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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

Intangible 'Fields'

(Or: How To Prevent Theft From Within A Company)

We had the opportunity recently to work with a team in a South-East Asian semi-conductor fab plant on a problem they were having with the occasional theft of chips. The task given to the team by their managers was to find a way to prevent the thefts.

Their first instinct, and the initial work the team did in the workshop we ran, was focused on a search for existing solutions. This quickly highlighted a plethora of technical solutions to the general problem of how companies try to stop people stealing small items. At the end of this exploration, the feeling was that all of these solutions came with significant trade-offs attached. They all solved one problem – the theft - but at the expense of making a whole bunch of other things worse – more complexity; more cost; more reliability problems, and so on. Indeed, when we started to think about what an 'ideal' solution might look like, all of these traditional solutions seemed to be heading in the wrong direction. They were all technical solutions to a problem that was in actual fact much more about the psychology of theft than the mechanics of preventing an object from being stolen.

What was needed, the team felt, was a deeper understanding of why the thefts were taking place at all. Now the team had a new problem; fundamental lack of access or understanding of the tiny number of individuals who might contemplate stealing from the company. In order to obtain a first insight into the story, though, what they decided they could do was to try and put themselves in the position of a potential thief and try and see what might be present to tempt them to do wrong. They thus constructed a Perception Map of the situation. Without going in to the whole detail of the complete map, there was one significant loop that emerged as important. This loop is reproduced in Figure 1.

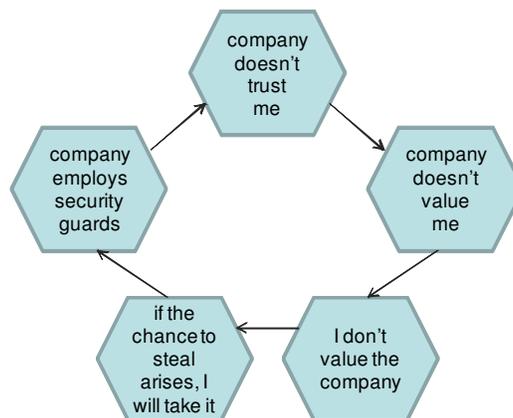


Figure 1: People Might Be Tempted To Steal Because...

The loop seemed to present a particularly difficult and pernicious downward spiral. The overriding message from this spiral was that things would likely get worse if matters were allowed to continue the way that they were. What was needed, therefore, was a way to 'break' the loop. At this point, the team didn't know how this might be achieved.

We started to think about 'the system'. While doing this, it soon became apparent that at the present time, when it came to achieving the function 'prevent theft' there was no system. Or, put another way, there wasn't a complete s-field model. As we know from this

TRIZ model, achieving any function requires the presence of a minimum of 'two substances plus a field'.

This made immediate sense when the group then looked back at the list of available technical solutions to the theft problem. Indeed, all of these solutions had engaged one or more different fields – whether it be optical, RFID, magnetic or any of the other available field types – and some kind of 'substance' attached to the object subject to the theft.

None of these 'fields' however seemed to offer anything that might relate to the people side of our theft prevention problem. We were left, though, with the remaining fundamental truth that, whether we faced a technical or people problem, we still had the problem of a missing field.

So what, then, does 'field' mean in the context of a people problem? In one of our early publications on the application of TRIZ to business problems, we suggested that 'field' in people cases meant 'communication'. Ultimately, we decided that the large majority of the S-Field tool was too esoteric for the prevailing management audience (actually, all we kept in the business version of the Hands-On book were the 'measurement' parts of the S-Fields tool), and so we transferred all of the useful bits of the tool to other parts of the method.

For our theft problem, 'communication' still felt to be something of a blunt instrument, and therefore not so helpful in offering solutions to the difficult problem at hand. At that point, what we needed was a more detailed definition of what 'field' could mean in a people problem context. This quickly led us to the Spiral Dynamics domain and the work we have previously published on pleasure-pain motivators at the different thinking Levels. A summary of this information is reproduced in Figure 2:

	Pleasure Seeking	Pain Avoiding
1. Survival	Sex	food, water, warmth, safety
2. Tribal	good fortune, 'one of the gang' revenge	curses/spells/rejection/isolation
3. Feudal	ego-gratification, 'my way' mass adulation, rebellion	defeat, loss of power rivals/threats
4. Order	stability, obedience, medals status, promotion	change, rebellion from others loss of status, outcast
5. Scientific	peer recognition, 'best in show' biggest/best/fastest, merit pay	losing, 'keeping up with the Jones'
6. Communitarian	'making a difference', harmony 'maximise my potential'	orange or blue attitudes aggression/conflict/hierarchy
7. Hierarchy	knowledgeable/'wise', 'life-long learning', discovery/challenge	sub-optimization, rigidity 'stupid rules'
8. Holistic	'defining the jigsaw', 'wrong jungle', empathy/trust	non-holistic non-spiritual

Figure 2: Pleasure And Pain At The Different Spiral Dynamic Levels

And then a blinding flash of the obvious. Fields are sources of energy; energy is required to achieve a function; functions are verbs. Hence, all the verbs in the 'pleasure seeking' and 'pain avoiding' table represent potential 'fields'.

