Systematic Innovation

e-zine

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In this month's issue:

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

Chief Contradiction Officer

Back in December, we reviewed the book, 'Dealing With Dilemmas'. The book represents one of the first serious attempts to examine enterprises, and more specifically the management of enterprises through the lens of contradiction. Author, Frank Buytendijk, identified six key contradictions that businesses need to address. The six came through an examination of the conflict between what he identified as the key silos that exist within a generic organization. While we liked the basic idea, because Buytendijk didn't have the advantage of knowing any TRIZ/SI, his model suffered since it missed a couple of significant parts of the story. When we apply the Law Of System Completeness to define the minimum number of elements that need to be present in order for any enterprise to function, we know there need to be a minimum of six elements. Then, if we take the Buytendijk's idea that the core contradictions inside any organization occur *between* the essential elements, we end up with fifteen fundamental contradictions. Something like this:

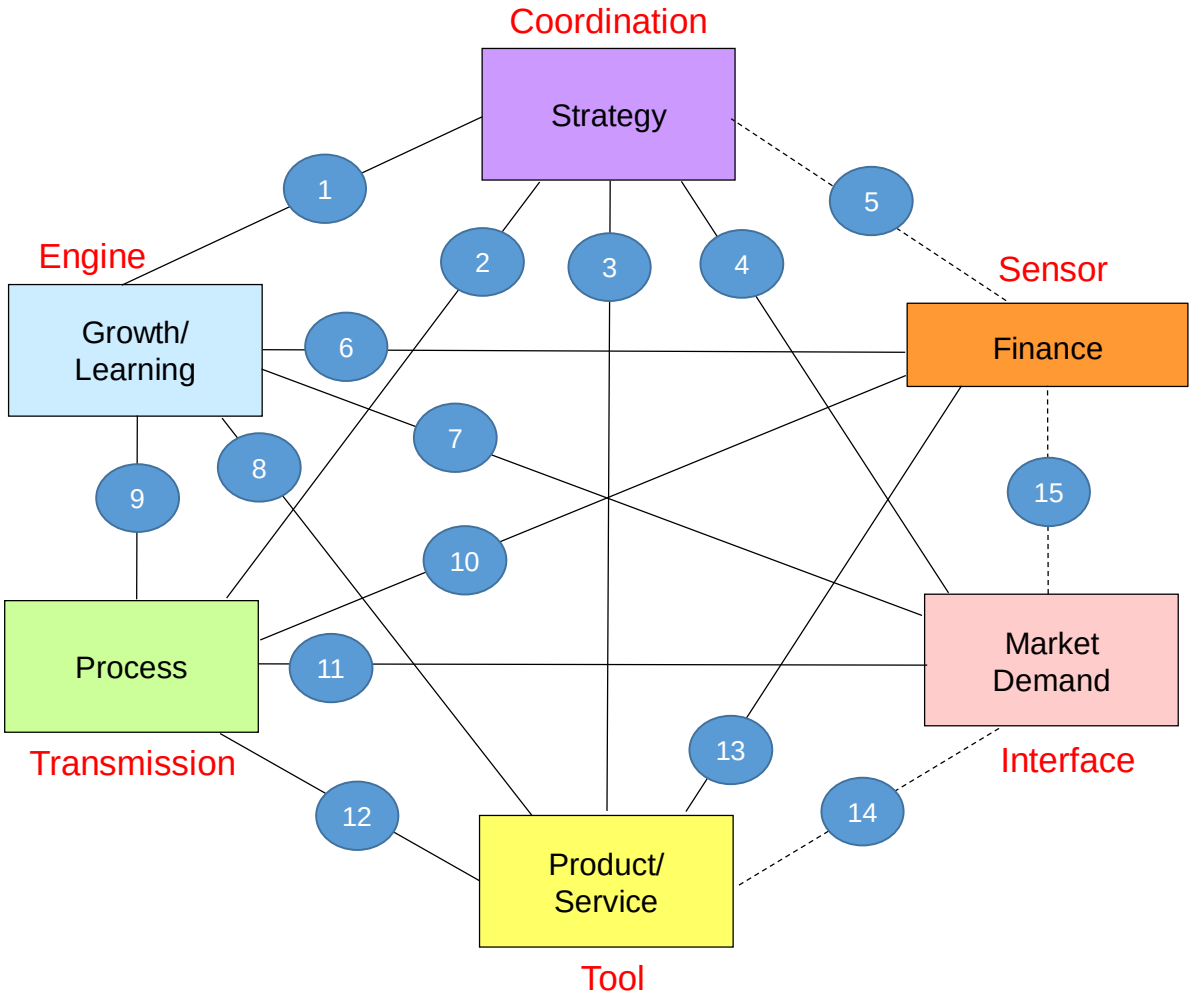

Figure 1: Fifteen Fundamental Enterprise Contradictions

Next up comes the search to identify what these contradictions are in more tangible terms. We can take our start point here, again from Buytendijk. The key contradiction between the 'growth/learning' (Engine) element of the enterprise and Finance (Sensor) –

contradiction number 6 in the Figure – is that between the long-term and the short-term. In that the principal role of Finance is to look after today's money, while the job of the growth/learning parts of the enterprise are all about creating tomorrow's revenues.

Here's what we think the other 14 fundamental inter-element contradictions look like:

	Between	Core Contradiction
1	Coordination-Engine	**Stability v Dynamic**
2	Coordination-Transmission	**Top-Down v Bottom-Up**
3	Coordination-Tool	**Sustain v Disrupt**
4	Coordination-Interface	**Reductive v Expansive**
5	Coordination-Sensor	**Action v Interaction**
6	Engine-Sensor	**Long-Term v Short Term**
7	Engine-Interface	**Listen v Lead**
8	Engine-Tool	**Optimise v Innovate**
9	Engine-Transmission	**Insource v Outsource**
10	Transmission-Sensor	**Fixed v Variable**
11	Transmission-Interface	**Inside-out v Outside-in**
12	Transmission-Tool	**Past v Future**
13	Tool-Sensor	**Open v Closed**
14	Tool-Interface	**Means v Ends**
15	Interface-Sensor	**Value v Profit**

Table 1: Fifteen Core Enterprise Contradictions

