Systematic Innovation

e-zine

Issue 152, November 2014

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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

Universal Hierarchy Of Contradictions

Whether one contradiction is more important than another depends to a very large extent on your perspective. If your job right now is to design a new fastening mechanism for a mobile phone case then clearly that's the most important problem in the world from where you (and your KPIs) sit right now.

But if you're the person in charge of innovation strategy for your enterprise, you need to take a more objective view of what's more important than what. To some extent even this ranking exercise is dependent on your context. Just because a given contradiction might be really important to a customer, doesn't necessarily mean there's anything you or anyone else in your organisation can do about it. But the fact that it's ultimately the customer that drives the relative importance debate means that, even if we can't fully accommodate what they want, it's at least useful to know where things sit in the natural order of things.

It's a challenge we've been thinking about for a long time. The most solid conclusion we've come to at the end of all of the blood sweat and pontification is that there's no such thing as an objectively provable model. Merely one that seems to be standing the test of time in terms of 'is it useful'.

Figure 1 presents the basic hierarchy as it currently stands:

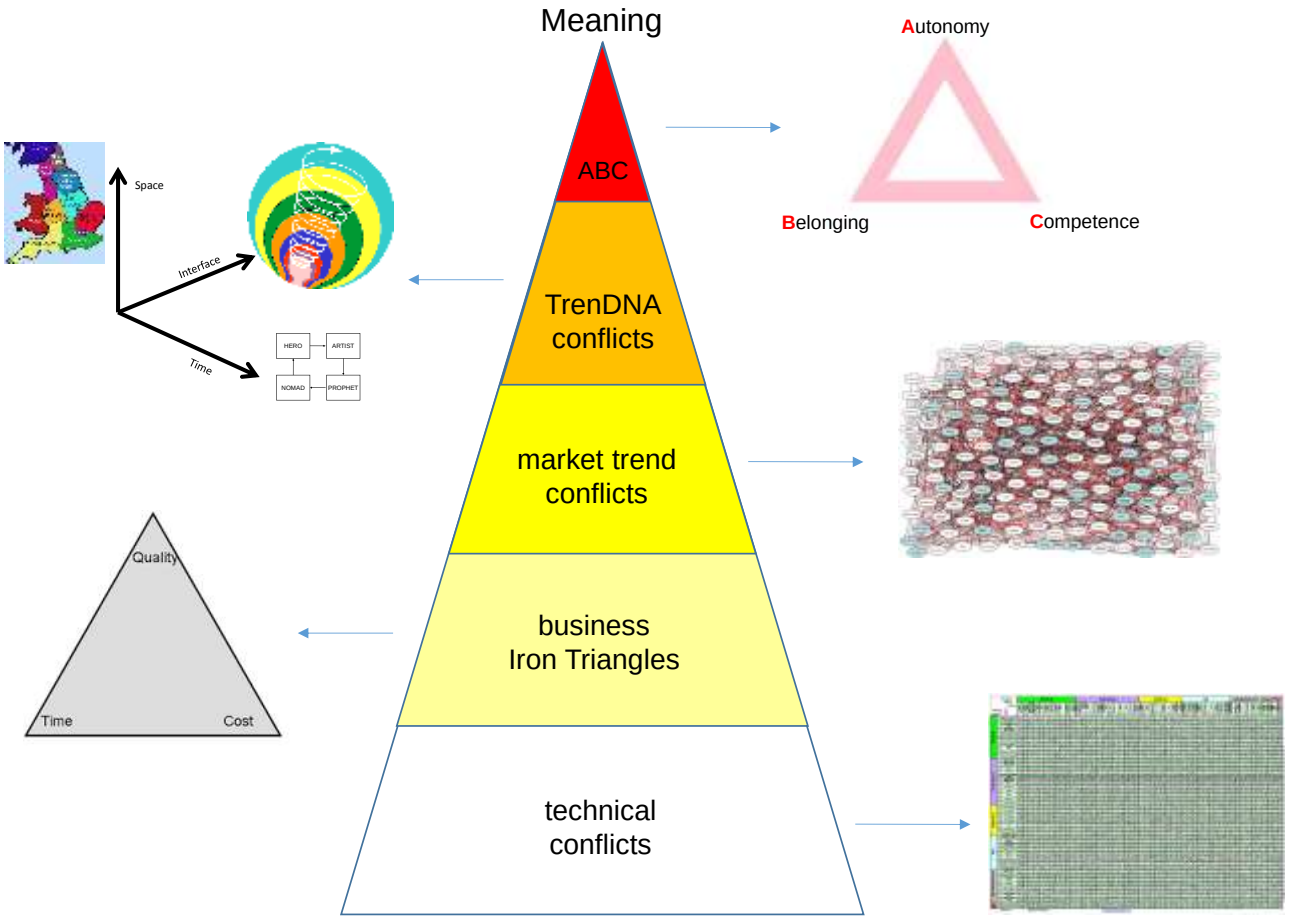


Figure 1: Universal Contradiction Hierarchy

Sitting right at the top of the hierarchy is ‘meaning’. Meaning being the main thing we all seek in life. Any contradiction that connects to our ability or otherwise to achieve meaning is as important as they come.

The first actual hierarchical level and the first opportunity to identify other things that might conflict with meaning, then, is defined by the Autonomy-Belonging-Competence (ABC) triad that defines our ‘self-esteem’ (Ezine, November 2013). Any one of these three could either conflict with meaning (‘I want to do something that is meaningful, but my lack of competence denies the possibility’), but any pair could also form a conflict. Figure 2 illustrates a triad of ABC conflict pairs:

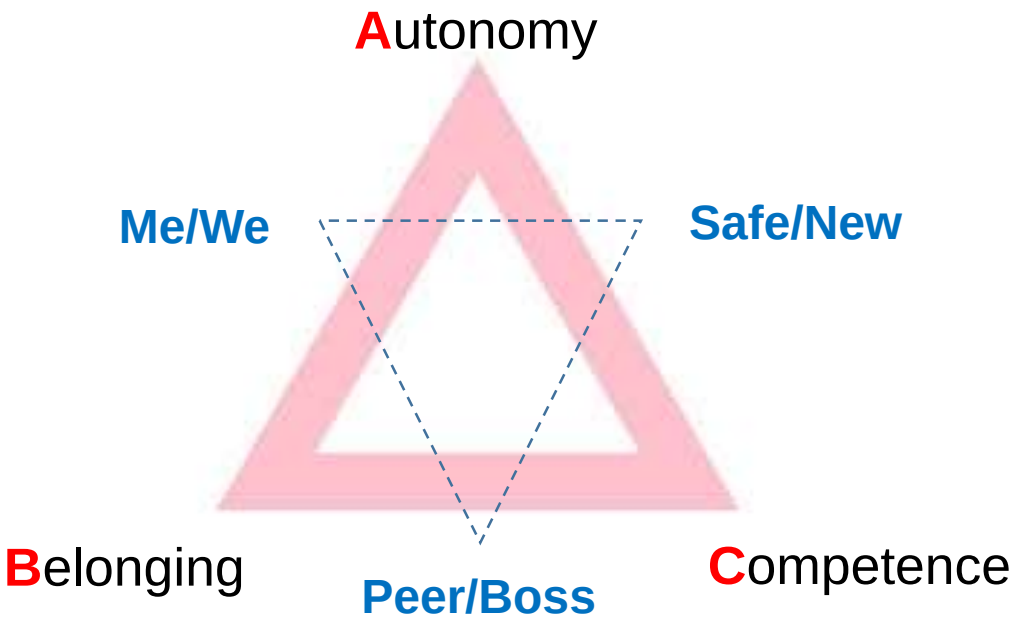


Figure 2: Autonomy-Belonging-Competence Conflict Pairs

Given that ‘meaning’ is often invisible to the naked eye, these three conflict pairs represent what most people will typically see as the primary life contradictions: at various moments in our life, we all want to be individual and part of the crowd; do exciting new things while remaining safe; and being above the tribe while still being a part of it. As we often find ourselves saying during workshops, any product or service that successfully solves one of these contradictions tends to be extremely successful (e.g Facebook and other social media web platforms allow us to solve the me/we contradiction – simultaneously being part of the crowd and also able to express our individuality.)

The next two levels of the hierarchy are in effect formed of a pair of jigsaw pieces emerging from the TrenDNA research. The whole point of the TrenDNA research was to try and uncover the underpinning DNA of social and market trends. The three main strands of that ‘DNA’, consistent with the recurring TRIZ theme of space-time-interface, turn out to be Cultural, Generational and Thinking Style related. And, per the TrenDNA methodology, when we can find conflicts between or across any of the segments defined within each of these dimensions (between Nomad and Hero generations for example, or between the Order and Scientific Thinking Styles’) represent big innovation opportunities.

If we can’t find contradictions at this DNA level (really?), the next level down the hierarchy becomes the main insight of the TrenDNA research: innovation isn’t about market trends, it’s about conflicts *between* different trends.

The universal hierarchy to this point has focused on ‘customers’ outside the enterprise. The rationale being that enterprise success comes largely through serving the needs of customers better than competitors do.

The final two layers of the hierarchy shift the focus to the innards of the organisation. If we can’t find and solve a customer-focused conflict, the next best thing is to look for some of the big enterprise conflicts. Which usually then means looking at the big ‘iron triangle’ ‘pick any two from three’ trilemmas.

If they’re beyond our reach, we’re left with the heart of the historical TRIZ contradiction territory: looking for pairs of things within our systems that conflict with one another.

Which takes us to the bottom of what might best be viewed as a pyramid: there being much more opportunities to tackle at the bottom than at the top, even though their overall impact will be inevitably smaller.

Importantly, finally, is a belief that the bottom ‘technical conflict’ layer of the pyramid is indeed the bottom. If we’re not looking for or solving contradictions at this level or above, the simple truth is we’re no longer in the innovation business any more.

Case Studies: Uber Part 1

A sure-fire sign that someone has just created a genuine innovation is that incumbent providers main response is to try and ban the upstart competition. Another is that these protests merely stoke the fires in such a manner that the growth of the new player goes exponential. The 'ride-sharing service' (some might say, 'app'), Uber, represents a pretty spectacular example of this kind of exponential virtuous cycle in action. Started in 2009 in San Francisco, the business is already deemed to be worth over $15B.

Wherever they go, the reaction seems to be the same: a great sigh of relief from customers, angry protests from incumbent taxi-drivers, and ecstatic shouts of 'freedom' from non-mainstream drivers. So what did the Uber people manage to get so right? And apparently with so little prior market research before they started?

As is so often the case in these types of breakthrough solution, the answer comes through looking at unmet or under-served customer needs. Which typically soon shifts towards examination of intangible needs. Of which, per our earlier article ('Universal Intangibles', November 2013), there are in effect just three that need to be taken in to consideration when designing a new anything. Figure 1 reproduces these three basic intangible needs we all carry:

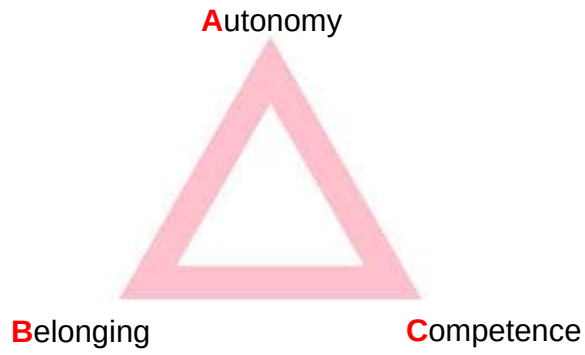


Figure 1: The ABC of 'Universal Intangibles'

The Uber case appears to reveal a universal truth related to this trio of emotional needs: breakthrough innovation is all about *each one* getting better. Or, put in more traditional TRIZ/SI terms, don't accept the trade-offs: it's no good improving one or two if to does so means the other(s) are allowed to get worse.

Even the simplest of ABC maps of the world of taxis before and after the arrival of Uber clearly highlights what their innovation has done for the customer:

	Pre-Uber Positives	Pre-Uber Negatives	Post-Uber Positives	Post-Uber Negatives
Autonomy	'I can afford to ride in taxis'	Customer hands over control over route to the driver (or potentially enters argument over who knows the route better) Customer experiences double-negative – if the driver goes the long way around I pay twice: once for the extra miles, twice for the lost time Embarrassment over if/how-much to tip	Fare, route, tip is all sorted before the customer steps into the cab = 'I stay in control' – if I'm not in control I don't get in!	
Belonging		Perception that drivers run a cartel that is not in the interests of the passenger	App-based and feedback based means that all passengers are now part of a self-organising eco-system. 'Peace of mind'.	
Competence	'empathic conversation' (possibly)	Driver has little or no inclination to allow the passenger to demonstrate they know best	App is cool, really easy to use and allows me to demonstrate to friends I'm 'ahead of the game'. I see the route, I decide whether a fare is fair or not	

Table 1: Intangible Pros and Cons Of Uber

Looked at through this ABC lens, the customer wins on every count. And because it's these intangibles that drive our behavior, it becomes as close to a no-brainer as things ever get when it comes to deciding whether to try Uber or not. In the old taxi world (Pink Taxi aside – at least they offer the (Belonging) intangible benefit of 'peace of mind') the customer only really had negative intangibles. Now they get green lights across the board.

If this all seems too simplistic to explain the success of innovators like Uber, conduct a similar ABC pros and cons analysis on every other breakthrough innovator (try Zopa or

other P2P lenders as a simple verification exercise), to see that what it's really trying to tell us is that we humans are emotionally rather simple. Put a net plus in every one of the ABC boxes we check off when we examine whether to shift from a current solution to a new one, and it's pretty much job done.