Things like the desire for stability or ego-gratification or the fear of rejection or curses are, in other words all types of 'field'. Admittedly they are somewhat intangible compared to magnets and lasers – hence the title of the article – but nevertheless, they are equally applicable in helping to define what makes a complete or incomplete S-Field model.

Now all (!) we had to do was somehow translate this concept into possible solutions to the problem at hand. In order to do that, we decided, it was necessary to make some kind of assessment of the thinking Level of the persons committing the theft act. Unless we knew this, it was highly likely that any 'field' we adopted to solve the problem could easily be the wrong one.

The main purpose of this article is merely to present the connection between incomplete S-Fields and 'people' problems, and to suggest the menu of available fields is that shown in the pleasure-seeking/pain-avoiding model. Clearly Figure 2 isn't 'complete' in that there are other possible emotional or intangible fields, but it is, we think, a good start.

That being said, no-one likes to be left hanging in the middle of a good story. So, what happened at the end of the team's work on the theft problem?

Well, the first thing was a recognition that it was the Level 3 person who was most likely to steal. This was also the mindset that would also not listen to reason (mode where the dominant paradigm is 'get away with what you can at the expense of whoever'). From here the question became, did we want this person in the company at all?

It also prompted a connection to the downward spiral shown in Figure 1 in that it begged the question, were the management security checks antagonizing people so that they found themselves in Level 3 thinking mode. With this thought in mind, there was a strong hint that getting rid of the security inspections would be a very good way of breaking the downward spiral.

If the security checks were potentially putting people into Level 3, 'Red' thinking, and that the company wouldn't normally recruit this type of person, this meant the thieves were most likely to be operating at the 4th Level. The truth of this assumption, of course, required some validation beyond what was possible during the workshop (it has subsequently be verified by the way). If it was true, then the 'fields' that could potentially serve to eliminate the theft problem looked like having something to do with the various motivators and de-motivators for Level 4. Of the candidates present in Figure 2, 'loss of status' and being outcast seemed like two very interesting directions. Without wishing to give too much away, one of the appealing solutions to come from these thoughts involved creating an environment of peer-pressure that would mean other workers rather than management would administer the punishments for anyone found to be stealing. One way of doing this, for example, would be for the company to divide the cost of thefts across everyone's pay. Although there are cultural reasons why this solution could not be directly employed in that form, the basic concept was felt to be sound; management measures and informs if and when thefts occur; management then penalizes theft (or potentially rewards good practice) *evenly* across the company – including the managers themselves – and then any localized punishment or reward was administered *locally* by the workers.

Again, the main point here is not about the actual solution now adopted by the company. The context of the company dictates that their solution can only work for them. Rather, what is important is the generally applicable thought that 'incomplete systems' can exist equally in technical and business/people situations, and that any incomplete system absolutely needs to satisfy the two substance plus field minimum rule. Irrespective of whether we are talking about fields that are 'tangible' or 'intangible'.

The Whole Story – 1) Plot Types

Back in March 2006 we started a journey to examine the possible relationship between literary plots and TRIZ (Reference 1). At the time we had some feedback from readers along the lines ‘well, it was interesting, but what has it got to do with innovation?’ Answers to the question have started to emerge from a number of fronts above and beyond our interest in the subject.

Perhaps most significant of these has been the progression of consumer ‘performance’ desires described by Peter Sheahan in his latest book ‘Flip!’ (Reference 1). In the book, Sheahan describes how, in the world of abundance that many of us are fortunate enough to live in, ‘story’ increasingly becomes the reason why we decide to buy something. In other words, we come to expect that a product or service will deliver the desired function; we also expect that the form will be aesthetically pleasing; once both of those are saturated, according to Sheahan, our desires will shift to story – Figure 1.

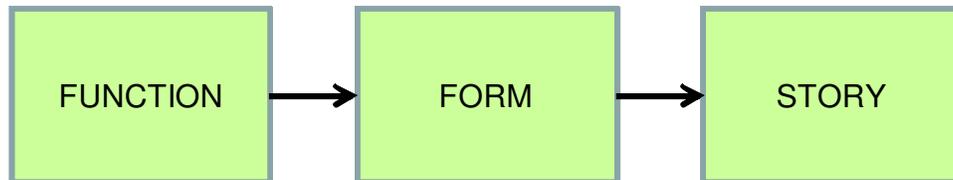


Figure 1: Consumer Desire Progression

As ‘story’ then becomes the dominant selling point of a product, providers need to be able to understand and satisfy that need. Hence, if we are to build ‘story’ into the innovation arena we need to understand what it means. This article presents the first in a series of three aimed at doing just that. The next two articles will examine, respectively, the links between story and customer purchase focus, and then the links between character archetypes in stories and innovation solution finding.

First, however, we further explore the subject of story plots. Our aim being to try and resolve the apparent discrepancies between the authors who have variously collapsed the world of film and literature into 7, 20 and 36 plots (References 2, 3 and 4 respectively). Of these three world views, the latter two appear to be very similar in both content and philosophy; one segmenting the same world into more fragments than the other. For example Plot 8 in the 20-plot world view is ‘Rivalry’. This then stretches to become familial rivalry, familial hatred and rivalry (superior/inferior) in the 36-plot view.