Hopefully, most of these contradiction pairs will sound fairly obvious. That said, in our experience working with many of the world's biggest organisations that no-one ever seems to be responsible for managing any of them. In the majority of situations, I think there is an implicit assumption that these contradictions are 'inherent' and that there is nothing that can be done about them. In a similar majority the contradictions have either always been invisible or have allowed to become invisible.

At best, when we see organisations heading towards a crisis, we will find assorted types and form of 'tiger-team' or 'rapid-reaction-force' established to tackle, for example, 'out-sourcing', or 'profit-maximisation'. The problem with these kinds of mon-istic management strategy is that they tend to deliver success along the nominated direction, but unfortunately at the expense of another dimension. And so, sadly, we end up with cost reduction programmes that end up increasing costs, bottom-up 'empowerment' initiatives that alienate everyone at the bottom of the pyramid, and so on.

If TRIZ teaches us nothing else, it is the importance of solving the problems that exist *between* contradicting parameters. What enterprises need, I believe is a Chief Contradiction Officer (CCO): a person positioned above all of the silos and tasked with actively challenging these 15 core contradictions.

Even the smallest enterprise these days is a complex web of hierarchically nested interdependencies. The Law Of System Completeness needing to be satisfied at each and every level of that hierarchy. Which means someone needs to be responsible for contradictions all the way up to the top and all the way down to the bottom. The CCO is the person who needs to be responsible for coordinating all of them. But then, specifically, needs to be able to sit above all of them, actively leading the 'Top 15' described here.

We first introduced the concept of a CCO in the Innovation Capability Maturity Model (ICMM). We introduced it as an essential role in any Level 4 or 5 enterprise. Putting innovation on one side and looking more holistically at the enterprise as a whole, the more we see the incredibly high levels of fragility in most of the management teams, the more we think the CCO role is needed in all forms and Levels of enterprise.

Principle 3 Deep Dive

A couple of months ago we did an analysis on the case studies we've been involved with during the past few years. Projects that have either been our own, or ones where a client has asked us to participate in the solution generation activities. When it comes to contradictions and contradiction-solving, it seems that we have consistently had our biggest successes coming through solutions generated with the assistance of Inventive Principle 3, Local Quality.

