Systematic Innovation

e-zine

Issue 116, November 2011

In this month's issue:

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

The Obvious/Non-Obvious Paradox

Following our discussion of the thorny oversell/undersell paradox in last month's e-zine, we were contacted during the month by readers telling of another common and perhaps even more intractable paradox: the one involving the obviousness or otherwise of a solution to a problem or challenge.

There are two scenarios most likely to be at play here, one that gets to the heart of the human creative processes, the other to the core of IP law.

Imagine, in the first instance, the scenario where we are given a difficult problem by our boss. The sort of problem that will take several months and considerable resources to even find a potential solution, never mind prove it. Imagine now that we go back to our boss at the end of the allotted time with a highly complicated, highly intricate, expensive-looking solution. In this scenario we are very likely to receive a pat on the back and hearty congratulations in return for all of our efforts. For, surely, this was indeed a difficult problem and we have somehow managed to find a way through all of the difficulties to locate our rare and precious answer.

Now imagine the alternative scenario. This time, at the end of the allotted problem solving period we go back to our boss with a solution that looks to be extremely simple. It's a solution that we also know will work and will come with inevitable side benefits of being easy to produce and commercialise. Do we receive the same pat on the back from our boss in this scenario? Answer: no mostly likely we do not. Instead we are far more likely to be criticized and questioned as to why it has taken us so long to come up with what looks like such an obvious solution. Surely, the accusations fly, it can't have been such a tough problem after all. What have we been doing all this time?

What's happening here of course is a common paradox: the test of any good solution is that it should look obvious in retrospect. Smart engineers know that the 'obviousness' test is one of the very best ways there is to determine whether their solution is 'the' solution.

We see an even more serious manifestation of the problem in our second scenario. One of the central tests used by Examiners in the various Patent Offices of the world is that the solution should be 'non-obvious'. Wow. Taken to its logical limit, this rule should mean that no good solution should – by definition – be patentable.

Thankfully, logic usually gets to prevail. We say 'usually' because there are a host of 'obvious' solutions that have simultaneously changed the world (eg hovercraft, electric loom) and were deemed to be ineligible for patent protection. More pragmatically, the smartest patent lawyers have realized they have a contradiction to resolve when they draft their invention disclosures: the invention should be both obvious AND non-obvious.

This article examines some of the strategies used by Agents and others to successfully resolve the contradiction, partly in the hope that – in true TRIZ/SI fashion – a good solution in one domain can be transferred to other domains. And, specifically in this case, to the problem of how we go back to our boss with our 'obvious' solution in the hope that we will receive our just rewards rather than the accusation that we can't have been very good at our job.

Figure 1 illustrates the basis of the obvious/non-obvious contradiction present at both ends of our scenario cases:

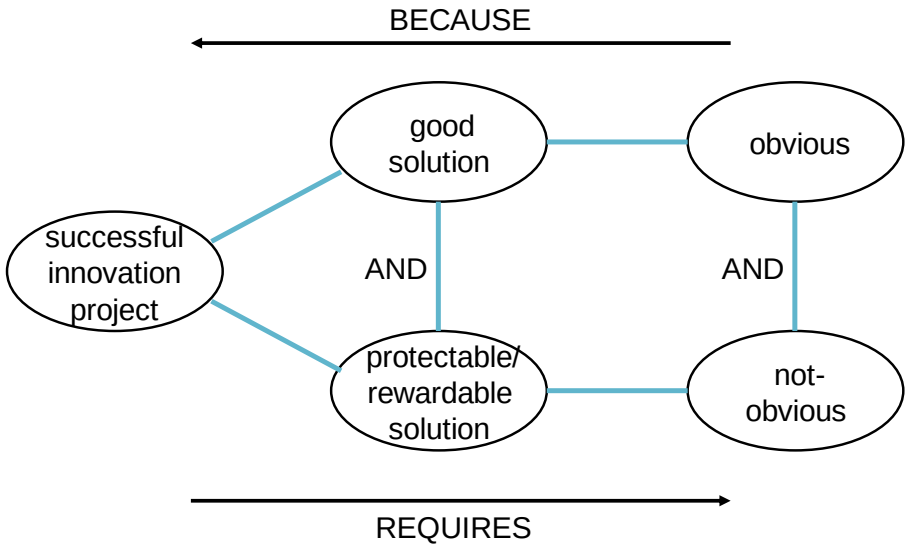


Figure 1: The Generic Obvious/Non-Obvious Contradiction

As we found last month with the under/over sell dilemma, very often the mere act of re-framing of the problem as a contradiction is sufficient to get people thinking in the right direction to develop meaningful solutions: does a successful innovation project really require a protectable solution? can we separate the contradiction in space? In time?

Or can we adopt a more structured approach and map the related conflict pairs to see how others have already tackled similar problems? Figure 2 illustrates the result of doing this for the 'good' versus 'protectable' conflict pair:

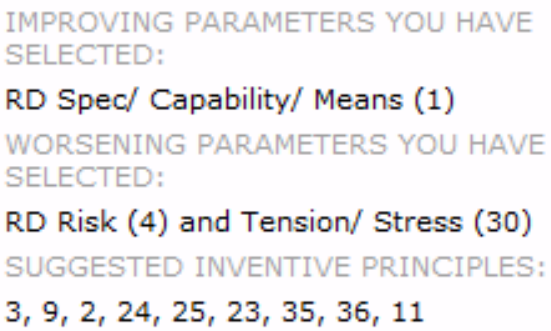


Figure 2: Solving The 'Good' Versus 'Protectable' Conflict

Several of the suggested Inventive Principles may be seen to offer multiple potentially useful new insights into how the problem might be solved for both the IP law and for the understanding-boss cases:

Principle 3 – Local Quality
Suggests treating different parts of the problem in different ways. Engineers and designers, for example, often have a tendency to simply unveil their final answer and expect everyone to fill in all of the suffering, trials and tribulations they've been through. Rather than going direct to the 'reveal', this Principle perhaps suggests describing and revealing different stages of the journey – with their attendant ups and downs – prior to the finale of the eventual 'obvious' solution.

Principle 9 – Prior Counter-Action
Here's the one closest to the strategy used by the smartest patent lawyers. They often talk about invention disclosure writing as being analogous to writing a good novel. In a murder-mystery, for example, the more intractable the plot, and the more insurmountable the obstacles the hero has to overcome to solve the whodunit, the bigger the wow when the murderer is finally revealed. The smart patent lawyers, in other words, disguise the obviousness of the breakthrough solution by building a clear picture for the examiner of the difficulty of the problem; the poor-ness of the prior art solutions and the amazing leap of inventiveness that finally gave the eventual solution. Indeed, a very simple test of some of the best examples will frequently find the patent lawyer using words like 'unexpectedly', 'surprisingly' or 'unexpectedly' at the point of first revelation of the solution to emphasise the non-obviousness of the solution.

Principle 2 – Taking Out/Separation
Similar in some respects to Principle 3, but definitely worth exploring in both spacial and temporal terms. Difficult in patent terms (although several lawyers swear by the strategy of not filing Claims in their initial submission so that they can add what effectively becomes the punch-line some time after the difficultness of the problem has been shared with the Examiner), but often very easy when dealing with the problem of letting your boss know why he/she should be thanking you for your simple and obvious solution: A really good way can be to present some of the complicated solutions prior to the real solution in order to attract the positive confirmation of the hard work that has taken place: boss sees complicated solution and is all set to give you your pat on the back, when you hold up your hand and reveal the even better, 'obvious' solution.