Christopher Booker’s seven-plot worldview though doesn’t immediately appear to connect to many of the plots found in the twenty-plot way of looking at things.

Before we get into the task of trying to resolve this dis-connect, it is worth saying a few more words about why it might be important to do so. If, as was suggested in Figure 1, the abundant world is increasingly heading in the direction of ‘story’, then organizations need to understand what ‘story’ is and what it means to their customers. If it turns out that there are only a small number of recognizable plots, then – same as there are only 40 Inventive Principles so far – there are only a certain number of ways that ‘story’ can be used to connect to the customer. Making that connection to the customer – in other words, when the customer sees your story, they ‘get it’ – becomes a vital innovation success factor. In the immortal words of E.M. Forster ‘only connect’.

Meanwhile, back to the task at hand, what we have presented in the Table below is a matrix examining the relationship between the seven Booker and twenty Tobias plot types.

	Overcoming The Monster	Rags To Riches	Quest	Voyage & Return	Comedy	Tragedy	Re- Birth
Quest			X				
Adventure			X				
Pursuit	x		X	x			
Rescue	x		X	x			
Escape	X		X	x			
Revenge	X		x	x			
The Riddle			X				
Rivalry	X		x				
Underdog	X						
Temptation	X			x		X	
Metamorphosis				X	X		X
Transformation				X			X
Maturation				X			
Love					X		
Forbidden Love	x				X	x	
Sacrifice				X			
Discovery				X			
Wretched Excess						X	
Ascension		X					
Descension						X	

As Booker rightly says in his epic tome, any plot can have elements of another plot in it (the first Star Wars film, for example, has elements of nearly all of the seven plot types). Each, though, will very likely have one pivotal plot type if it is to be viewed as ‘successful’ by the reader or viewer. What we are plotting here in the table, then, are the most direct links between the 20-plot view of the world and the 7-plot view of the world.

The large X’s in the table represent direct correlations between Booker and Tobias. The small x’s represent situations where there ‘could’ be a connection between the two plot definitions. Thus, to take a simple example, Booker talks about ‘Overcoming The Monster’ as one of the seven major plot types. In Tobias’ worldview, this could then mean a variety of different scenarios:

- In the ‘Escape’ plot, the protagonist is held against his or her will by a captor (Monster) and has to escape against apparently insurmountable odds.
- In the ‘Underdog’ plot, the protagonist (underdog) has to overcome an apparently unbeatable superior (Monster)
- In the ‘Revenge’ plot, a wronged protagonist has to achieve revenge over an apparently unstoppable enemy (Monster)
- ...and so on

As can be seen from this, and indeed any other of the examples, the two models seem to possess elements of orthogonality – two different dimensions of a story. The 7-plot model of the world is all about the core underlying essence of a story, or, in other words its *meaning*. The 20-plot view of the world, on the other hand, is directed onto the action, or verbs – in other words, what happens. For example, a ‘Pursuit’ could be a Quest, or it

could be about Overcoming a Monster, or (if the hero learns something as a result of undertaking the pursuit) a Voyage & Return.

This orthogonality is important as it implies that any 'story' built into an innovation ought to examine each dimension: there needs to be an action focus and there needs to be an underlying meaning if we are to resonate with the customer.

One of the important points made by Booker in his book is that all stories have an underlying purpose. In a two-plot view of the world, all stories are about either encouraging the reader or viewer to put themselves in the place of a protagonist set on self-expression ('Rags To Riches', 'Quest' and 'Voyage & Return' being the classic three), or they are about sacrifice and the corresponding pitfalls of expressing oneself too far. In this regard they map extremely well to the odd and even numbered Levels in Spiral Dynamics (Reference 6). More on this subject at another time. The reason for mentioning it here is that, as Booker again suggests, these plots are what resonates with the 'consumer'. Moreover, they are the *only* things that resonate.

The same thing, but in a different dimension applies to the Tobias view of the world; these are the *only* action settings that resonate.

Set into our own more general innovation context, if 'story' is the emerging paradigm, and if the world only recognizes a small number of different meanings and action settings, then ignore *either* at your peril.

References

- 1) Sheahan, P., 'Flip! How Counter-Intuitive Thinking Is Changing Everything', William Morrow & Co, Sydney, 2007.
- 2) Booker, C., 'The Seven Basic Plots: Why We Tell Stories', Continuum International, 2005.
- 3) Tobias, R.B., 'Twenty Master Plots And How To Build Them', Piatkus Books, 1995.
- 4) Miller, L.J., 'The 36 Plots', <http://www.rpglibrary.org/articles/storytelling/36plots.html>
- 5) Beck, D., Cowan, C., 'Spiral Dynamics: Mastering Values, Leadership And Change', Blackwell, 2005.

Humour – Principle 17B

“If an object contains or moves in a plane, consider use of dimensions or movement outside the current plane”

Here’s an idea we had while baby-sitting troublesome cousins for a weekend this month. We’re allowed to make jokes like this, right?