The only thing we're missing, in fact, is how much more or less each of the Autonomy, Belonging or Competence factors is than the others. And is there enough of an overall 'win' to justify the almost inevitable negative intangible associated with the reduction in Competence that comes with having to learn something new. Both of which are actually optimization jobs. And therefore the only time it's worth actually going to the trouble of listening to customers directly. Which is where we'll head in Part 2 of this article.

In the meantime, all you need to think about is 'am I improving A, B and C?' on your own projects.

Not So Funny – Chocolate Teapots & Banana Skins

I tend to be as forgiving as anyone when it comes to supporting the bluest of blue sky research. Every experiment, I tend to think, will deliver an outcome that will turn out to be useful at some point. Sometimes, though, it's a tad more difficult to see what that point might be. Or rather, I increasingly find myself thinking, given the number of real problems we can see around us in the world, shouldn't we all be focusing our attentions on things that don't all fall into the category of 'first world problems'? Enter a specialist team at Nestlé who revealed to the world last month their attempts to make real a previously mythical piece of culinary equipment, the chocolate teapot. Something that has become part of modern English usage as an insult (To wit: 'He's as useful as a chocolate teapot').

That the team succeeded in creating their boiling water holding teapot (and demonstrated it on prime-time television) is, I guess, some kind of testament to their thermodynamic skills. Even if the teapot only survived for a couple of minutes. But, really?

The Nestle scientists failed to win the coveted Ig Nobel Prize for all-round improbable research. This year's prize was won by a Japanese team to study the slipperiness of bananas in order to better understand why we always slip on them and perhaps explain why it's always funny. Or, at least, the experimental set-up is.

Fig. 2 Experimental set up with the coordinate of the detected forces

Other winners included a team that studied the brains of people who see jesus in toast as well as another team which asked whether it was mentally hazardous to own a cat.

Perhaps the best titled winners was the team which won the Art prize for 'measuring the relative pain people suffer while looking at an ugly painting, rather than a pretty painting, while being shot [in the hand] by a powerful laser beam.'

Here are a few other, ahem, tenuously viable research programmes:

Dog Restrainer
(Note the interesting backward jump along the
Dynamization trend relative to the previous solution, 'the lead')

Other research just seems like somebody forgot to turn on their brain when they set about designing their experiments:

Teenagers Lie About Sex: Say it Isn't So!
Young men tend to over-report their sexual histories by one partner, and young women tend to subtract one, Ohio State University psychology professor Terri Fisher found. She surveyed 293 heterosexual female and male college students — average age 18 — about their sexual histories. Her paper, published in the journal *Sex Roles*, claims that when attached to a fake polygraph test, both became more truthful. At least, that's what Fisher thought, as there was no way of checking the veracity of those statements either.

Nine Social People Have Different Brains Than Nine Not-As-Social People
People who have a wide circle of friends and who thrive in social situations *might* have more white-matter pathways in their brain. "It's unknown whether their brains were predisposed to social engagements or whether larger social networks prompted brain development," Oxford University neuroscientist Maryann Noonan said. Her research,

conducted at the Montreal Neurological Institute, involved scanning the brains of 18 participants and determining the size of their social network, based on the participants' versions of the number of social interactions they reported having during the previous month.

It's a flimsy conclusion that's drawn from comparing only nine allegedly social people with nine allegedly non-social people, and a continuum of sociality would make for even smaller samples. Moreover, how could one verify the respondents were reporting their social life accurately? How was the neurologist able to rule out the thousands of other possibilities for increased white matter in the brain? And since the white matter of the brain is composed of nerve fibers and myelin, it may just be that the social gadflies have more of the fatty sheath wrapped around nerve fibers *for insulation, rather than for connectivity.* Not so impressive.

I'll leave you to speculate on the potential usefulness of some of these images, taken from the final reports of some other alternative-reality research:

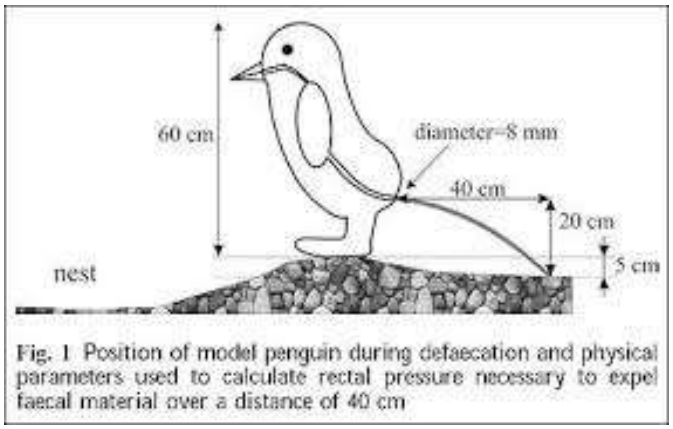
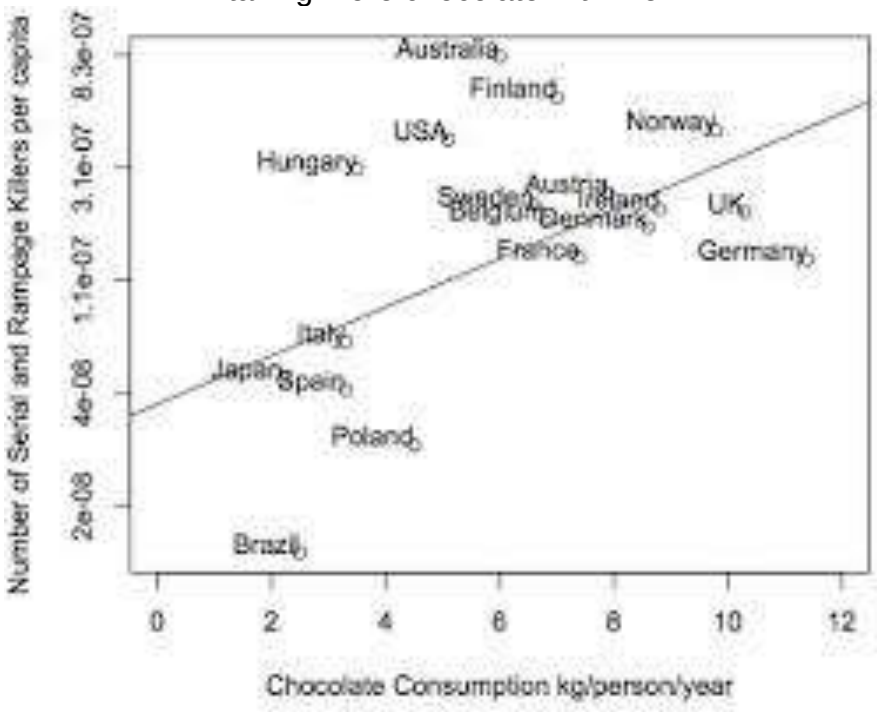


Fig. 1 Position of model penguin during defaecation and physical parameters used to calculate rectal pressure necessary to expel faecal material over a distance of 40 cm

Here's my favourite… to the extent I'm rethinking my next trip to Australia. Either that or taking more chocolate with me.