I don't think this was a particularly big surprise to me, since Principle 3 is one of my standard 'go-to' solution strategies, and has been so almost since I even knew TRIZ existed. What has been surprising is the reaction we often receive from others when we say these words. Principle 3, the replies usually go, isn't that one of the really abstract Principles? From which I interpret, 'difficult to use'. I can see that this might be the case. It is generic. To me that's where a lot of its power comes from. But then again, if you're a person that doesn't have the opportunity to use TRIZ and the Inventive Principles every day, then perhaps 'abstract' is a problem. I thought I'd take the opportunity in this article to dig a little bit deeper into why I think Local Quality is one of the most powerful of the Inventive Principles.

To start the story, it seems relevant to head back a few years to an article we produced for the December 2004 issue of the ezine (Reference 1). The article was an attempt to help newcomers get the best out of all 40 of the Principles. It did so by making the point that each of the Principles comes in two parts: a connection part and a direction part – Figure 1:

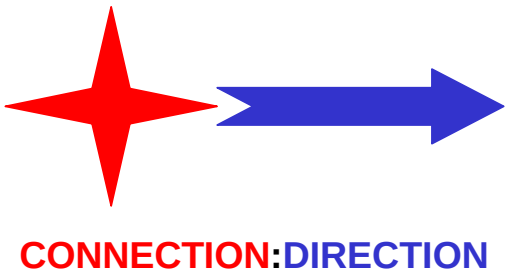

Figure 1: Connection:Direction Solution Generation Strategy

What this means is that, when we're looking to use the Principles as a provocation to move us away from an existing solution to a productive new one, it works in two stages: the first stage requires us to make a connection between the entity we're trying to improve and the Principle. The second stage then requires us to use the direction part of the instruction to alter the part of the entity we connected to. For Principle 3, the connection and direction elements are reproduced from Reference 1 here:

3, Local Quality	A uniform/'homogenous' entity Something uniform around the system Different parts of a system	Make it non-uniform/non-homogenous Locally optimize each Different (possibly opposite) functions

Let's look at a couple of examples to see how the SI team will look to use this Connection:Direction method to generate large numbers of ideas. The main point at this stage being an emphasis on 'large numbers'. In any creative process it is always important to separate the job of generating ideas from the (subsequent) job of evaluating those ideas. The usual rule when we're in 'generation' mode is that we should be looking to make at least a dozen connection:direction provocations for each of the Inventive Principles we use. If we're being tough on ourselves – something we're very likely to do when it comes to Principle 3 – the rule is twenty.

First up, let's examine a simple product-based example. The fork. In theory a near universal artifact that has had hundreds of years' worth of evolution. And yet, when we start the process of thinking about fork improvement ideas using Local Quality, and we look to connect aspects of the fork that are 'uniform' or 'homogenous' we can quickly find there are many:

Homogenous material
Constant thickness
Inner tines same shape
Outer tines same shape
All tines the same length
Tine-walls parallel
Gap between tines homogenous
Constant radius of curvature on head
Tine tip geometries all the same
All surfaces have same surface-finish
Inter-tine surfaces are smooth
Smooth handle surface shape

Figure 2: Fork 'Homogeneities'

There's 12 evolution opportunities already, but still not 20. Now let's zoom in and look at the micro-detail and see if there are more homogeneities:

Young's modulus – same everywhere
Poisson's Ratio – same everywhere
Surface energy (hydrophobic/hydrophilic) – same everywhere
Surface hardness – same everywhere
Coefficient of thermal expansion – same everywhere
Density – same everywhere
Colour – same everywhere
Friction coefficient – same everywhere
Stiffness – same everywhere
Strain rate – same everywhere

…and there's another 10, without getting in to any of the more detailed material properties we might care to look at. Rather than do that, let's now zoom-out and look for homogeneities at the 'meta' level:

All forks in a cutlery set are the same
All have the same profile to (supposedly) achieve efficient stacking
All carry the same makers mark
All designed for the same 'average' human hand

All designed for the same ‘average’ human mouth
All designed for the same ‘average’ washing process

And now we’re already well past our ‘ambitious’ target of twenty. We could go on, but hopefully the point is made. Actually, two points: the first being that all I’ve done here is use the 9-Windows viewing tool – actually just three of the nine windows – to look for connections from the sub-system, system and super-system perspectives, and in so doing have uncovered homogeneities that might otherwise have remained invisible.