(No children were harmed in the making of this photo, etc. Both Emily and Ben were returned safely to their parents)

Patent of the Month – Pourable Butter

I don't think we ever imagined that butter would be the focus of our patent of the month feature. US7,279,191 granted on October 9, however, proved us wrong. Maybe not the most important subject in the world. And maybe not the most important invention either, but nevertheless, at the very least a nice demonstration of a strategy that might just well have applications in a host of other areas.

Rather than pourable butter for domestic use, the motivation of the inventors here has been for a rather more serious industry problem:

Food preparation plants now prepare a wide variety of food products that often incorporate butter. However, these plants are often unable to adequately handle the butter in preparation for incorporating the butter onto or into finished products. These plants typically melt the butter and thereafter transport the melted butter within the plant via a manifold system. Processes for heating and liquefying butter must be carefully controlled to avoid burning or browning components of the butter. These processes for heating and liquefying butter must be also carefully controlled in an effort to prevent separation of the fat and aqueous components of the melted butter.

Another difficulty often arises in these plants when inadequate temperature control over the long manifold runs sometimes present in these plants allows the melted butter to cool excessively and thereby solidify and plug the manifold runs. This solidification difficulty creates still more difficulties beyond the mere problem of unplugging the manifold runs. Specifically, food production lines that depend upon these manifold systems for supplying melted liquid butter will typically yield off-specification food products when plugged manifold lines disrupt the supply of melted butter to the production lines.

Typical solutions to this problem involve either substituting the butter for something else or adding things to the butter. Both of which have the inevitable effect of detracting from the desired butter flavor.

Here's what the inventors have discovered:

United States Patent
Landon

7,279,191
October 9, 2007

Method of forming a non-fractionated, room temperature pourable butter

Abstract

A method of forming a fat product, the method entailing heating a first material to a first temperature to form a first intermediate, the first material comprising fat and the first temperature adequate to remove any memory of crystallization from the fat; rapidly cooling the first intermediate to a second temperature to form a second intermediate, the second temperature adequate to provide nascent seed crystals in the second intermediate; and quiescently cooling the second intermediate to form the fat product, the quiescent cooling adequate to support growth of macro-crystals about the nascent seed crystals.

Inventors: **Landon; Todd** (Mound, MN)

Assignee: **Land O'Lakes, Inc.** (Arden Hills, MN)

So, essentially, the viscosity of butter can be reduced by staging the cooling during processing. The benefits of doing this are described as:

...the butter product, has surprisingly been found to have a consistency that is either about the same as, or softer than butter at typical refrigeration temperatures ranging from about 35.degree. F. to about 40.degree. F., while having a consistency at temperatures warmer than refrigeration temperatures, such as temperatures in the range about 50.degree. F. to about 75.degree. F., that is definitely softer than the consistency of butter at those relatively warm temperatures. Still more surprisingly, at relatively high temperatures on the order of about 68.degree. F. to about 75.degree. F., the consistency of the fat product 24, such as the butter product, is significantly softer than the consistency of butter at these elevated temperatures. In fact, at these temperatures, the fat product 24, such as the butter product, has a pourable consistency. Indeed, at a temperature of about 72.degree. F., the fat product 24, such as the butter product, has been found to have a Brookfield viscosity that ranges from about 1,000 centipoise to about 55,000 centipoise, depending upon the first temperature that is selected during operation of the first cooling apparatus 18. On the other hand, at a temperature of about 72.degree. F., butter has a significantly higher Brookfield viscosity than the fat product 24 of the present invention and is not a pourable substance.

Not only that, but it seems further temperature cycling of the butter product does not see any degradation of the viscosity properties.

All in all a pretty impressive result from a very simple processing strategy. Not far behind in the impressive stakes is what the Contradiction Matrix has to say about the problem. Essentially what we have here is a conflict between the desire for a lower viscosity and, as described by the inventors, a fixed relationship between temperature and viscosity:

IMPROVING PARAMETERS YOU HAVE SELECTED:
Stress/Pressure (19)
WORSENING PARAMETERS YOU HAVE SELECTED:
Temperature (22)
SUGGESTED INVENTIVE PRINCIPLES:
35, 3, 19, 2, 39, 31, 36

To us the invention looks to be a very clear example of what Principles 3 (Local Quality – i.e. fast and slow rates of cooling) and 19 (Periodic Action – i.e. fast and then slow). Based on what we were discussing earlier in the year about Principle 35 and the crossing of phase boundaries (January 2007 issue), this Principle also seems to be present, and in actual fact may just be the most important of the strategies used in the invention. Few if any process engineers are likely to randomly conduct differential cooling rate trials as would have been suggested by Principles 3 and 19. They would be much more likely, however, to think about doing more structured trials as would emerge from an understanding of the phase diagram for butter.

Best of the Month – Randy Pausch/The Medici Effect

It would take a hard heart not to enjoy the farewell lecture of Carnegie Mellon University lecturer Randy Pausch. Pausch, one of the main brains behind modern day computer animation (think Disney/Pixar) and the 'Alice' computer programming teaching method, was diagnosed with terminal cancer earlier this year. His 'farewell' lecture to his students is not only a stunning example of thriving in the face of adversity, it is a great piece of public speaking and, if that wasn't enough, also contains some really elegant insights into, dare we say it, the meaning of life.