Patent of the Month – High Energy Storage Capacitor

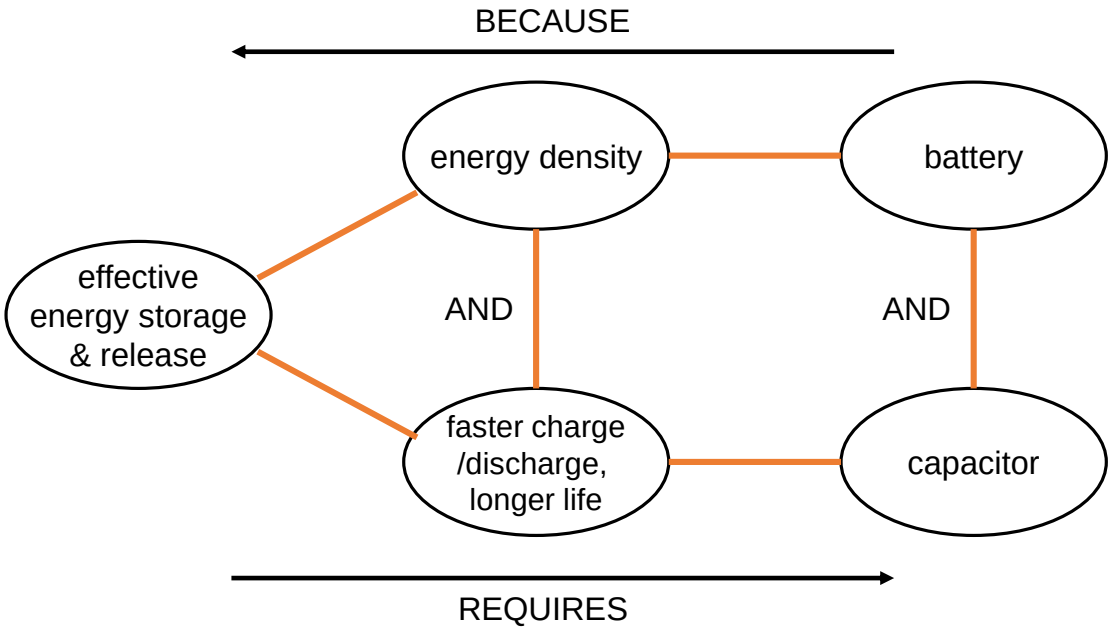
We head to a trio of inventors at Stanford for our patent of the month this month. US8,877,367, 'High Energy Storage Capacitor By Embedding Tunneling Nano-Structures' was granted on the 4th of November. As with most important solutions (and we think this one very definitely falls in to that category), the background description section of the disclosure document highlights the contradiction needing to be solved:

Energy storage is a crucial component of a large number and variety of electronic devices, particularly for mobile devices and electric or hybrid vehicles. Energy storage devices have been based on a wide variety of physical effects. For example, electric fields can be employed to store energy in capacitors, and chemical reactions (involving ion motion) can be employed to store energy in batteries. However, energy storage in a capacitor can be limited by the device geometry (e.g., 2-D capacitor plates having limited area), and batteries can have a slow response time due to the ion motion inherent in electrochemical reactions.

Battery powered devices such as hybrid or electric vehicles are often limited in performance by the low energy stored per weight in batteries. Batteries have low storage density due to the low voltage produced by electrochemical reactions and the large size and weight of the ions stored in the batteries. Slow ion transport in batteries also causes slow charge and discharge performance. Furthermore, the reliance of existing batteries on ionic transport causes high degradation rates of the batteries.

Accordingly, it would be an advance in the art to provide energy storage having higher energy density than a capacitor, faster charge/discharge than a battery and/or much longer lifetime than a battery.

All this makes it very easy to map the problem on to a conflict template:



And, therefore, as easy to map on to the Contradiction Matrix. Which I think would look something like this:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Power (18)

WORSENING PARAMETERS YOU HAVE SELECTED:

Speed (14) and Reliability/Robustness (35)

SUGGESTED INVENTIVE PRINCIPLES:

2, 35, 3, 19, 24, 15, 28, 12, 14, 1, 13, 37, 31

As to what the intrepid trio did to solve the problem. Or rather, 'make a step change advance' is:

Improved energy storage is provided by exploiting several physical effects individually or in combination. The first effect can be referred to as the All-Electron Battery (AEB) effect, and relates to the use of inclusions (Principle 24) *embedded in an active region* (Principles 3, 15) *between two electrodes of a capacitor. Electrons can tunnel to/from and/or between the inclusions, thereby increasing the charge storage density relative to a conventional capacitor. One or more barrier layers is present in an AEB to block DC current flow through the device. The AEB effect can be enhanced by using multi-layer active regions having inclusion layers with the inclusions separated by spacer layers that don't have the inclusions* (Principle 3)*. The use of cylindrical geometry or wrap around* (Principle 14) *electrodes and/or barrier layers in a planar geometry can enhance the basic AEB effect.*

Other physical effects that can be employed in connection with the AEB effect are excited state energy storage, and formation of a Bose-Einstein condensate (BEC). In excited state energy storage, the inclusions have excited states with higher energy than their ground states, and energy can be stored by transferring charge to the excited states. This effect can increase energy storage capacity. Although electrons cannot form a BEC because they are fermions, the bound electrons-hole pairs known as excitons that can form in semiconductors are bosons, and can therefore form a BEC. All-electron batteries can be configured to facilitate exciton formation and hence BEC formation. BEC formation is expected to increase resistance to field emission tunneling, increase dielectric constant, and reduce the ground state energy with the result that more energy can be stored in excited states before instability occurs.

Applications include grid energy storage, electric vehicle energy storage (EV or PHEV battery), portable electronics (laptop, cell phone, etc.), and troop gear/weapons, where the advantages include high energy density storage (possibly greater than 250 Whr/kg), high power density storage (.about.10.sup.8 W/kg), fast charge/discharge rate, and low degradation over time because there are no chemical reactions. Further advantages include no moving atoms/ions, and no risk of catastrophic, unsafe failure.

The present approach relates to a capacitor and an electron battery having very high storage density. Because the present approach relies on electrical energy stored as electrons instead of ions, small and light devices with high storage capacities are provided. Furthermore, electron transport allows for fast charge and discharge. The present solid-state devices can also have improved lifetime relative to existing energy storage devices. In this approach, energy storage is via electrons in bulk, as opposed to surface charges (e.g., conventional capacitors) or ions (e.g., batteries).