Secondly, resulting from this ‘invisibility’ are the assumptions the fork designer made when he or she was drafting their beautiful fork design. Or rather what they very likely allowed their CAD system to fill in for them. It’s easy to allow the CAD to default to constant everything. Make the thickness the same everywhere – great for the designer, because it’s now saved them the tedious job of having to specify all three dimensions separately; make all of the tines have the same parallel sides – another drafting time saver. But every time the designer allowed the CAD system to save them a few precious seconds, the eventual product took another turn for the worse. Now, in fairness to the designer (and the CAD system software engineers), a lot of the assumptions built into the CAD software have been made to assist in the mass-manufacture of the artifact. If all of the tine walls are parallel, that’s great because now we can manufacture the forks using a really simple stamping press. 9000 forks a minute, job done. Except, of course, we’ve now allowed the manufacturers convenience to take precedence over what might have benefited the customer. The customer, of course, also (implicitly) likes the idea of a low-cost fork, but then again, we’re still allowing ourselves to fall into the trap of assuming things have to be the way they always have been. So, ‘of course’ the material is homogenous – with the same hardness and strength everywhere, and with the same level of hydrophobicity, because ‘that’s the way the sheet of steel arrived’. Spot the assumption? Who says we have to start with a sheet of steel? Now we have 3D printing, that assumption becomes irrelevant. Now we can just as easily print a ‘meta-material’ with different properties at different points in the design as we could the standard homogenous product. Nothing has to be ‘homogenous’ any more… and that’s why Principle 3 offers up so many opportunities to make our invisible assumptions very visible indeed.

Let’s see if the same idea works in the far less tangible space of a ‘people’ problem:

Figure 3: Pharmacy Homogeneities?

At first sight, it doesn't look like there are too many 'homogeneities' in this picture. Quite the opposite in fact since the overall impression is perhaps one of 'random clutter'. However, let's see if we can find our 'twenty'...

(In no particular order)

- All of the prescriptions are handed out in a standard bag
- All pharmacies have the same basic layout (serving counter adjacent to another, higher, counter the customer can't see behind (why?)
- Prescription drugs are dispensed 'unseen' in a room behind the counter
- All 'customers' are assumed to be the same: 'ill'
- Customers assume all 'pharmacists' are the same
- The pharmacist always 'controls' the transaction (they know; we don't)
- All products on offer are equally indiscreet
- All customer spaces are equally indiscreet (no privacy)
- All products exist to 'cure' or 'remove' symptoms
- All of the branded products come in the same packaging (understandable from a branding perspective, but not so great from an overall visual display perspective)
- All the store aisles are parallel and a standard width
- All the most popular products are found at eye/hand level
- The 'pharmacy' is always at the back of the store
- All parts of the story are equally lit, with the same colour lighting
- The temperature is the same everywhere in the store
- Each hour of the day is the 'same'
- Each day of the week is the 'same'
- Each day of the year is the same (no apparent accounting for seasonality of many medical conditions)
- The pharmacist goes to lunch the same time as all the patients/customers coming in to the store
- Prescription prices are all the same

As soon as we have made our 'homogenous' connection, the direction part becomes 'obvious' – make it 'non-homogenous'. Again, this is intended to be interpreted in a myriad number of different ways, but ultimately, all of them are about overcoming the 'time-saving' assumptions we – and the designers of pharmacies or forks – have unwittingly made. Maybe it's easier for the outsider to see them (and hence why we have used Principle 3 so often within the SI team), but every time TRIZ/SI tells us to solve a contradiction using 'Local Quality', it's try to tell us that, somewhere – at least twenty places! – we took a wrong short-cut, and now's the time to correct it.

Reference

1) Systematic Innovation E-Zine, 'Connections & Directions Towards The More Ideal System', Issue 33, December 2004.