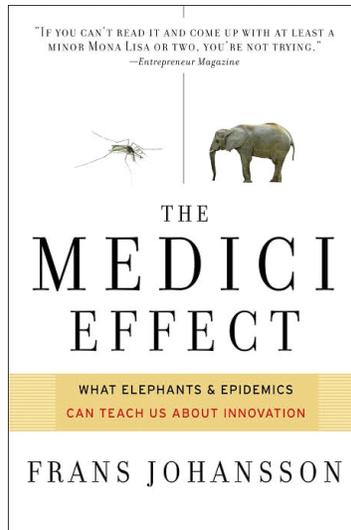


Pausch requested that the whole lecture be placed, copyright free, on the Internet for the benefit of all. If you have an hour and a half to spare any time soon, we heartily recommend a visit to <http://www.cs.cmu.edu/~pausch/>. (In particular look out for the recurring 'head-fake' theme – if nothing else, this ought to give pause for thought to any readers involved in the teaching of TRIZ. Or any other tools or methods for that matter.)

Speaking of 'head-fakes', our other recommendation for the month is 'The Medici Effect' by Frans Johansson. Such is the parlous state of business literature these days (insert image of another hundredweight of books being shovelled into our trash-pile here), that we're forced to recommend a book that came out in 2006, and, moreover, over half of which runs totally counter to what we know to be true from the TRIZ research. Nevertheless, the book is a worthwhile read – you get to shout 'no it isn't' throughout the first half, and then 'ooh, really' throughout the second.

The first half of the book, then, sets about describing the 'Intersection'. The 'Intersection' is where different scientific, artistic and other fields and disciplines come together in order to create enormous potential for innovation. The title of the book comes from the banking Medici family of northern Italy. The Medici's were basically the venture capitalists behind the Renaissance. Without the Medici's and the great convergence they created in and around the city of Firenze, we would have no Leonardo Da Vinci. Or rather Da Vinci might've had to work for a living instead of lazing around painting masterpieces and inventing helicopters that would never fly. Anyway, the main thesis of the book is that much great innovation occurs when different domains coalesce. If this all sounds a bit like Altshuller's definition of Level 3 inventions (ideas that transfer from one industry to another) then you'd be absolutely right. Alas Johansson has obviously never heard of TRIZ otherwise he wouldn't devote every fifth page to the idea that 'all good ideas are totally unpredictable'. Rather, Johansson insists, the best that inventors can hope to do is enter the 'Intersection' and spend a lot of time there getting things wrong until one day they end up with something that transforms markets.

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If this thesis is difficult to accept, it should not detract from the verve with which Johansson describes some of the stories in the book, and some of the ideas about how the number of potential breakthrough solutions goes exponential in the 'Intersection'. Modern-day giants like Pixar, Virgin (including the 16-million selling 'Tubular Bells' album that launched the company – in itself an example of what happens at the intersection of two different disciplines (rock and classical in this case)), Wizards Of The Coast and famous New York restaurant, Aquavit. In any event, whether you agree with the thesis or not, it is always seeing a different perspective to your own. If only to get you to question some of the assumptions that might have become (too?) ingrained.

So much for a first half of interesting-but-incorrect'ness. The second half, though, takes us into far more fertile territory. The territory of the unique challenges we face when executing intersectional ideas and how we can overcome those challenges. Enter the ideology of comfort, the tyranny of comfort, the downward spirals that prevent companies from entering the Intersection, and the need for individuals to break away from existing networks if they are to stand any chance of being successful.

There is a lot of interesting stuff here. Not just from Johansson himself, but a host of injections from the refreshingly large number of other researchers the author sees fit to credit. Things like the fallacy that working under pressure (i.e. when we all wait until the evening before a deadline to write a report) makes us more creative. Or how about all the evidence saying that brainstorming in meetings is at least two times inferior to sessions where individuals generate ideas alone or virtually. Or the fallacy of taking less risk the more successful company's become. Plenty of grist for the mill here, and as such, well worth the price of admission.

Conference Report – South-West Manufacturing Network Launch Event, Exeter

Well, it was difficult to criticize the turnout; over a hundred and fifty people turned up to this event in the South West of England. Not bad for a part of the world where, apart from Rolls-Royce and Airbus, the manufacturing base has never been what the region has been known for. Perhaps the fact that neither of the two big players turned up was a sign of what was to come?

The big pull, networking opportunity aside, was ex-SAS soldier and current let's-go-take-a-bunch-of-paraplegics-and-survive-in-the-jungle TV star Ken Hames. For those readers who live outside the UK, the SAS is the UK's elite fighting force. These are the handful of soldiers who get themselves behind enemy lines and then swashbuckle themselves back to safety. Having caused untold damage to the enemy on the way of course.