Principle 24 – Intermediary
As with so many things in life, nothing ever quite seems to beat advocacy from a third party. If I tell you how good my solution is, your immediate reaction is almost inevitably going to be something along the lines, 'well he would say that wouldn't he'. On the other hand, if someone neither of us knows tells you how good my solution is, it is assumed that this person has nothing to gain by saying what they just said, and so we are much more likely to not just believe them, but to act upon their suggestion. Precede your revelation of your 'obvious' solution with a few words from a recognized domain expert to describe how difficult the problem is, and the stage is set for your 'obvious' solution to receive the plaudits it deserves.

Principle 25 – Self-Service
Get your boss to work on the problem in parallel with your work!

Principle 23 – Feedback
Make sure your boss (or the Examiner) is aware of your journey as you make it, and particularly as you encounter and surmount different problems along the way. Extreme possibly, but several inventors can be seen to submit a string of patent applications, only the last of which is the eventual 'real' 'obvious' solution.

Principle 36 – Phase Transitions
Making use of the business rather than the technical interpretation of the Principle, a good idea is to time the revelation of your solution to coincide with some kind of phase transition in the business cycle. Times of crisis tend to be the very best ones – people are so happy to see a potential resolution to the crisis as a result of your solution, that they're barely conscious of the whole obvious/non-obvious debate.

Etc.

Easy when there's a method in place, right?

SME Innovation: Crossing The Ditch

As the UK, along with various other parts of Europe, looks set to plunge again into (predictable according to us) recession and depression, the economists and politicians have finally woken up to an important fact. The primary engine of economic sustainability and growth comes from successful small and medium sized enterprises (SMEs) that manage transform themselves into successful big companies. With this in mind, the UK government is currently looking enviously across the continent at Germany's 'Mittelstand' as a model to be emulated in the future. On a certain level, there is a solid logic behind this 'someone, somewhere already solved your problem' illustration: Mittelstand organizations (those that have grown beyond SME status, are typically still privately (often family) owned and typically also take a long term view of the world) form the bedrock of the German economy.

Therein, however, lies the problem. Thanks to their long-term perspective on life, Mittelstand organizations have often taken several generations to reach the position they have. Often simply because, being family owned, one generation takes on the responsibility to pass on something sustainably successful to the next generation.

How, then, might a country without a similar foundation or even culture hope to emulate the success of a Mittelstand mindset? And ideally within the next five or so years?

At the heart of the problem here, we think, is 'The Ditch' discussed in the seminal management text, 'The Rule Of Three' (Reference 1). Figure 1 attempts to illustrate what the Ditch is all about:

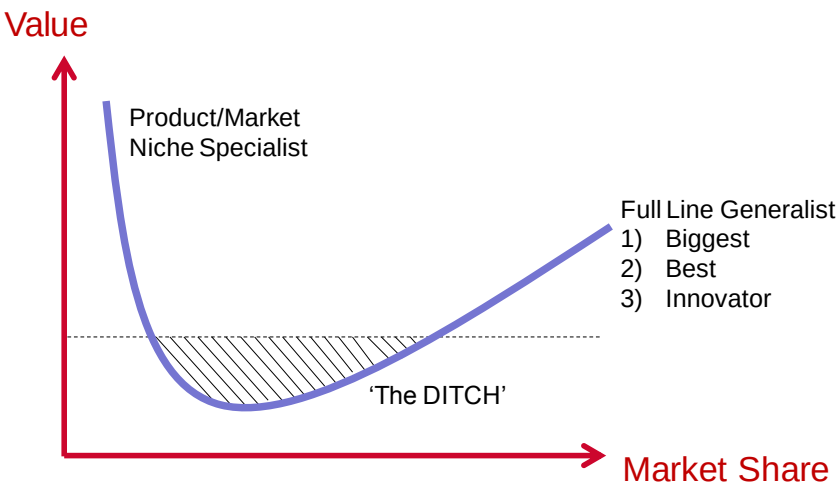


Figure 1: 'The Ditch'

Over on the left hand side of the curve are the SMEs of the world. They get to be successful by offering small quantities of high value products and services to clearly defined small niches. Then, over on the right, are the 'Big Three' that come to dominate a market and – in terms of the UK government ambition – provide the large scale tax revenue that the economy needs because these are organizations that manage to combine a significant market share with a high value offering to their customers.

Unfortunately, between the two comes the 'ditch' – a place characterized by low value, unsatisfactory market share and therefore low margins. Mittelstand organizations tend to avoid the Ditch by discovering 'niches' that are big enough to sustainably employ 500-1000 people and small enough that they are unattractive to the real big companies. Oftentimes, due to their long-term worldview, they are able to identify and grow such niches over periods frequently measurable in decades. See Bavarian antenna manufacturer, Kathrein (www.kathrein.com) for an archetypal example.

Somehow, when time pressures mean solutions are needed in months or years rather than decades, the high potential SMEs need to find other way to get across the Ditch. We might, therefore, extend our 'someone, somewhere…' search to see whether anyone has successfully resolved the problem.

Fundamentally, of course, any Big Three company was at some point in time a small company. And so, there must be examples of organizations that have successfully made the journey. Microsoft, Google, Apple, HP and many others started in someone's bedroom or garden shed. Looking across all of these successful ditch-vaulters, we can observe four basic strategies that seem to work:

1) 'cracks in the pavement'
2) 'IP King'
3) 'disruptor'
4) 'lucky paradigm shifter'

Without wishing to belittle the efforts of people like Bill Gates in any way, Microsoft perhaps offers us the archetypal illustration of the fourth of the strategies on offer. Gates benefited from a whole sequence of fortuitous events that all came at the same time as an enormous global paradigm shift – the one from industrial to knowledge. Whether other SMEs can hope to reliably and repeatably use this kind of global-paradigm-shift-plus-sequential-luck strategy is open to some doubt. Not impossible, but not very likely either.

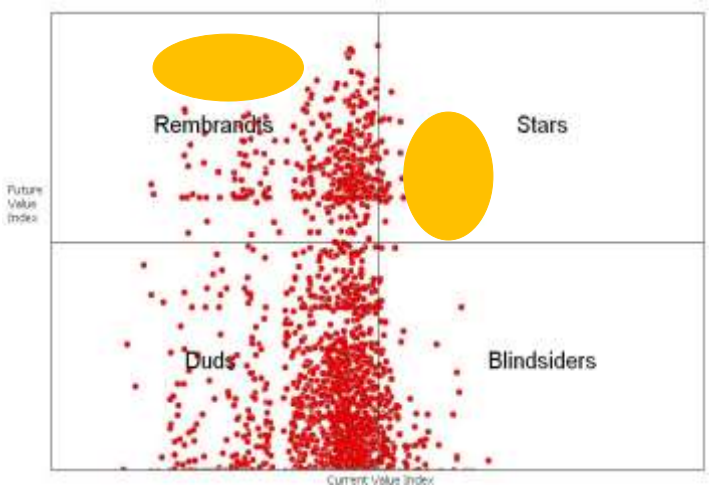
Which then leaves us with the other three 'strategies that work':

Cracks In The Pavement

Here is the strategy borne of the fact that increasingly the large companies find themselves unable to break out of the silos that they inherently tend to build around themselves. There are a lot of innovation opportunities for small companies to exploit the gaps that come to exist between silos and in effect become the key that unlocks the big incumbent companies inability to cooperate. A good example right now is The company Tidal Generation in the UK. The company started when a group of individuals interested in tidal energy realized that the barriers to entry for potential players had little to do with technology, but rather a lot to do with the logistics of integrating different parts of the jigsaw and in particular overcoming the problem of getting turbines placed into the ocean. In all likelihood, Tidal Generation will be bought by one of the big companies (Rolls-Royce, Siemens, EDF) they successfully brought together, but this doesn't have to be the case. Should they so wish, the switch from a vertically dominated to a horizontally dominated

supply chain that they helped provoke should enable this kind of SME to successfully avoid the Ditch.