Not So Funny – Sarcasm, Highest Form Of Wit?

Out of all the possible strategies for encouraging change in others, sarcasm is usually the least effective. It is, however, also the most fun….

There's usually an element of Principle 13 in any useful bit of sarcasm…

…sometimes, the deliverer of the sarcasm manages to squeeze in one or two additional Principles to help compound the effect. Here's a particular favourite. I like to think of this as the Principle 13/17 Double Whammy, with a touch of Principle 10 thrown in for good measure. Degree of difficulty 3.8…

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Principle 13 plus 16?…

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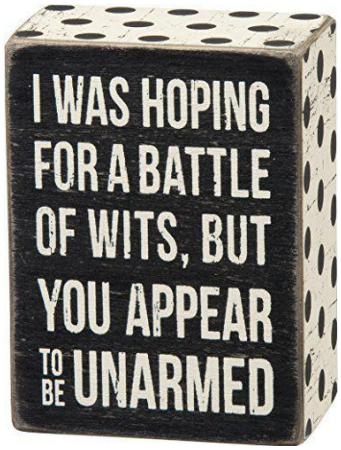
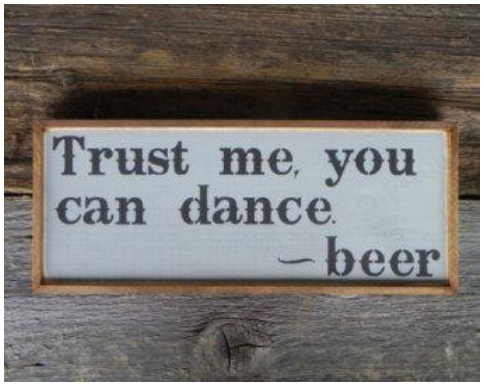
Principle 13 and, respectively left to right, Principle 2, 2 and 38…





Sometimes, I'm not sure where the boundary between sarcasm and irony is. If in doubt, I tend to revert to a higher power. Principle 7, maybe?... or 5?

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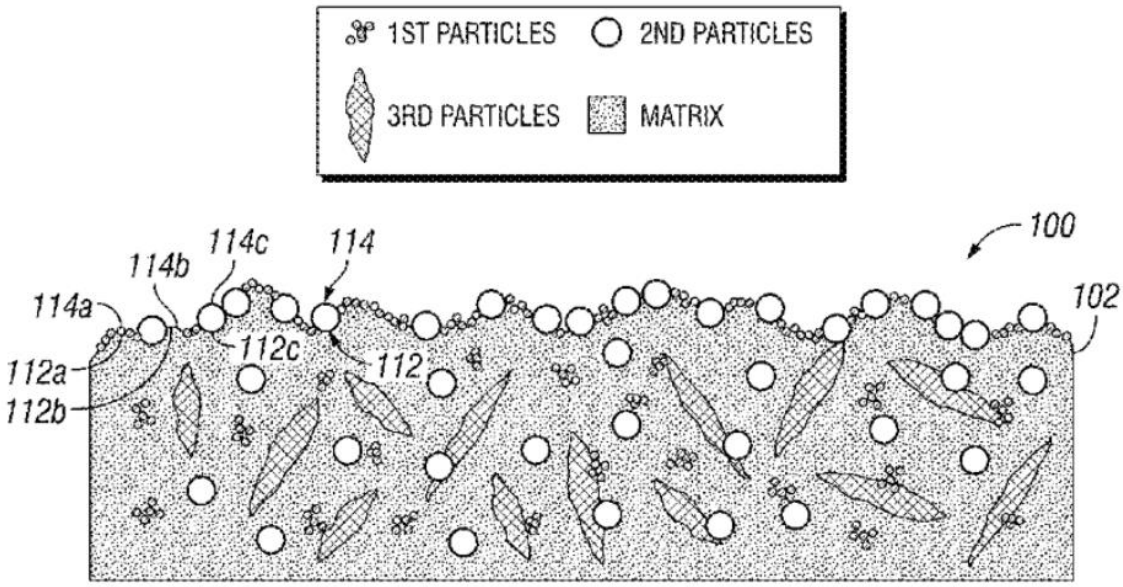
Patent of the Month – Delaying Ice Formation