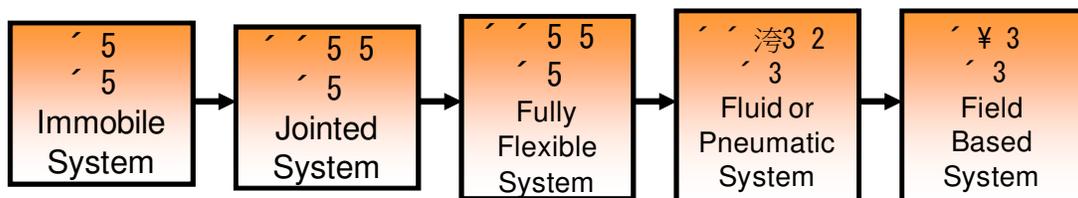


As it turns out, 'elite fighting force' is not the same thing as 'elite talking force'. Or 'elite coherent-message force' come to that. To say that Hames was garbled was something of an understatement. Unless, of course, the intention of the conference organizers was to convey that business was all about plans and equipment that don't work, leaders that didn't know what they were doing, and that as a consequence the classic British stiff upper lip, 'we'll-muddle-through' attitude was the only sensible remedy. For this seemed to be the theme of all of Hames' Boys Own stories; the triumph of improvisation in the aftermath of insurmountable odds.

Next up was a session to explore the top-three problems facing our organizations. For those that might be interested, the room's top three problems-facing-our-organisation were (in no particular order):

- Inability to find competent staff
- Lack of speed to market
- Lack of new ideas

As if by magic, this acted as a cue for our 'Systematic Innovation' presentation. Unfortunately, all the opinion soliciting activity meant that proceedings were overrunning and hence (and how about this for another sign of the times) the innovation stuff got squeezed into half its intended slot. At this point, in a fit of somewhere between pique and utter resignation that here was another wasted day spent in the UK, I switched a bunch of of my slides to Chinese:



The South West Manufacturing Network, it says in my takeaway information pack, aims to raise the profile of the region's manufacturing base. Gerry Brame, chairman of the network, said: "For too long, manufacturing has appeared to be old-fashioned, dirty and a sector in decline, but not so here in the South West. This event is to celebrate the sector and to share with some forward-looking companies their success and issues." The event was sponsored by former helicopter giant, Agusta Westland. The company's head of operations, Annette Hobhouse, added: "The network will provide the opportunity to learn from each other, help each other and share our experiences, all on our doorstep. It is important that we work together to raise the profile of industry in the South West, to promote its attractiveness and to continue to maintain the necessary skills and expertise in the region."

Two weeks after the event and we have already received two orders for Systematic Innovation books. It's official; the South West revolution starts here.

Investments – Biodegradable Plastic



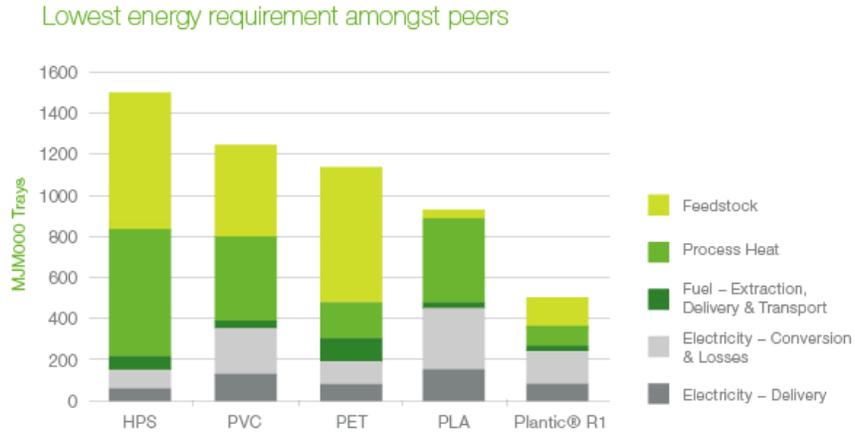
Recently floated on London's Alternative Investment Market (AIM), Plantic Technologies was originally incorporated in Victoria, Australia in 2001 for the purpose of acquiring, developing and commercialising intellectual property developed by an Australian Federal Government funded research group: the Cooperative Research Centre for International Food Manufacture and Packaging Science ('CRC'). The CRC identified that a range of corn starch based formulations could be used to manufacture a flat sheet bioplastic, which then could be thermoformed to produce biodegradable trays. This discovery led to the lodgement of a provisional patent in 1999. In 2002, Plantic was granted ownership of all the intellectual property by the CRC. By July 2003, Plantic had established supply to Cadbury Schweppes (Australia) and Kenman Kandy, a division of Mars/Masterfoods. The company officially launched its Plantic® material and its presence to the packaging industry in August 2003 at the Auspack Trade Show in Melbourne, Australia and won two packaging awards for its Cadbury Milk Tray chocolate box rigid tray.



First entering the World Market in 2004, Plantic began operations in Europe, based in Germany, in close proximity to several leaders in the European food and confectionery industry. In 2005 Plantic commenced supply to Nestlé in the United Kingdom for two major confectionary lines. In that same year Plantic entered into development arrangements with Visy Industries in Australia and a major technology partner in the USA to develop barrier resin for rigid injection stretch blow molded (ISBM) containers and bottles which could be manufactured with a layer of Plantic®. The primary target market for the Plantic® material in ISBM is for use as a barrier layer within a multi-layer PET bottle for products which require protection from oxygen ingress or carbonation loss, as in the case of carbonated beverages and juices. The technology is also targeted for use with other materials such as polyolefins (polypropylene and polyethylene) and polylactic acid (PLA).

