bat raises the fish to its mouth and chews it while still flying. The partially masticated fish is then stored in the cheek pouches. This allows the bat to continue fishing, increasing its foraging efficiency. Alternatively, the hunter may transfer the fish to the uropatagium and take it to a perch to consume it.



Noctilio leporinus is able to catch fish up to 100 mm in length from depths as great as 25 mm below the water surface. Another behavior to note is that they have been seen to make very long rakes in areas where they have hunted successfully before. Bats do this even though there is no water surface disturbance at the time. Researchers suggest this is a memory-directed rake, simply dragging a previously productive area.

Noctilio leporinus also adjusts the frequency of its echolocation call to enhance communication. When two bats are on a collision course, one bat "honks" at the other. This allows them to veer away, and prevents a collision. The honk is produced by dropping the frequency sweep of the echolocation call an extra octave.

Fish-eating, or piscivory, in bats is thought to have evolved from catching floating or swimming insects off the water. *Noctilio albiventris*, a closely related species, is primarily insectivorous, and has been found to employ echolocation to capture insects from the water surface. The right-hand picture clearly illustrates the extraordinarily long taloned feet that have evolved to enable capture of sub-surface prey.

The fishing bat has evolved solutions to a number of contradictions. Perhaps the most notable one involves the ability to detect prey which is not directly visible. We could map this conflict onto the Matrix as follows:

Improving Factor	Worsening Factor	Principles				
Ability to Detect/Measure (47)	Amount of Information (11)	19	3	32	7	10
the fishing bat wishes to detect prey fish but they are below the water's surface and therefore cannot be seen		13	25	4		

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Principle 3, Local Quality seems to be the main detection method in that the bat's echolocation system is tuned to detect disturbances in what would otherwise be a smooth, flat water surface. Principle 10, Prior Action, appears also to be being used in that the bats are known to return to fishing grounds that have been bountiful on previous trips.

<http://news.nationalgeographic.com/news/2006/07/060724-bat-fish-video.html> presents some very nice video footage of the bats in action.

Short Thort

[Systems become more complex because...Part 34](#)

An existing system develops a problem and in the urgency to cure the symptoms, the problem owner convenes a brainstorming session. The session inevitably generates multiple solution ideas. Urgency dictates that several of the generated ideas are tried, often in parallel with each other. In as short a time as possible, given the urgency, a winning combination of usually several of the solution ideas is identified. These solutions 'work', so in future *all* the same solutions are implemented again without questioning whether there is a better way. Pressures of time mean we are rarely given the chance to really understand the system and our impact on it and so we tend to adopt a 'throw enough mud at a wall and some of it will stick' problem solving strategy.

The first reaction of the human brain when presented with a problem is 'have I seen this problem before?' If the answer is yes, we are highly likely to retrieve the solution we have already stored and then stop thinking. The effect is especially apparent when we are in a rush.

News

TRIZ Companion

Last month saw the last of the 3rd reprint of the TRIZ Companion book leaving the office. A new edition has just gone to the printers and will be available by the time you read this issue of the e-zine. The new edition includes a number of new and modified entries, based on method enhancements developed during the last 12 months.

Live Systematic Innovation II

We will be conducting another live systematic innovation session at our UK office on 30 and 31 January. A maximum of 12 people will be able to register for the workshop. At this point in time, 4 people have already reserved places. See the website for more details and faxback form if you are interested in joining them.

'Innovation Bootcamp'

The second quarter of 2007 will see us experimenting with a longer duration version of Live Systematic Innovation. The bootcamps are intended for people who wish to get immersed in the systematic innovation process in a fully immersed atmosphere. Delegates successfully completing the workshops will be eligible for our second certification level. At the moment the plan is to do one event in the UK and one in SE Asia. Watch this space and the website calendar for more details.

Systematic Innovation for the Venture Capital Community

2007 will also see the arrival of a new aspect of our research. The venture capital and investment community generally works on a 1:20 ratio of getting their technology investment decisions right. In other words, the one big success will pay for the 19 investments that fail. We have long been of the opinion that with an appropriate understanding of technology and market evolution that this ratio can be improved

considerably. We now think we have all of the necessary elements to do the job right. We will be running a first public event to introduce our findings to the VC community at a suitably conducive location during the second quarter of 2007. Again the website will feature full details as soon as we have finalized our plans.

III Symposium of Six Sigma Methodology

We are happy to announce our presence at the third Mexican Six Sigma methodology conference. We will be giving a keynote presentation and one day workshop on TRIZ and Six Sigma in the software environment. This year's symposium will be the first one to feature a special stream relating to software. The event will be held March 22-24 in Guanajuato.