The last paragraph here perhaps offers up a suggestion that a profound step-change in thinking has occurred (or rather 'been demonstrated') in this invention. With improvements in performance measurable in orders of magnitude, I wouldn't be surprised if this patent carried with it the seeds of the much needed step-change what has long been the major bottleneck in the world of electronics: our ability to store and access all of our energy needs. Or, put another way, maybe this invention means I won't have to charge my phone twice a day any more.

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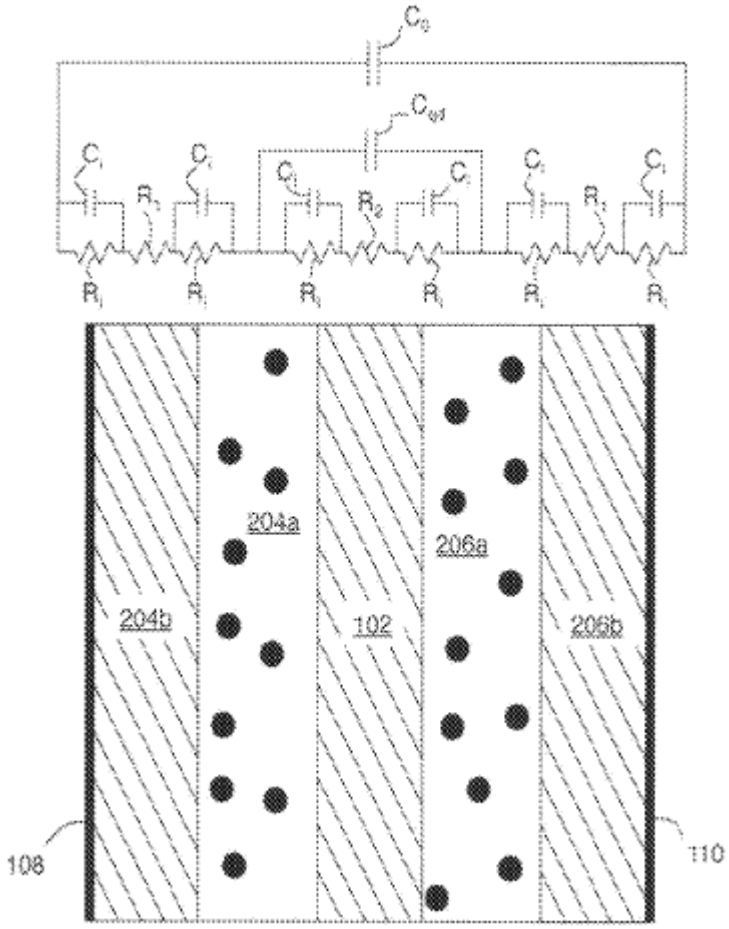
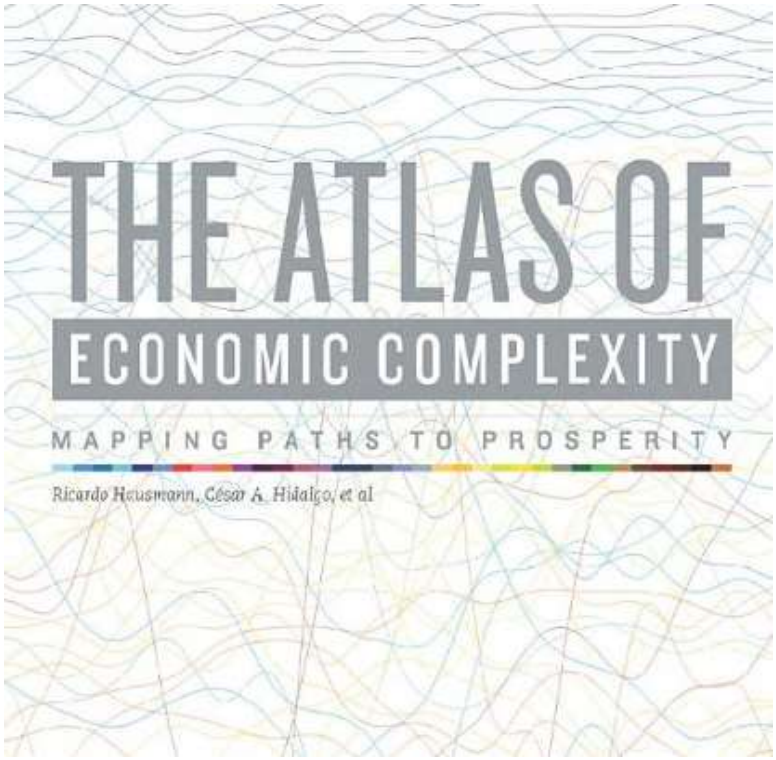


Best of the Month – Atlas Of Economic Complexity



Boy, has it been a struggle to find something to recommend this month. The ocean of compellingly-titled-but-meaningless-content-when-you-go-look Kindle-only books certainly doesn't do much to help the situation. Great that every aspiring author on the planet gets to share their opinions about the world so easily. Not so great that we all have to wade through acres of dross to try and find someone with an opinion worth listening to. It's a classic contradiction of self-organizing systems: when they first emerge, the cream hasn't had much time to rise to the top yet.