Since 2005 the company has moved from strength to strength, establishing distribution agreements with global leaders, while customising our technology to suit an ever broader range of conversion techniques & applications, including thermoforming, injection molding, film extrusion and blow molding, as well as rigid and flexible packaging.

The company's fortunes were recently boosted following the publication of independent test results showing the overall environmental benefits of their material systems over conventional plastics:



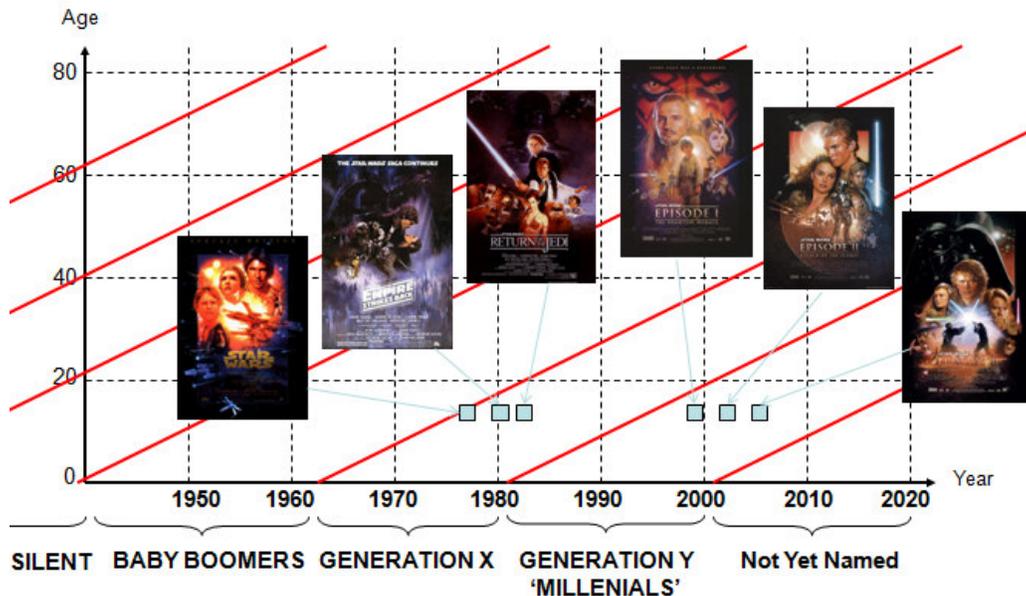
As can be seen from the earlier pictures, some of the company's materials degrade immediately upon contact with water; in other applications the degradation rate can be tuned to suit the local application circumstances. The growing fight to buy corn notwithstanding, Plantic's technology is also highly competitively priced relative to conventional materials.

It seems to us that, not only is the company an attractive investment proposition with its current roster of materials and applications (check out www.plantic.com.au for more details), but it also has massive untapped potential in a host of other application areas. We already know, for example, that their capability makes an excellent fit for one of our building industry clients. Watch this space on both that front and for the company in general.

Generational Cycles – Star Wars

Theory. Anyone who saw the original series of the Star Wars films during their formative years was highly likely to have been disappointed by the second trilogy.

Why? Well, as can be seen in the generational cycle picture below, the two clusters of films were released to audiences of two distinctly different generations. The first three films were aimed at rising Generation X kids. As described in the Fourth Turning research, Generation X represents the ‘Nomad’ archetype. The more recent trilogy was released during the formative years of Generation Y, a ‘Hero’ generation.



Whether George Lucas was explicitly aware of the generational shift or not (our belief is that he was) the result is two clusters of films with distinctly different appeal. Thus, if you're Generation X, the rampant heroism (an apparently endless stream of races, fights, etc) of the later trilogy probably came across as trivial and trite and ultimately left feelings of 'where's the story?' and 'where's the character I care about?'. More explicitly, you probably found that these films were 'missing something'. Specifically what they were missing was the Han Solo (Harrison Ford) character – a classic Nomad if there ever was one.

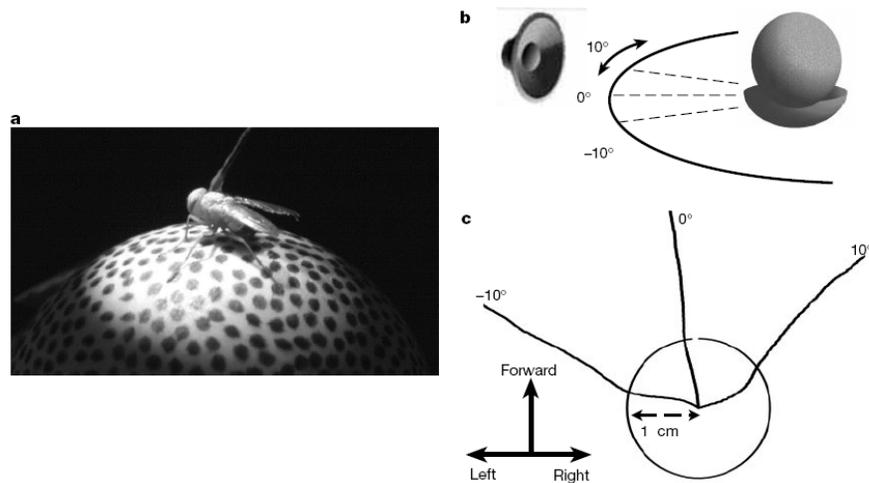
The first Star Wars film comes in for specific mention in the Fourth Turning because it features key Nomad (Han Solo), Hero (Luke Skywalker) and Prophet (Obi-Wan) characters that consciously or otherwise gave the film an appeal across the generations.