IP King
The second reliable strategy is the one in which the SME protects their interests by creating a portfolio of strategically important IP:



And then, usually more importantly, develops or co-opts the muscle needed to defend the IP in the event of an infringement by one of the big players. We call this the 'BFG' strategy: the smart SME looks to find a Big Friendly Giant to help them fight the inherently expensive IP corner. UK company Dyson represents a good example of a company that has crossed the Ditch by playing this game. Their cyclone vacuum cleaner technology now being protected by a portfolio of several hundred patents.

Disruptor
The third strategy is perhaps the most frequently observable when looking back on companies that have crossed the Ditch, but ironically, there seem to be many more cases of after-the-fact fitting to this strategy rather than overt, pro-active use of the strategy. In simple terms, the disruptor strategy is the one that lies at the heart of Clay Christensen's classic Innovator's Dilemma (Reference 2). Perhaps adding to the irony is the fact that the book was written primarily for the people in the big companies threatened by the (SME) disruptor rather than for the disruptors themselves. The reality is that the book as at least as relevant strategically to the SMEs as it is to the large incumbents. The only real trick the SMEs learn to adopt is the (paradoxical to most) strategy of targeting the incumbent companies least valuable customers and non-customers by creating an offering with 'lower' value than that produced by the incumbents.

There is nothing we've found to suggest that these three (or four if you wish to include 'luck') strategies are the only ones that an SME can cross the Ditch with. If only because, were we to map the Ditch problem as a contradiction ('we wish to grow, but we don't wish to suffer inadequate margins'), we would obtain several Inventive Principle suggestions that don't encompass the strategies we know to have worked. There is always the possibility that the next generation of SMEs will find their own new rules (we'll be there to watch!). In the meantime, one of the key constraints on most SMEs as they look to cross the Ditch is that they fundamentally have limited resources to devote to the journey. In many cases, they have but one opportunity to get things right. With that in mind, the safe

money will go with the established ‘someone, somewhere already solved your problem’ routes described here.

Small companies – of which we are one by the way – can and do cross the Ditch to become successful big companies. As we make our own journey, my money is going with the three proven routes rather than trying to get famous by creating a whole new one. Some battles are worth fighting, and some are not. Small companies, we think, are far more likely to succeed by flowing with the big tides rather than trying to swim against them.

References

1) Sheth, J., Sisodia, R.S., ‘The Rule Of Three: Why Only Three Competitors Will Survive In Any Market’, Free Press, 2002.
2) Christensen, C.M., ‘The Innovator’s Dilemma: When New Technologies Cause Great Companies To Fail’, Harvard Business School Press, 1997.

Not So Funny – Brevity

The academic community is not widely known for its wit (unless you count some of the learned jokers who were responsible for evaluating some of our paper or proposal submissions over the years!). Which means when it does happen it has a tendency to go viral. Like this recent submission in one of the more learned of the most prestigious of the world's journals:

Can apparent superluminal neutrino speeds be explained as a quantum weak measurement?

M V Berry[1], N Brunner[1], S Popescu[1] & P Shukla[2]

[1]H H Wills Physics Laboratory, Tyndall Avenue, Bristol BS8 1TL, UK

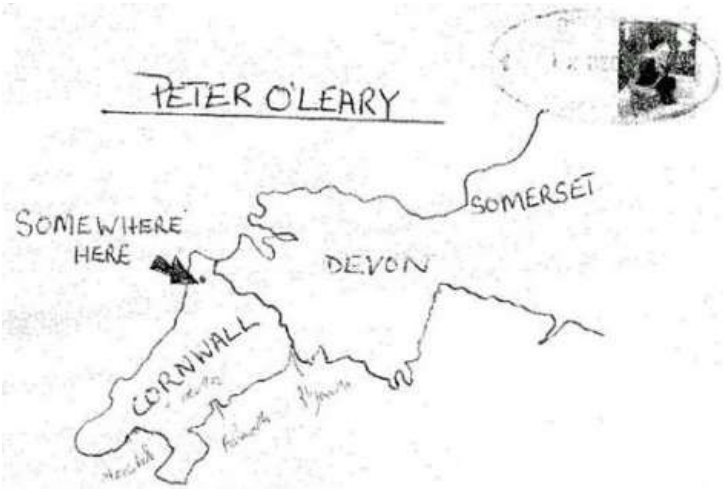
[2] Department of Physics, Indian Institute of Technology, Kharagpur, India

Abstract

Probably not.

All in all, a pretty good illustration of Principle 2, Taking Out in action: in this case, taking out all of the extraneous information that might otherwise clutter up the abstract.

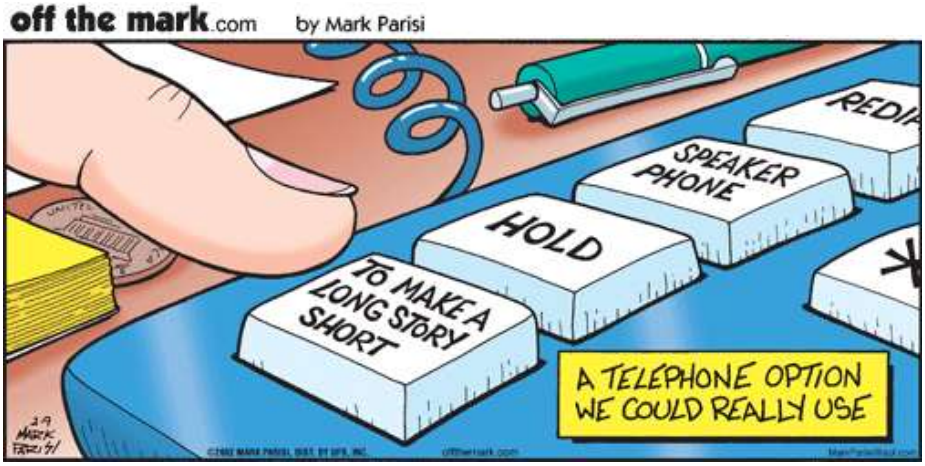
Much as we like to criticise the Royal Mail here in the developing nation that is the United Kingdom, they're also pretty good at delivering letters when letter senders perhaps take the Take-Out Principle a tad too far. Here's another recent favourite example:



Amazingly, the letter did manage to find its way to Peter O'Leary, albeit it took nine days to get there rather than the promised 24 hours. They also succeeded with this one – which kind of makes me wonder, if they can deliver this, how come they can't ever manage to make a profit? (answer: maybe because everyone is busy trying to work out where to send

mysteriously addressed letters?) Apparently this next example also made it to the correct destination:

There will always be the customer who makes their own extreme determination of how much they can take out of the things they do in order to save themselves effort. The smart companies are the ones that learn to stay ahead of the game and do the taking out before the customer realizes they need it. Here's one I'd pay good money for right now:



I've also got a sneaking admiration for this minimalist watch:

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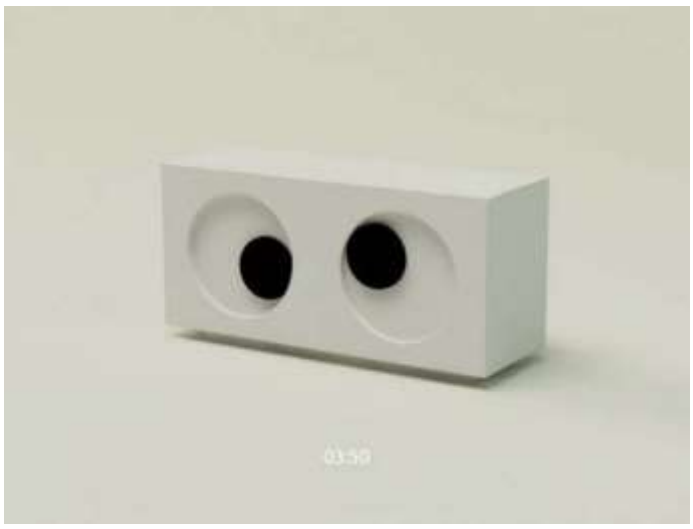
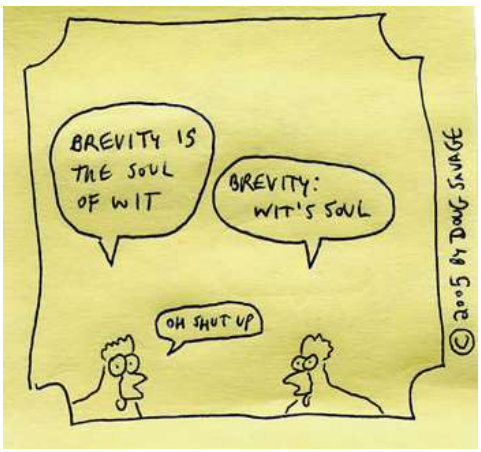
But not quite as much as for the clock version:



True genius.
Brevity rules.
Mostly.



Patent of the Month – Multi-Phasic Nanoparticles

Patent of the month this month takes us to the University of Michigan at Ann Arbor. US8,052,849 was granted on 8 November. The invention relates to a method of forming multi-phasic nanoparticles and to the nanoparticles that result from the method.

Here's what the inventors have to say about their motivation for the invention:

Electrified jetting is a process to develop liquid jets having a nanometer-sized diameter, using electro-hydrodynamic forces. When a pendant droplet of conducting liquid is exposed to an electric potential of a few kilovolts, the force balance between electric field and surface tension causes the meniscus of the pendent droplet to develop a conical shape, the so-called Taylor cone. Above a critical point, a highly charged liquid jet is ejected from the apex of the cone. This well-established process has been employed by two processes, i) electrospraying and ii) electrospinning. In electrospraying, the ejected liquid jet is eventually fragmented due to instabilities and forms a spray of droplets. Among the various applications, production of charged gas phase ions of bio-macromolecules for mass spectroscopy is the most widely used. Using polymer solutions or melts as jetting liquids, electrospinning gives a way to develop fibers whose diameters are a few orders of magnitude smaller than those available from conventional spinning. Only during the last decade, electrospinning has witnessed increasing attention and nanofibers have been spun from a wide variety of polymers. In the last decade, electrospinning has witnessed increasing attention and nanofibers have been spun from a wide variety of polymers.

Recently several multi-component jetting systems have been reported employing capillaries with different geometries. Among those is a coaxial core-shell geometry, which has outer and inner liquid-feeding channels and which produces stable cone jets having sustained core and shell layers. Much less is known about alternative geometries of multi-component jetting such as a side-by-side configuration.

Anisotropic multi-phasic nano-objects possessing two distinct phases may establish significant advances in nanotechnology and may have broad impact in areas, such as microelectronics and biotechnology. The possibility of selective modification of each side of the biphasic object makes this system very attractive and versatile for electronic and biomedical applications.

Accordingly, there is a need for improved methods of forming nanometer sized particles and for multiphasic particles with unique chemical properties.

In other words, what we have here is a classic administrative contradiction: we wish to achieve anisotropic multi-phasic nano objects with two distinct phases, but we don't know how to achieve it. There are generally two ways to begin approaching such contradiction types: the first involves delving into the details of *why* we can't produce what we want. Typically this involves us drilling down to an atomic level understanding of the problem. The other involves attempting to resolve the problem by mapping the original problem statement onto the matrix. In this case, since the inventors chose not to provide details of the micro-level subsystem behaviours, as outsiders we are left with just the second option. In which case, the 'we don't know how to do it' side of the contradiction is probably best mapped as a 'manufacturability' issue, since fundamentally the challenge is about how we make the desired two-phase nano objects. Here's how we mapped the problem onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Adaptability/Versatility (32) and Manufacturing Precision/Consistency (42)

WORSENING PARAMETERS YOU HAVE SELECTED:

Manufacturability (41)

SUGGESTED INVENTIVE PRINCIPLES:

13, 24, 28, 10, 25, 29, 31, 15, 1, 19, 26, 5

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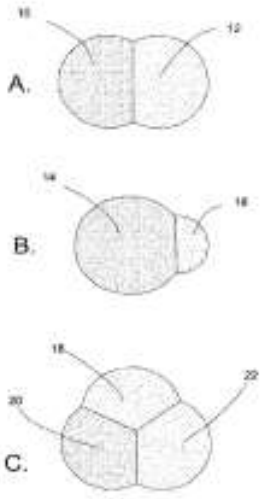
And here's how the inventors describe their solution:

The present invention solves one or more problems of the prior art by providing in at least one embodiment a method of forming multiphasic particles by electrified jetting. The method of this embodiment involves the jetting of two or more different liquids in side-by-side capillaries thereby generating composite liquid stream having a multiphasic cone jet. The formed cone-jet is then exposed to a force field which causes the composite liquid stream to at least partially solidify into a nano-object.

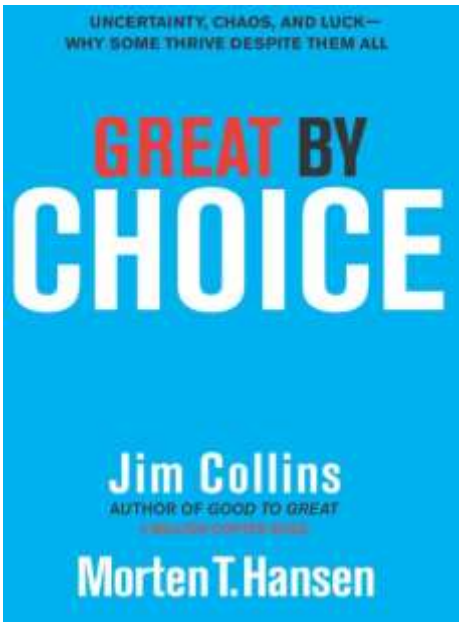
In another embodiment of the invention, the multiphasic nano-object formed by the method set forth above is provided. For example, biphasic nanospheres or biphasic nano-fibers can be produced using the method of the invention depending on the specific properties of the liquids used and on the working parameters. Appropriate selection of jetting liquids with control of the process parameters as set forth below allows biphasic nano-objects to be formed in a variety of morphologies such as nanofibers or nano-spheres. The biphasic objects include composite structures that are nanocrystals as well as structures with surfaces modified by selective reactions. The nano-objects of the invention are advantageously useful in many practical applications, such as photonic and electronic devices, storage devices, and biomedical materials.