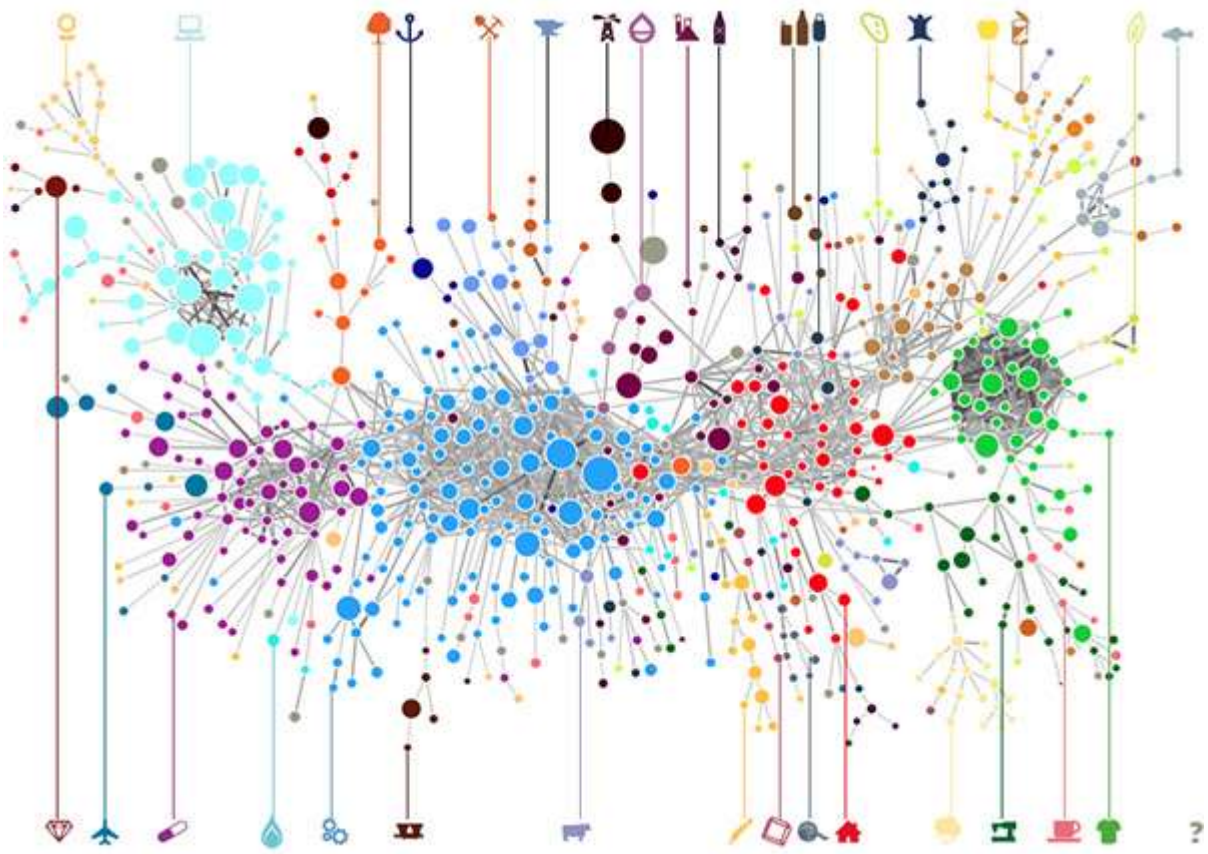
Not that the world of hard-copy publishing has much to say on the subject either these days. Albeit the contradiction of the editors they use is slightly different: how to spot the next big thing when stepping out of the box can be severely career-limiting if you get it wrong.

Which is all a long-winded way of saying that 'The Atlas Of Economic Complexity', even though it ends up being our choice for the month, is a long way away from any kind of breakthrough.

"Why do some countries grow and others do not?" asks the books advertising blurb. The authors of offer readers an explanation based on "Economic Complexity," a measure of a society's productive knowledge. Prosperous societies are those that have the knowledge to make a larger variety of more complex products they hypothesize. So far so good. Through the graphical representation of the "Product Space," the authors are able to identify each country's "adjacent possible," or potential new products, making it easier to find paths to economic diversification and growth. In addition, they argue that a country's economic complexity and its position in the product space are better predictors of economic growth than many other well-known development indicators, including measures of competitiveness, governance, finance, and schooling. And that's where everything

comes crashing down around our ankles. Because they've missed the critical insight that it's not so much the trends as the relationships between trends that drive how the future emerges, all of the predictions made and conclusions drawn need to be taken with a rather large pinch of salt.

On the other hand, the shear amount of raw data and the imaginative visualizations, make this a quite remarkable raw-data resource for those of us that do understand that it's the relationships between the data rather than the data itself where the innovation gold-dust lies. That's why you should think about adding the book to your Christmas list.



Oh, and by the way, if you're still not sure, the 2011 edition is now free at the MIT.edu website. Ho ho ho.

Wow In Music – Love & Affection

One of the difficulties of codifying ‘wow’ in music is that oftentimes the emotional reaction a listener gets comes as much from the lyrics as it does from anything that might be happening musically. Sometimes a lyric can be so good that it helps establish a fan-base for an artist that will endure for decades. Even if the subsequent number or extent of wows delivered is rather sparse.

A classic example of such a lyrical ‘wow’ is Joan Armatrading’s signature song, ‘Love And Affection’. Released in 1976, the song became Armatrading’s first hit, and even today, nearly 40 years later, the first two lines are often quoted as the best opening lines of all time.

"I am not in love, but I'm open to persuasion."

Per our current understanding of wow, what makes the lyric evoke the reaction it does is the unexpected build and release of tension. Firstly, the opening line, ‘I’m not in love’ builds an initial tension because the expectation of the listener is that most popular songs are love songs and this doesn’t fit (the band 10cc pulled off pretty much the same trick with their 1975 hit, ‘I’m Not In Love’). But then along comes the second line to shift the listener in a different – also unexpected (Principle 17) direction.

If that wasn’t enough (it did make her career after all), having built this intriguing frisson, the song then continues the listener along a bigger emotional arc: It's an emotionally naked song, not just in being about being on the cusp of having sex with somebody you're in love with for the first time, but in the way it takes us into the singer's inner life; solitary thoughts, reflections to bolster a fragile ego ("I got all the friends I need", thank you very much), doubt, fear... the thoughts then swept over by feelings which lie beyond rational expression.

This uncomfortable sense of inner life is supported by the melody and the arrangement. The mood established by the cat's cradle acoustic guitar in the introduction makes you think that you've been listening to something quiet, until you remember all of the details that were subsequently added; the brooding *Jaws* string section, sonorous percussion, the

two sets of backing vocals, and that alto saxophone.

"Thank you. You took me dancing."

The object of the song is that uneasy figure, someone who you are sure is a friend, might be something deeper, but might not remain a friend if you articulate that wish to them. The complex interpersonal politics of such complexity - and what might be won - are articulated in the song;

"Now I got all
The friends that I want
I may need more
But I shall just stick to those
That I have got
With friends I still feel
So insecure..."

and

"With a friend I can smile
But with a lover I could hold my head back.
I could really laugh...
Really laugh..."

What's missing is an elemental force that should feel simple, good, entirely natural;

"Now if I can feeeeeeel the sun in my eyes
And the rain on my face
Why can't I
Feeeeee-eeeel love?"

(A word of praise for old-fashioned singing that has the confidence to hold a note here. This is precisely the sort of vulnerable song that you most dread being given an X-Factor-style doing-over.)

As the hour of reckoning comes closer and closer, both the song and the vocalising become ever more disjointed and ecstatic, finding joy and meaning in repeating the words for their sound and meaning;

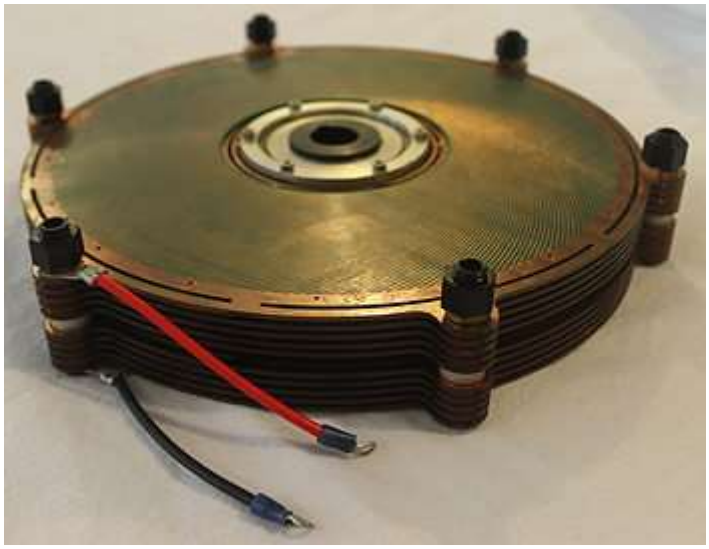
"I can really love
Really love
Really love
Really love
Really love
Love love love love
Love love love love"

Two unexpected musical surprises occur in this song. The male hipster voice that speaks "Give me love!" at 1.45 is odd - and a bit silly - the first time that you hear it. I always imagine that this was a record company imposition, put in there to make the record fit more into a more specifically black, and more explicitly pop, soul idiom and to prevent the listener from subconsciously suspecting that it’s a song sung by one woman to another. But if you accept the convention that it’s an unconscious articulation of the singer's inner thoughts, rather than think of it as being the enthusiastic response of the loved other, then it doesn't jar.