Patent of the month this month takes into the aerospace industry and a team of inventors at Boeing. US9.637,658 was granted to the combined Washington/California team on the 2nd of May. In a beautifully succinct background description, the problem being solved is as follows:

Accumulation of frost, ice, or snow on aircraft changes airflow over aircraft wings, reducing lift and increasing drag. The accumulations also add to the total weight, increasing lift required for takeoff. Accordingly, frost, ice, or snow is normally removed prior to take-off. While in flight, hot engine bleed air, electric blankets, mechanical boots, or combinations thereof may be used to keep ice off exterior surfaces of aircraft. Unmanned Aerial Vehicles (UAV) and rotorcraft cannot operate at certain altitudes due to potential icing of flight surfaces. The listed measures actively consume energy, add weight, and reduce fuel economy.

On the ground, anti-icing and de-icing fluids in the form of hot glycol sprays are employed. While effective, such fluids generate an added expense and may cause gate delays from additional application time. The glycol fluids may generate added expense for remediation. As a result, different options for removing ice from aircraft are desirable.

While it might be easy to say, it's a problem – actually several connected problems – that's not so easy to map onto the Contradiction Matrix. We want to reduce the amount of ice accumulation, but we don't want to consume energy, impair fuel consumption or add weight. Here's what we get when we map that lot onto the tool:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Amount of Substance (10)

WORSENING PARAMETERS YOU HAVE SELECTED:

Weight of Moving Object (1) and Energy used by Stationary Object (17) and Loss of Energy (27)

SUGGESTED INVENTIVE PRINCIPLES:

35, 18, 7, 2, 19, 31, 40, 6, 3, 9, 24, 13, 38

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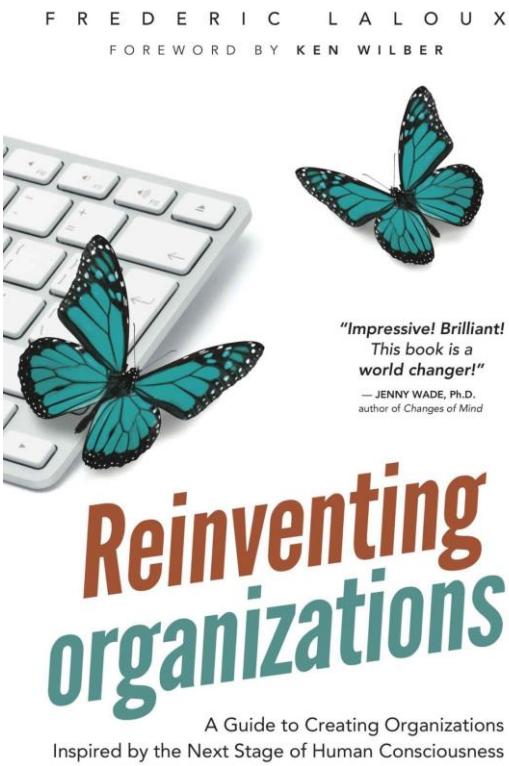
And here's how the inventors solved the problem:

A cured coating comprising: at least one cured coating layer containing first particles substantially homogeneously distributed throughout a thickness of a cross-linked, continuous polymer matrix, the thickness of the polymer matrix extending inward from a top periphery of the polymer matrix to a bottom periphery of the polymer matrix; the coating layer containing second particles substantially homogeneously distributed throughout the thickness of the polymer matrix; the coating layer containing third particles substantially homogeneously distributed throughout the thickness of the polymer matrix; the second particles containing a fluoropolymer and having a composition different from the third particles and the first particles; and an outer surface of the at least one coating layer including surfaces of at least first particles extending outward from the top periphery of the polymer matrix, the outer surface exhibiting a water contact angle greater than 90.degree. and exhibiting a property of delaying ice formation compared to the coating layer without the first particles, wherein the coating layer exhibits a cured porosity of from at least 5 vol % to at most 25 vol % substantially homogeneously distributed throughout the thickness of the polymer matrix and the outer surface exhibits a surface roughness on a length scale of from about 100 nm to about 5,000 nm.