In other words, by incorporating the 'force field', a clear link to Principle 28, Mechanics Substitution ('add a field'). Then also a good illustration – through the 'at least partially' statement – of a Principle 10, Prior Action. The bringing together of two side-by-side jets corresponds to a Principle 5, Merging, evolution. The only missing part of the equation, in terms of the Principles suggested by the Matrix is the (important!) aspect of 'selective reactions'. Principle 15, Dynamics, would get us there with a bit of a stretch ('allow a system to change to achieve optimal operation under difficult conditions'), but far better would have been Principle 3 or 37. Oh well, you can't always have everything.

At least the main inventive step is clear and accounted for. All in all an excellent reminder of the importance of 'field'-based solutions. Especially when we find ourselves operating at the nano-scale: finding a field to move a one tone physical object is not always so easy; finding one to move a few atoms is a rather easier challenge.



Best of the Month – Great By Choice



Following the (justifiable!) drubbing that 'Good To Great' management guru, Jim Collins, took in what we think is still the best business book of the last 5 years, The Halo Effect, we never thought we'd be dedicating our book-of-the-month slot to any future Jim Collins effort. But never say never and here we are, offering our almost wholehearted advocacy of 'Great By Choice'. Although Collins never mentions The Halo Effect by name, it is made very clear throughout the book that Collins has been stung by his critics, and that he has thus felt a need to respond. He could, of course, have responded merely by ignoring their words (after all, the Halo Effect has sold a mere fraction of the 4 million copies of Good To Great), or by defending previous research methods. But instead of either course of action, Collins has gone to great lengths to define and describe the radically-re-thought research methodology used through this new book. Indeed the detailed appendices covering each aspect of the research methods take up fully a third of the overall book. That Collins should respond in such a manner is probably worth the price of entry by itself.

There is far more on offer, however, to make this one of your easier purchase decisions this year. The primary thesis of the book is a characterization of what Collins describes as '10x' organizations – these being organizations that have consistently out-performed their contemporaries by a factor of 10 or more across a series of different success metrics.

Having discovered a sample of 10 such 10x organizations (some obvious – Apple, SouthWest – some less so – eg biotech company, Amgen) he then proceeds to dissect and determine the key factors underpinning their extraordinary performance. These factors essentially distil down to four elements:

1) 'Level 5' leadership – the Level 5 term coming from his earlier Good To Great work and the idea of the need for organizations to have largely ego-less, big-picture thinking ambition to 'make a difference'.
2) Productive Paranoia – the ability to contemplate and build into the strategy of the organization a worst-case-scenario way of looking at the world; one that serves to encourage people to see bad stuff as an opportunity rather than a threat.

3) Practical Creativity – in which Collins demonstrates that it is not the greatest/best innovators that win, rather those that innovate just enough to gain the commercial advantage they need.
4) Fanatical Discipline – the ability to set out a strategic direction and to stick to it through good times and bad. Perhaps paradoxically, Collins shows that the truly disciplined 10x companies managed to achieve their growth targets in bad times and successfully constrained themselves to not overstep their capability in good times.

Not everything in the book works. In particular the section covering the Practical Creativity success strand demonstrates a poor degree of understanding of the innovation subject. We agree with his conclusion, that it is not the most innovative that necessarily out-performs the market, but disagree almost completely with how the conclusion is reached. Had Collins understood the differences between and the parallel needs for both business and technical innovation, the arguments would have become much more coherent. A far more robust conclusion – according to us – would have been that the 10x companies knew when their markets were ripe for technical or business innovation, and once the type had been determined, were able to make the appropriate step-change faster than and more effectively than their competitors.

We also think there is a fifth essential strand to the 10x story. We took the TRIZ Law of System Completeness as our start-point here – indeed, any story that describes any number of 'essential' elements where the number of elements isn't five, we become immediately suspicious of. Collins' four elements indeed turn out to be consistent with four of the five essential elements of a complete 'great by choice' system. The one he's missed (which is actually present in the data when you know what to look for) is the 'tool' element – which we interpret as the ability to deliver a 'more ideal' product or service to the target customer base.

These niggles (!) aside, this is a really nicely written argument for better ways of doing business and better ways to design the way in which businesses operate. There are a host of insights on offer, and the chapter and associated research on the role of luck in the success of organizations is nothing short of revelatory. Especially the concept of 'return on luck' – which, according to our interpretation of the data presented, might just be the biggest success driver of them all. Each of the 10x and comparison companies used as examples through the book had about the same amounts of good and bad luck over the years (luck occurs randomly, surprise!), the 10x companies did a far better job of capitalizing on their good fortune and minimizing the adverse consequences of their bad luck. Or rather, in the latter case, managed to somehow turn the bad luck into the next piece of good luck.

In summary, then, a real page turner. Even the appendices. And that perhaps says everything that needs to be said to recommend it unreservedly to all our e-zine readers.

Conference Report – Creativity In Action Conference 2011, Kilkenny

This 2-day conference was supported by a South-East Regional Authority initiative as part of the 'CIME' project, part funded by the European Regional Development Fund within the framework of the Ireland - Wales 2007 - 2013 INTERREG 4A Programme. It was convened at the rather wonderful Kilkenny Castle in the centre of Ireland on the 2nd & 3rd of November.

The overall aim of the Creativity in Action Conference was to promote investment in creativity and demonstrate the value and use of creative thinking to stimulate economy/growth/links in general environments of business and society. The purpose was to facilitate co-operation and cross fertilization between business, academics and experts in the fields of creativity & innovation.

The first day of the conference was aimed at micro and small businesses in Ireland, while the second focused on academics, politicians, agencies and associations, with keynote talks from, most notably, John Perry, Irish government minister for small business. The two-day bespoke Creativity in Action Conference was also intended to showcase the CIME Project outcomes and business impact to date, interlaced with the engagement of expert input on best practice and demonstration sessions via master workshops and plenary case studies. The aim was to bring together methods and tools from collaborative businesses and educations, which can be adapted to innovation and creativity in organisations.

In all, over 150 people turned out for the two days. Best of all were the number of small business success stories on show. Ireland has had a pretty tough time since the 2008 GFC, and it was really encouraging to see some of the very proactive responses now coming to fruition in its wake.

Darrell, The Mayor of Kilkenny and Tim Ogilvie (of 'Design Thinking' fame)

The CIME project (www.cimeproject.com) was set up to help small and medium sized enterprises to think in a more creative and innovative way in order to survive in the current challenging economic climate. The project helps such companies to become more efficient

and effective in managing their business(es) and explore new opportunities and new ways of doing business. It also helps them to respond to new technologies and trends as they emerge and adapt to changing market conditions.

The National Centre for Creativity (nc4c) is a proposed virtual centre of excellence for the research, understanding, development and promotion of creative thinking within the community, education, business and public sectors in Ireland for realising the potential of individuals and society.

Through the CIME Project, five Business Innovation Networks in the South-East Region of Ireland have been set up (one each in Carlow, Kilkenny, Waterford, Wexford and South Tipperary), each comprising 15 micro-enterprises across a broad range of sectors that are engaging in creative and innovative training techniques through a course of workshops, individual mentoring sessions and networking events.

Our presentation at the event was on the application of Systematic Innovation tools within and around the SME context (i.e. it contained lots of new and re-framed material). Part of the story as expanded upon in the second of the two articles earlier in this ezine. Our slides, along with those of the other keynotes may be found at the conference website: http://www.ciaconference2011.com/

Investments – 3D-Printed Bone

It looks like bone. It feels like bone. For the most part, it acts like bone. And it came off an inkjet printer.

Washington State University researchers recently reported having used a 3-D printer to create a bone-like material and structure that can be used in orthopedic procedures, dental work and to deliver medicine for treating osteoporosis. Paired with actual bone, it acts as a scaffold for new bone to grow on and ultimately dissolves with no apparent ill effects.