In the more recent trilogy, this generational balance has all but disappeared. What we are instead left with are three classic Hero films. Hero films for a Hero generation.

Biology – *Ormia ochracea*

Two case studies in one. Last month we talked about the ongoing arms race between the Hawaiian field cricket and the parasitic fly that preys upon it. The focus in that article was the cricket. This month the focus shifts to the fly, *Ormia ochracea*, as it also has a pretty remarkable tale to tell. One that has the potential to transform the hearing-aid industry.

The story begins with the publication, in a 2001 issue of *Nature*, of the results of experiments to see how the fly was able to find the singing crickets. That paper described how the fly, which measures less than one centimetre in length, can determine the direction of a sound within a range of two degrees.



Tethered flies on rotating sphere – experimental set-up to assess the direction-finding capability of the fly. See www.scar.utoronto.ca/~amason/movie/flyball2.mpg for a demonstration.

This a feat previously ascribed to only keen-eared owls, cats and humans. What made the capability so remarkable was the fact that the fly's ears are less than 0.5mm apart. This close proximity causes the arrival times of the sound pressures at the two ears to be less than 1 to 2 μ s depending on the direction of propagation of the sound wave. The small differences in these two pressures must be processed by the animal in order to determine the incident direction of the sound. The smaller the separation between the ears, the worse the direction-finding accuracy becomes. The problem is in fact general to all small life-forms. From a contradiction perspective, the problem looks like this:

IMPROVING PARAMETERS YOU HAVE SELECTED:
Measurement Precision (48)

WORSENING PARAMETERS YOU HAVE SELECTED:
Length/Angle of Stationary Object (4)

SUGGESTED INVENTIVE PRINCIPLES:
 26, 28, 10, 24, 3, 32

To make matters worse, the flies in question have only about 100 nerve cells in each ear, compared with thousands in the human ear. Other experiments by a team at Cornell University used electrodes to demonstrate how the simpler nervous system of the fly can process sound information so accurately. "Beyond the mechanical processes of the ear drum movement, we now know how the nervous system converts movement of the eardrums into information on sound direction," says Mason.

So how does the fly solve the problem? Take a look at the physiology of the fly's ear and, from a front aspect of the thorax, we see a pair of eardrums; these meet in the midline and are very low mass in life (light and flimsy), responsive to air pressure (i.e. typical tympana). Then there is a small skeletal element of cuticle called the cuticular bridge which spans the midline and is embedded in these right and left tympana. A group of sensory neurons attaches at each of the opposite ends of this bridge. The bridge couples the two eardrums together mechanically. The mid-line joint of the bridge allows it to flex in the middle. Sound activating the eardrums causes a complex movement of these structures and small time of arrival differences arising from differing angles of the fly to the sound source are converted into differences in amplitude of movement of ear surfaces and differences in the right and left firing sequence of the right and left neuro-sensory groups.

What is happening here is that when the membrane inside one ear moved, so does the one in the other ear—but, thanks to the cuticular bridge, the movement of the other ear occurs a split-second later. "And that delay turns out to be really critical," reports the team of researchers. The discovery was the very first evidence of such coupling and has not been reported in previous studies of directional hearing. An analytical model of the mechanical response of the ear to a sound stimulus is proposed which supports the claim that mechanical interaural coupling is the key to this animal's ability to localize sound sources.



The acoustic sensory organs that transduce the mechanical response to sound into neural signals are connected at points 1 and 2. The mechanical coupling between the tympana due to the intertympanal bridge (composed of the region identified by points 1, 3, and 2) allows the ears to achieve directional sensitivity.

Although it is a pretty big jump (and fairly non-instinctive), this cuticular bridge is nevertheless a good example of the Inventive Principle 24, 'Intermediary' strategy. Perhaps it would have been nice to also see Principle 5, 'Merging' featuring in the Contradiction Matrix recommendation, but even without it, Intermediary should have pointed a user in the right direction to find the solution evolved by the fly. Although not recorded by the researchers involved in studying the fly, we suspect that the relative stiffness of the bridge and the two eardrums which it connects together are also playing an important role in solving the problem. If that is true, it would add further consistency to the Matrix recommendations – in this case to Principle 3.

In effect, the fly's ears are acting as an extremely small, simple and sensitive directional microphone. Hearing aids that incorporate directional microphones would help the hearing impaired filter out background noise and tune in to one sound - a task that would enable them to better decipher what one person is saying in a crowd of people. "Hearing aids made with directional microphones would make selective listening much easier," say the Cornell researchers. We await the practical demonstration with interest.