A bit technical, as things are prone to be when we look at the Claim section of almost every patent, but nevertheless, the words plus the picture at the head of this article combine to reveal a lovely illustration of Principle 7, Nested Doll in action. Not to mention elements of Principles 40, 31 and 3.

I suspect we'll see this solution spreading in to several domains where not having ice form on surfaces is beneficial (wind turbines, drones, etc). And there's a desire to do the job passively.

Best of the Month – Reinventing Organizations



Hey, a Gravesian psychology book about business. Better yet, one advocating the jump to Tier-2, Level-7, Yellow, GT, 'Holarchy' or whatever other label you might know it by. Author, Frederic Laloux uses the slightly new-age'ish 'Teal', which I suspect might make a few toes curl. Not that that should be taken as a criticism as this is a very enjoyable read. Best of all, it describes a number of real-life organisations that have successfully made the leap to Teal. Including one that made the leap and then allowed themselves to slip back to where the majority of organisations on the planet operate – at 'Order' Blue or 'Scientific' Orange.

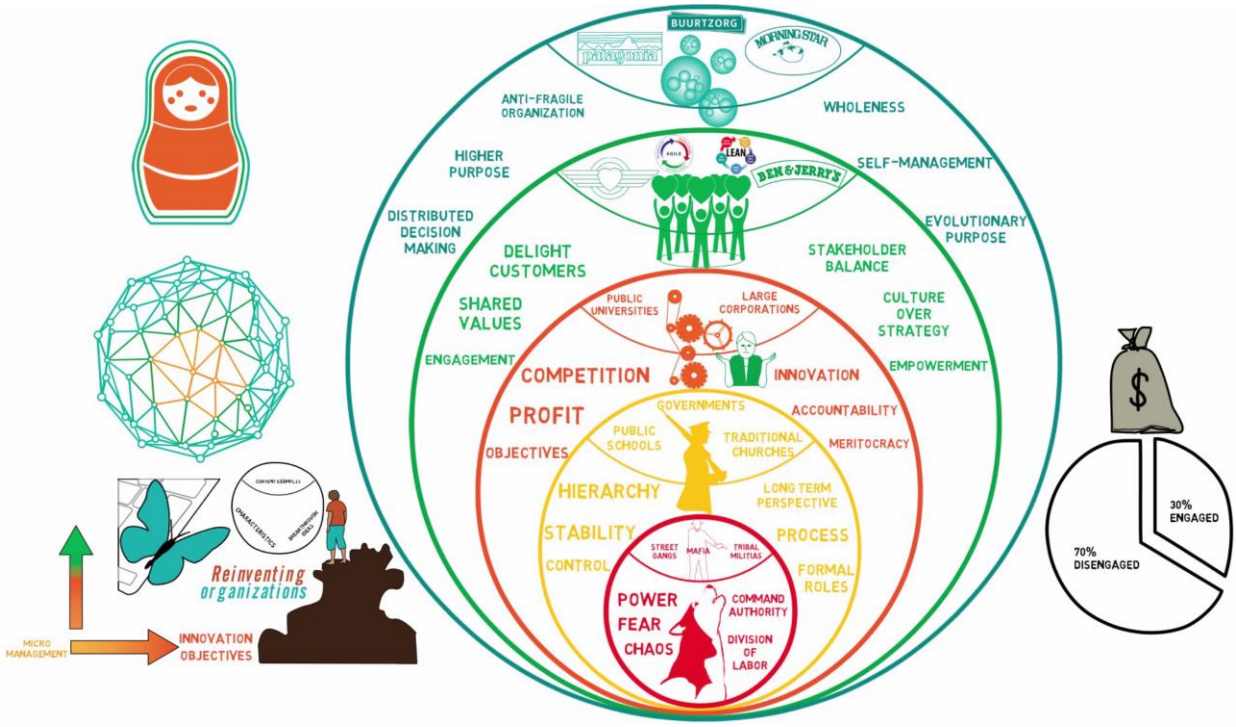
SI fans need to read the book, if only because it's not often that we get to read books of any description that appear to be even aware of Graves' work. True, too, it is gratifying to learn that others have successfully made the leap you've probably resigned yourself to assume is impossible. At least in your lifetime.