The sudden appearance of that saxophone at 2.50, however, is crucial and glorious. A non-verbal articulation of the realisation that, yes, this *is* going to happen. It's evokes those moments when a tangible, physical, sense of emotion breaks through; crying, being held or kissed, sexual arousal, noticing that you're drunk by now. In their unshowy way, the vocals become unabashed thereafter; she's crying "You know what I like!" by the end.

It's only a small-scale story of finding somebody, but it always feels like a remarkably brave song to me.

Investments – Electrostatic Motor



An American start-up company is developing a novel motor technology that harnesses electrostatic forces instead of electromagnetism. Wisconsin-based C-Motive Technologies predicts that its technology could produce the lightest, most reliable, energy and cost-efficient electric motors, and non-contact power transfer devices, on the market. It adds that its C-Machine motors will produce high torque at a lower cost than any other motor available or under development.

Rather than relying on magnetic fields to create mechanical motion, the technology harnesses the electrostatic (static cling) force of electric fields. C-Motive's motors use this force to align closely stacked stationary and rotating aluminium plates.

"We have proven the concept of a new motor that uses electric fields rather than magnetic fields to transform electricity into a rotary force," explains the company's co-founder, Dan Ludois, who is also an assistant professor of electrical and computer engineering at the University of Wisconsin in Madison. The development could solve a number of practical problems while saving money, he adds.

A C-Machine motor is smaller than a conventional motor, operates without a gearbox, and eliminates the need for copper windings, electrical steel laminations and rare-earth magnets. It is designed to run at 95% efficiency, cutting losses by a factor of three compared to conventional motors. It is also low-maintenance because it is built from low-cost stacked and recyclable aluminium plates that are flexible and adjust themselves automatically, almost eliminating the need for downtime and cutting repair costs.

Electrostatic motors are not new. Benjamin Franklin and others described and built motors based on electrostatic forces in the 18th and 19th centuries, but none achieved practical operation.

Since the widespread adoption of electric motors more than a century ago, magnetism has been the only practical source of rotation. However, Ludois and his colleagues believe that advances in materials, mechanical engineering and manufacturing techniques could now revive the electrostatic motor.

When Ludois was working on his PhD thesis in 2011, he realised that instead of relying on magnetic fields, he could achieve a similar result by manipulating electric fields to create a motor based on electrostatic attraction.

In 2012, Ludois and two other PhD students set up C-Motive to develop and commercialise his ideas. The company's non-contact capacitive power conversion technology allows power to be transferred wirelessly and could replace high-maintenance slip-rings and brushless exciters while improving control over electric machinery. C-Motive says that its innovations allow electrical charges to be stored in high enough densities to produce practical motion on an industrial scale. The secret rests in a patented technology which controls and harnesses these potentially unwieldy forces. The technology occupies half the volume of a standard brushless exciter and weighs a tenth as much.

Generational Cycles – Unmet Needs

Given that the underpinning DNA of the generation cycle model of Strauss & Howe is the transfer of influence from parent to child, it can often be as revealing to think about what patterns of influence *weren't* passed on from one generation to the next. "What did you need from your mother and father or primary caregiver(s) in the first ten years of your life that you did not get? Meaning "What was your parental unmet need in the first ten years of life?"

If we look at the archetypal answers to these questions for the four main generations, here's what we will find:

	main unmet needs (perceived)..	Resulting in…
Prophets	**…Strong role model, being told 'no'**	Selfish, self-importance, lack of trust of authority figures ('look after number one')
Nomads	**Attention, guidance, feedback**	180degree reversal when they become parents ('I won't let that happen to my kids')
Heroes	**Boundaries, authority figure**	Strong sense of entitlement and 'I know best'
Artists	**Freedom to explore, fail and learn important life skills**	Thin-skinned adulthood, indecisive, unsure, surrendering to easy option…

As shown in the right-hand column, each unmet need results in some form of compensatory behavior when that generation become parents. The four-generation repeating cycle is in no small part driven by this shift in unmet needs and course-changes when each generation grows up.

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Biology – Gannet

Over the course of evolutionary time, nature has proved its ability to re-invent the wheel many times over. In no small part because there aren't ultimately that many problems that a living organism has to overcome. Lots of things have had to learn, for example, how to survive repeated head impacts. Rams and woodpeckers are scrupulous in the precise, single-direction fashion in which they smash their heads into things, whether trees or one another: The aim is such that there's very little side-to-side torsion exerted on the brain, none of the movement that induces whiplash injury and other kinds of damage.

Gannets have solved a similar problem, albeit, they've evolved a slightly different strategy. These magnificent black-and-white seabirds, with wingspans of as much as six feet, catch fish by spectacular dives into the ocean. Starting from heights of 100 feet or more, they enter the water at 60 miles an hour and hurtle downward far beneath the surface, pursuing their chosen fish underwater, like penguins, using their wings to swim.

It's an awesome performance — not least because they are so successful as hunters: they are eagle-eyed (if the avian metaphor may be allowed) and they have, unusually for birds, true binocular vision, which helps them lock on target. If lucky, they will consume the fish while still underwater, only eventually bobbing back to the surface to take off, something they do very clumsily, and resume high-altitude patrol.

However, their fishing success is one thing. Their survival is quite another. To dive into water from 100 feet may not be lethal for a gannet, but it would, or should, get a fearful migraine. Yet that doesn't seem to happen. Gannets manage to bob to the surface with all their mental faculties intact, their brains entirely unhurt.

And how?