The authors report on successful in vitro tests in the journal *Dental Materials* and say they're already seeing promising results with in vivo tests on rats and rabbits. It's possible that doctors will be able to custom order replacement bone tissue in a few years, said Susmita Bose, co-author and professor in WSU's School of Mechanical and Materials Engineering. "If a doctor has a CT scan of a defect, we can convert it to a CAD file and make the scaffold according to the defect," Bose said.

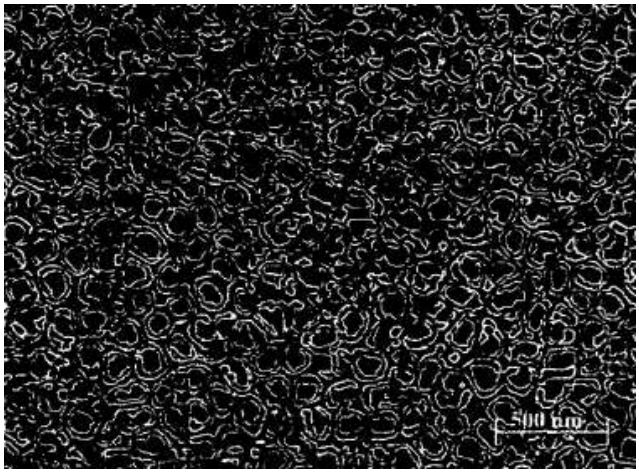
The material grows out of a four-year interdisciplinary effort involving chemistry, materials science, biology and manufacturing. A main finding of the paper is that the addition of silicon and zinc more than doubled the strength of the main material, calcium phosphate. The researchers - who include mechanical and materials engineering Professor Amit Bandyopadhyay, doctoral student Gary Fielding and research assistant Solaiman Tarafder -- also spent a year optimizing a commercially available ProMetal 3-D printer designed to make metal objects.

The printer works by having an inkjet spray a plastic binder over a bed of powder in layers of 20 microns, about half the width of a human hair. Following a computer's directions, it creates a channeled cylinder the size of a pencil eraser. After just a week in a medium with immature human bone cells, the scaffold was supporting a network of new bone cells. The research was funded with a $1.5 million grant from the National Institutes of Health.

The work represents another fascinating application of what we think looks set to be the next major step-change in manufacturing technology: the low-cost ability to create meta-materials.

Interestingly, in the case of the Washington team, they have already submitted a number of patent applications to hopefully ensure their place in the sector as it emerges and

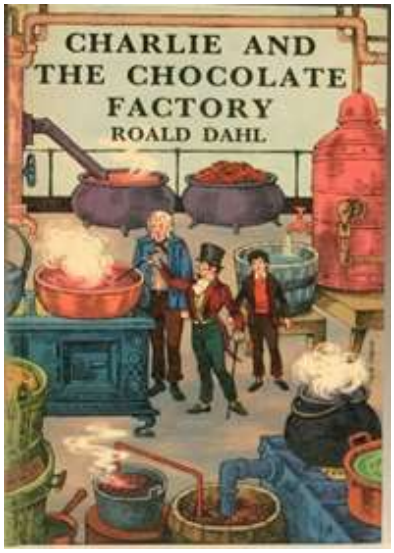
develops. In classic innovation deployment terms, very encouraging that the group have focused on a very high value niche where their lack of economise of scale are a relatively minor factor.



Key patent applications:

20090276056	RESORBABLE CERAMICS WITH CONTROLLED STRENGTH LOSS RATES
20090093881	MODIFIED METAL MATERIALS, SURFACE MODIFICATIONS TO IMPROVE CELL INTERACTIONS AND ANTIMICROBIAL PROPERTIES, AND METHODS FOR MODIFYING METAL SURFACE PROPERTIES
20090068272	MESOPOROUS CALCIUM SILICATE COMPOSITIONS AND METHODS FOR SYNTHESIS OF MESOPOROUS CALCIUM SILICATE FOR CONTROLLED RELEASE OF BIOACTIVE AGENTS

Generational Cycles – Willy Wonka



Book: 1964

Film: 1971

Film'; 2005

Since the first publication of Roald Dahl's children's book 'Charlie And The Chocolate Factory' in 1964, it has come to be recognized as a 'timeless classic'; a book that transcends the generations. The reality, however, is slightly different. Sure, the book is as popular now as it was upon its first publication, but if we examine the three main events in the dissemination of the story, we can see one or two subtle but – we propose – quite profound differences. They are profound because, being a story aimed at children, it touches people at a highly impressionable time in their lives.

The universal theme of both book and films is that nice children finish first. Poor (literally) Charlie wins his golden ticket to visit Willy Wonka's chocolate factory, and, being the nicest child among the group being shown around, he's the one that gets the whole factory handed over to him at the end of the adventure. Nice children get their due rewards.

Look a level deeper, however, and we can observe an important difference between the 1971 film starring Gene Wilder and both the original book and the 2005 re-make starring Johnny Depp. The important difference relates to a character called Arthur Slugworth.

In the book, Arthur Slugworth is one of Willy Wonka's rival chocolatiers. Slugworth, along with Wonka's other rivals Mr. Fickelgruber and Mr. Prodnose, sent in spies to steal the secret recipes to Wonka's treats. Having obtained these, he began making candy balloons that a consumer blows up to incredible sizes, and then causes to burst before eating them; a plagiarized invention. The work of Slugworth (along with the other rivals) came close to ruining Wonka's factory. Wonka was forced to close his factory and fire all his workers. A few years later, Wonka's factory began working again (operated exclusively by Oompa-Loompas) and his work continued to dominate the candy industry, with no rival able to plagiarize his work because using the Oompa Loompa as his workers enables Wonka to operate his factory without regular employees and keeping it off-limits to the public, so no spies can infiltrate. Slugworth is never heard from again, but it is stated that Slugworth, Prodnose, or Fickelgruber would each give their front teeth to enter Wonka's inventing room (a laboratory) for five minutes.

Move forward to the 1971 film. In *Willy Wonka & the Chocolate Factory*, Slugworth's company is in business. Inside Bill's Candy Shop, Wonka's products and signs are the

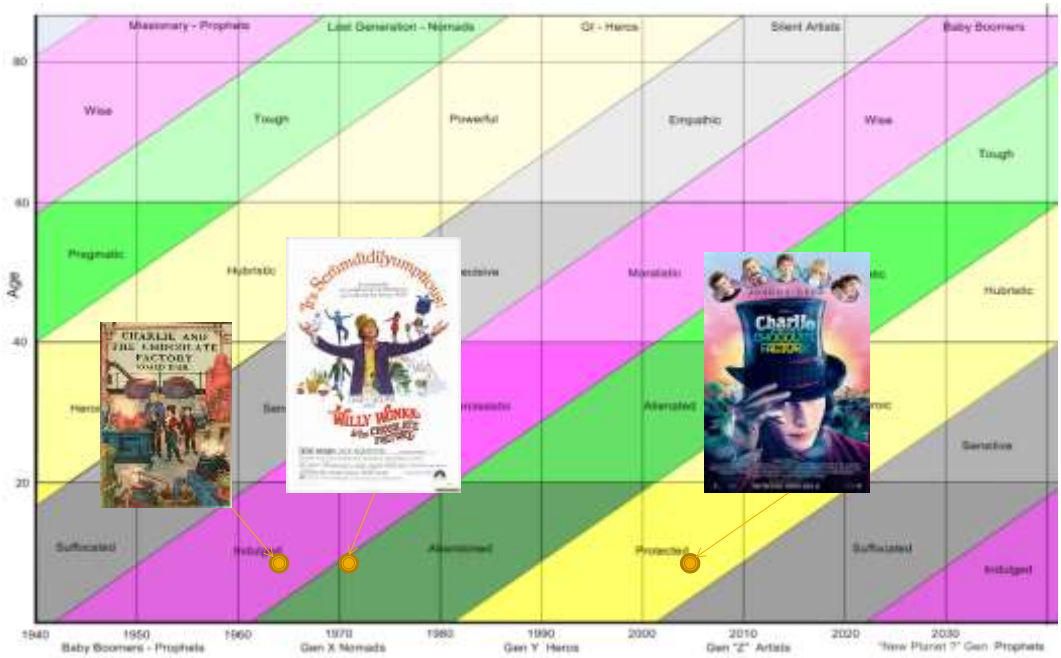
most visible; but Slugworth's Sizzlers are also prominently displayed, and one is even sold to a child called June Marie. Also seen are signs for Fickelgruber's candy. Grandpa Joe describes Slugworth as the worst of Wonka's rivals, telling Charlie that he was one of those who sent his spies in dressed as Wonka workers to steal Wonka's Recipes.