Here's what the Contradiction Matrix might have to say about the challenge:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Stress/Pressure (19)

WORSENING PARAMETERS YOU HAVE SELECTED:

Speed (14)

SUGGESTED INVENTIVE PRINCIPLES:

35, 17, 24, 13, 6, 14, 29, 36

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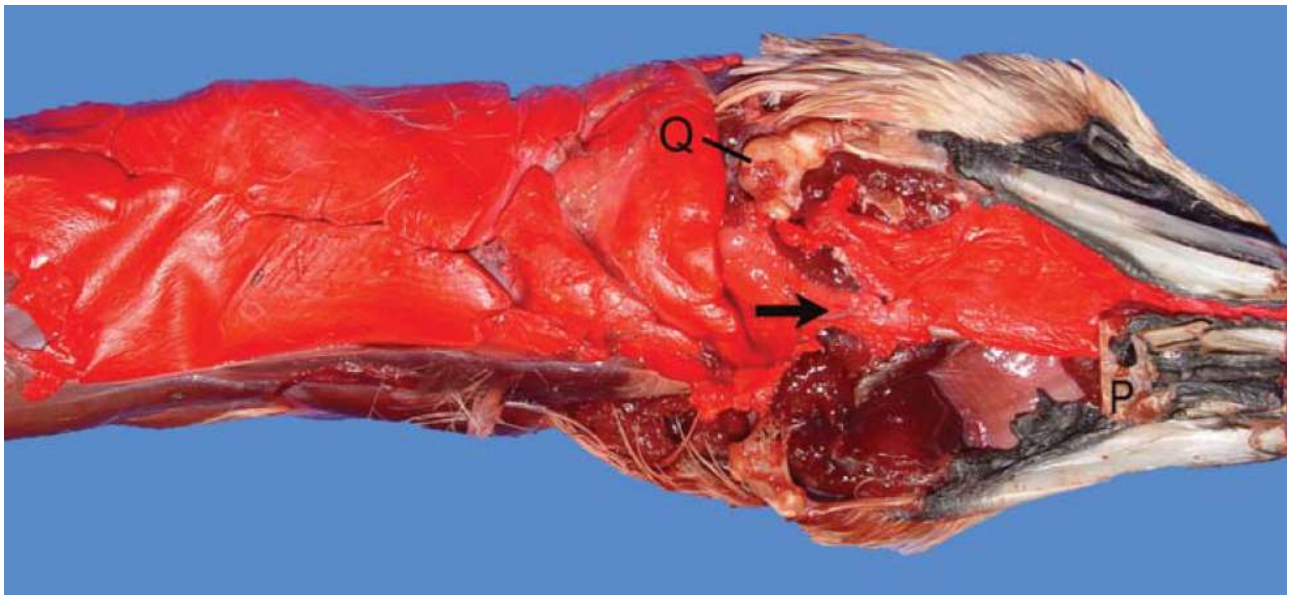
And here's what skull modifications evolution has come up: to mitigate the brain-shattering trauma of a 60-mile-an-hour collision with a wall of water, air sacs (Principle 29) built into the gannet's face act as cushion; it's extremely long and narrow beak (Principle 17) helps the bird enter the water with only a very stealthy kind of impact; and it has no nostrils that would allow water to gush inward and do serious damage to the delicate tissues inside. A gannet's skull is built like the nose of a Concorde: strong, delicate, unpierced, and able to tilt downward on landing but hold straight ahead when passing at great speed through the water.

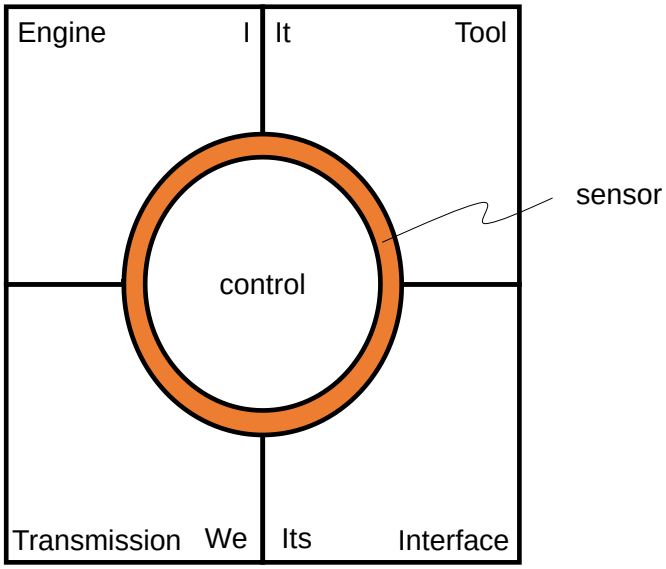
Finding a photo of the clever air-sacs turns out to be quite difficult. The best reference for anyone wanting all the gory details is here: http://www.seabirdgroup.org.uk/journals/seabird_21/SEABIRD%2021%20(2008)%20Daoust%20et%20al.64-76.pdf

Here's the sort of thing you'll find there:



Short Thort

Most Big Data Analytic companies start life in the world of measurement.
They quickly learn how to measure things.
Patient experience. Punctuality of trains. You name it.
Except. They rarely ever make the transition to making meaningful measurements.
A meaningful measurement is one that enables a meaningful action.
Meaningful action is about improving a system.
Improving systems means relevant connections between what's being measured and the levers that can be applied to change something in the system.



The only way to ensure the measures are connected to the available (or designable) levers is to design the measures in cooperation with everything else in the system.
Meaningful measurement, therefore, starts with people that:

a) Understand systems
b) Understand what 'insight' is
c) Know how to design solutions responding to that insight

Complex systems: everything connected to everything else.

News

SI HQ

As of 1 February 2015, the UK headquarters of Systematic Innovation moves to The Old Vicarage in North Devon, and we will be saying a fond farewell to the ChangeHub in Clevedon. It's been a happy 8 years, but we've now outgrown its four walls and need something bigger. Especially now the builders have finished doing what they needed to do at the Vicarage.

India

In addition to our short trip to India in December, it looks like we'll be back again in February and June 2015, conducting a combination of public workshops and in-house

projects. The itinerary is currently looking like it will include Mumbai, Bangalore and Pune. If anyone is interested in having Darrell come and do something during either trip, please let us know in the next month or so.

GenerationDNA
Apologies to all 'advance-ordering' readers of the new book for the delay in getting the finished product out and on the shelves. A combination of printer backlog and Darrell-project-overload has meant that we're now expecting a January 2015 launch. We're running a public GenerationDNA workshop in Exeter at the beginning of February, which we expect will mark some kind of official launch.

IRDG
We are happy to announce that the formation of an exclusive agreement with the Ireland-based Industry Research & Development Group to offer Irish companies our ICMM and SI services. The first scheduled event will be an ICMM public launch event in March 2015. More details as they emerge. In the meantime, we are very happy to be a part of what we think makes for a very compelling win-win-win collaboration.

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

FMCG – Bespoke software design
Healthcare – intelligent (PanSensic) network management project
Medical Devices – Trendstorming workshop series
Transport – TRIZ workshop series
Financial services – TrenDNA 'real voice of customer' project
Conglomerate – innovation strategy project
Financial services – due diligence consulting agreement
FMCG – strategy and new-product-development study (SME)
FMCG – Evolution Potential study
Automotive – SI certification programme