A man calling himself Slugworth becomes a prominent character in the film. As each Golden Ticket is found, a sinister man approaches the finder and whispers something into his or her ear. After Charlie finds the last ticket, the same man approaches Charlie as well, and delivers what is presumably the same speech he has given the other children. He introduces himself as Arthur Slugworth, president of Slugworth Chocolates Incorporated, and bribes the child to bring one piece of the newly-invented Everlasting Gobstopper to him so he can discover and plagiarize the formula. Two of the children respond to Slugworth's bribe. Veruca Salt crosses her fingers behind her back when Willy Wonka asks the children to promise not to show the Everlasting Gobstopper to anyone else. Mike Teavee asks his mother what secrets they can sell to Slugworth; his mother is also heard telling her son to keep his eyes peeled and his mouth shut. Grandpa Joe also responds near the end of the movie. After Willy Wonka snaps at him and Charlie Bucket for sampling Fizzy Lifting Drinks, (probably a final test by Wonka of character) Grandpa Joe threatens to give Slugworth the Everlasting Gobstopper. However, Charlie can't bring himself to betray Wonka and thus returns the Everlasting Gobstopper to Wonka.

Although at first it seems as though Slugworth is the film's main villain, Wonka eventually reveals at the end of the film that the man is not Slugworth, but a fellow Wonka worker named Mr. Wilkinson, and that his offer was a moral test of character.

Now spool forward to the 2005 film. Here Slugworth only makes a split-second appearance. He receives a secret recipe from Prodnose and is not heard of again. Examples of the plagiarization are shown, as is Wonka closing the doors on his workers, including Grandpa Joe. When Grandpa Joe meets Wonka, he tells him he used to work in his factory. Wonka does not seem to recognize Grandpa Joe, instead demanding if Grandpa Joe was one of the spies. When Grandpa Joe says that he wasn't one of the spies, Wonka says "Welcome Back."

So what?



First up, we can see that the book, 1971 film and 2005 film have each been influential to three different generations: The book was read by Boomer children: the Gene Wilder film was watched by young Generation X, Nomads, and the Johnny Depp film was targeted at Generation Y 'Hero' children.

What the Boomers and Generation were told was simply the 'nice children win' message. By bringing Arthur Slugworth into their story, the very clear subtext of the 1971 film was 'nice children win *because they don't sell out'*.

It's a distinction that we think carries an awfully large insight into the differences between Generation X and the generations around them. The Boomers protested and then sold out; Generation Y never knew anything other than selling out (see Idol/X-Factor, etc); but for the most part, Generation X never has. Not selling out has instead become something of a GenX life mantra; something that makes the generation stand-out from the others as being slightly (or a lot!) odd – indeed, we only have to see the way Johnny Depp (iconic Generation X!) plays Willy Wonka as a deeply off-kilter character to see how Generation Y has been taught to view the generation before theirs.

Not that Arthur Slugworth can take all the credit, of course, but just maybe he had a hand to play. As we often say, in any complex system, everything influences everything else, and sometimes apparently quite subtle differences can turn into some quite enormous outcome shifts.

For some other subtle but potentially profound differences between the generations resulting from the different interpretations of the book, check out:

http://en.wikipedia.org/wiki/User:Paul2387/Differences_between_book_and_film_versions_of_Charlie_and_the_Chocolate_Factory

Biology – Sperm Whale

“In the frigid, black depths of Monterey Bay mysterious monsters are killing fish with murderous death beams. Or so some scientists suspect.”

While it sounds like science fiction, new evidence provided by one scientist’s creative use of military and medical technology on a baby sperm whale – the one that died after beaching at Waddell Creek last July – supports the idea that the predatory whale has the hardware in its nose for generating and focusing lethal blasts of sound at its prey. "It’s the largest, most complicated nose in the world," said cetacean researcher Ted Cranford, who works for the Space and Naval Warfare Systems Center in San Diego. A full third of a sperm whale’s body is its nose, he said.

In an unprecedented adaptation of military technology, Cranford used the three-dimensional X-ray facility at China Lake Naval Weapons Station to scan the head of the newborn whale. The large China Lake scanning equipment was designed to accommodate huge rocket engines for structural integrity scans, but it’s also great for scanning whale heads, Cranford said.

Cranford processed the massive quantity of data generated from the scan with medical imaging software borrowed from a company called Vital Images, he said. The result is a multicolored, three-dimensional, dissectable computer model of the sperm whale’s head. "Now we can stand back and look at it on a computer screen and look at it any way we want to," Cranford said.

Not only is the result useful, it’s just plain neat, say marine mammal experts.

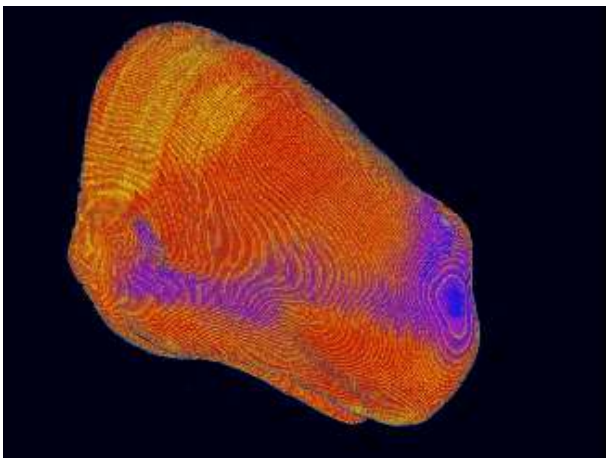
"It’s every bit as good as anything you’ve seen on National Geographic," said Dave Casper, a marine mammal veterinarian at UC Santa Cruz Long Marine Lab who helped orchestrate the collection of the whale’s head from the beach.

The inexplicably huge and complex noses of sperm whales have long been the object of speculation by biologists. Some scientists figured the nose serves as a flotation device used by the whale in its deep sea hunting dives. Others, like UC Santa Cruz’s renowned

cetacean expert Ken Norris, have weighed in with the idea that the nose is a sound generating organ that may focus sound waves to deliver debilitating blasts of sound at its prey.

Scientific ignorance about the sperm whale nose has hinged partially on the fact that no one had a good enough idea how a sperm whale head was put together and how all the mysterious anatomical machinery is arranged. That problem stems from the very practical problem of finding sperm whale specimens to study. "Sperm whales aren't uncommon," Casper said, "but sperm whales are deep divers" so when one dies it rarely washes up onto a beach. Being so near the deep waters of the Monterey Bay certainly played a part in why the baby sperm whale – with part of its umbilical cord still attached – came ashore at Waddell Creek beach, he said.

Before Cranford dreamed up the idea of scanning a whale head, researchers had no alternative but to rush to beaches where whales washed ashore and perform hasty dissections before decay ruined it or the tide came in. That was a difficult way to learn about whale anatomy, said James G. Mead, curator of marine mammals for the National Museum of Natural History in Washington, D.C. Not only was it hard work, but it was difficult to visualize how all the parts fit together in an intact whale, Mead said. Decades ago researchers started learning a lot about sperm whales by dissections done at whaling stations, Mead said. Since then however, getting information about these leviathans has been a matter of luck and timing. As a result, Cranford's scan is a breakthrough in cetacean study.



"You can see the relationship of structures in the head a lot better," said Mead about Cranford's scan. "It's a fantastic tool."

Mead's only criticism of the scan is that the resolution of the color images is somewhat poor. But that's because getting color images and a finer resolution would have required an overwhelming amount of data that would have been very difficult for anything but a supercomputer to process.

Despite this, the scan still provides extremely valuable information, he said. Among the most exciting revelations from the scan is the particular alignment of a series of mysterious structures in the sperm whale nose. The alignment supports the idea that they might be acoustical lenses, Cranford said. According to some researchers, such lenses might focus sound created by the whale – much like a glass focuses light – to create a stunning blast of sound.

"Sound can stun prey," Cranford said. And although no one has heard or seen a sperm whale actually zap a school of fish or squid, there is circumstantial evidence they can do it, he said. A nasal stun gun would explain, for example, why full-grown sperm whales that have injured or missing lower jaws have been found with bellies full of fresh fish, he said. With an acoustic paralyzer in your nose, fishing becomes more like grazing: just open your mouth and swim through stunned fish, then swallow, Cranford said.

To figure out if the mysterious nose structures are acoustic lenses, Cranford said he plans to take the information from the scan and create computer models to test whether the structures could physically function in that manner. But that project will take time and money that Cranford doesn't have right now. He's still thanking his wife for letting him spend their savings on the China Lake scan after scientific institutions told him his idea wouldn't work.

"They said it was impossible," Cranford said, referring to the reaction he got to his original proposal, which was to scan a gray whale head, Grant givers at the National Science Foundation and the National Geographic Society acknowledged that it was a great idea, he said, but not feasible. But now that Cranford has proven that the technique works. Mead hopes someone will try scanning other whale heads or perhaps an entire dolphin or porpoise. There is still so much mystery about the workings of our ocean-going cousins, Mead said, that more scans of any whales at all would be a tremendous scientific windfall.

The sperm whale, *Physeter catodon*, is the largest-toothed animal alive today. Some grow as large as sixty-two feet in length and weigh 50 tons. While larger whales, like the Blue, may filter small animals out of the water and consume them, the sperm whale is the largest animal that hunts and eats using its teeth.

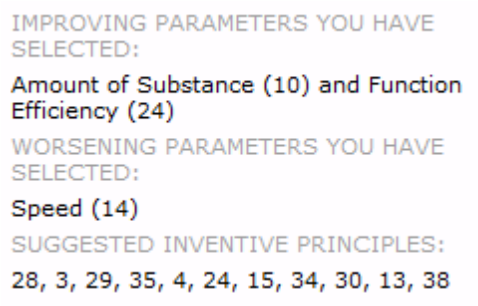
Sperm whales live in the cold northern and southern waters of the world and are believed to never venture into equatorial seas. For that reason, the arctic and antarctic populations don't interbreed.

For many years the sperm whale was the source for many valuable commercial items. Spermacetirc oil, a waxy material found in the head of the animal, was used in making candles, cosmetic oils, and fine lubricants. Ambergris *(right)*, found in the whale's intestine, was valued as a stabilizer in perfumes. Blubber, the fatty substance that insulates all whales from cold water, was an important source of oil.

Hunting sperm whales was a dangerous profession in the days before cannon-launched harpoons and motorized vessels. A small boat was lowered from the main ship and rowed quietly toward the whale. When close enough, a barbed harpoon was thrown into the whale's body. Sperm whales, enraged by an attack, have been known to turn on the boat, ram it with their heads, smash it, spill the crew out and crush the men in their powerful jaws.

Sperm whales, like all whales, have lungs and must come to the surface to breath (a whale spout is not water, but an exhale of warm, moist air that condenses in the colder sea air). They can submerge for as long as fifty minutes and dive as deep as 3,300 feet in search of food. Scientists suspect sperm whales hunt by using sound as a weapon. In the head of the whale is an organ called the spermaceti. As described earlier, scientists believe the whale can use this as a kind of "sound lens" in order to focus an intense beam of sound energy on a specific target (like a squid, or a fish). The explosive "crack" sound is enough to stun or kill the animal.

While the jury is still out on this sound ‘death-beam’ theory, one thing is clear. When mapped onto the Contradiction Matrix, the use of focused sound would be completely consistent with the most frequently used strategy (Principle 28, Mechanics Substitution – ‘introduce a field’) to solve the prey capture-versus speed conflict (‘speed’ because, at 50tons, the whale finds it difficult to accelerate to capture what is inevitably much smaller and nimbler prey).



Amazing too how several of the other suggested Principles point us in the same sperm whale evolved directions.

Short Thort

"My intuitive thinking is just as prone to overconfidence,
extreme predictions and the planning fallacy
as it was before I made a study of these issues."
Daniel Kahneman
(winner of the 2002 Nobel Prize in Economics)

News

Nagpur
With a following wind, it looks like we will be conducting Level 1 and Level 2, practitioner workshops in Nagpur, India in March and April next year. Although primarily for the benefit of VNIT, it looks like the workshops will also be open to the public. Details on the website.

Whispered Voices India
Speaking of India, it also looks like we will be conducting a tour of big companies (Reliance, Kingfisher, L&T for starters) in February. The trip is planned to culminate in a first convening of a TrenDNA, 'Whispered Voices' workshop in India. Dates are still fluctuating a little, but very likely to be during the first half of February.

Melbourne
Speaking of February, it also looks like we will be doing more public workshops in Melbourne. At the moment, the plan looks like a Sustainability focused event on 6-7 February and a more conventional SI one on 9-10 February….

Oman
…after we've run what we hope will be a series of 'educate-the-educator' workshops in Oman. Precise dates are still to be fixed, but 'January' looks like being definitive. Thanks to the country's Government for inviting us.

Duke
Our relationship with the Corporate Education arm of Duke University continues to grow, and we are pleased to announce another round of joint-client engagements in Germany, France, Mexico and India in the coming months.

Music PhD
If anyone is or knows anyone that is interested in music, software-programming and 'wow' composition, we're currently recruiting for a 3-year PhD programme we expect to be sponsoring starting from the first or second quarter of 2012. Enquiries to Darrell in the first instance please.

New Projects
This month's new projects from around the Network:

- FMCG – IP study
- FMCG – procurement cost-breakthrough reduction project
- Automotive – design study
- Chemical – new project development 'fuzzy-front-end' workshops
- Electronics – TrenDNA workshops
- Software – IP study
- Food – ApolloSigma IP strategic study
- Financial Services – IP valuation studies
- Wholesale – logistics-breakthrough workshops
- Oil&Gas – Eyes on the World workshops