Personally, by the time I was two-thirds of the way through, my blinding flash of the obvious was that a Yellow re-invention of the world definitely won't happen in my lifetime. The Holarchy thinkers might want it, and there might be a lot of them (5% of the population now according to Laloux). But nowhere near enough at the senior management level to make a significant difference. Holarchy thinkers understand complexity and the irrelevance of questions like, 'prove to me that this is a better way of organizing work', but the people that matter – the leaders that are fundamental to making change happen – are for the most part a country-mile away emotionally from what is required. The business environment is driven by Blue and Orange thinking and too many people have too much to lose to allow Laloux's shift to happen on a broad scale.

The merits of ‘self-organisation’ are consistently expounded throughout all of the case-study descriptions, but, what they also make crystal clear is that self-organisation still requires an awful lot of effort from everyone involved. Working in Holarchy organisations comes with a lot of highly meaningful and enjoyable work, but, boy, does it sound tiring at the same time. Mainly, I suspect, because the big contradiction holarchy thinkers suffer from is an all-too easy willingness to walk away and find more interesting things to go and work on when the going gets tough.

I’m not a massive fan of arch-Baby-Boomer moralists like Crosby, Stills & Nash, but when I listened to them preaching between their songs, the one bit of sense they made all night was ‘humans can’t be trusted, because we’re ‘fuck-ups’’. Frederic Laloux is not a Baby-Boomer – born in 1968, he’s hardcore Pragmatist – but he understands the truth of Crosby’s rant: self-organisation doesn’t come easy. Just read the AES case study to see exactly why. If the CEO doesn’t ‘get it’, no point starting. If the CEO gets it, but the Board doesn’t – i.e. the AES story – then also no point starting.

Nice try though. Great to know you’re not alone, and that others are trying. But ultimately, this feels like a classic case of ‘can’t get there from here’. It sounds great, but for just about anyone – leader or otherwise – working in an already established Blue or Orange organization, Laloux offers no useful insight into how to fight the real fights necessary to really make a difference to the corporate life. I am, at once, enthralled and depressed. But, hey, maybe that’s the way the Holarchy life is supposed to be. Life is a self-organising emotional rollercoaster.



Wow In Music – Overture/Cotton Avenue

Bass guitars are intended to provide the rhythmic pulse of popular music. When the bass player steps forward to take a solo, that's usually a good time for me to head to the bar. There are occasional exceptions, but frankly not many. That said, one of my all-time favourite musical moments is a bass solo. Or rather a whole series of mini-solos. The piece of music in question is the opening track on Joni Mitchell's album Don Juan's Reckless Daughter. It's one of her most 'experimental' records. 'Mis-understood' might be another word. It's the place where her musical invention gets to take full flight. No doubt helped by the high caliber jazz musicians she brought into the studio with her. Most notably, Jaco Pastorius, who, I think, reached the pinnacle of his musical achievement on this album.

Many people consider Jaco Pastorius to be one of the best bass players to ever live, if not *the* best. Though his life was short, his impact is practically eternal. But with all of the music that has come and gone in the last five decades, it can be easy to become numb to just how good he was. It's difficult to imagine what it must have been like to be Joni Mitchell or the engineers working on the project. Here's an attempt to dissect "Overture-Cotton Avenue". This song is an outstanding example of several of Jaco's signature styles. It has a little bit of everything, and is a good study in fretless bass guitar and bass guitar in general. From an expressive beginning to chord slides, from bass groove importance and rhythm section support to harmonics, from the evolution of the bass line throughout the song to soaring melodic voicing, not to mention overall support of and respect for the song-writer, this song is a must-listen.

Ideally, you do just that as you listen out for Jaco's parts…

- 0:00 – Intro section, acoustic/vocal intro (Joni's opportunity to show off her creative chops with six over-dubbed guitars, at least two of which are in different tunings)
- 1:45 – Jaco comes in, expressive bass string hit, like thunder (Principle 38), with high slide (Principle 15)
- 1:56 – strong bass riffs and fast staccato walk-up, walk-down, (Principle 1) followed by a chord "chime-in" (Principle 5), and accenting with low string hits and rumble (17)

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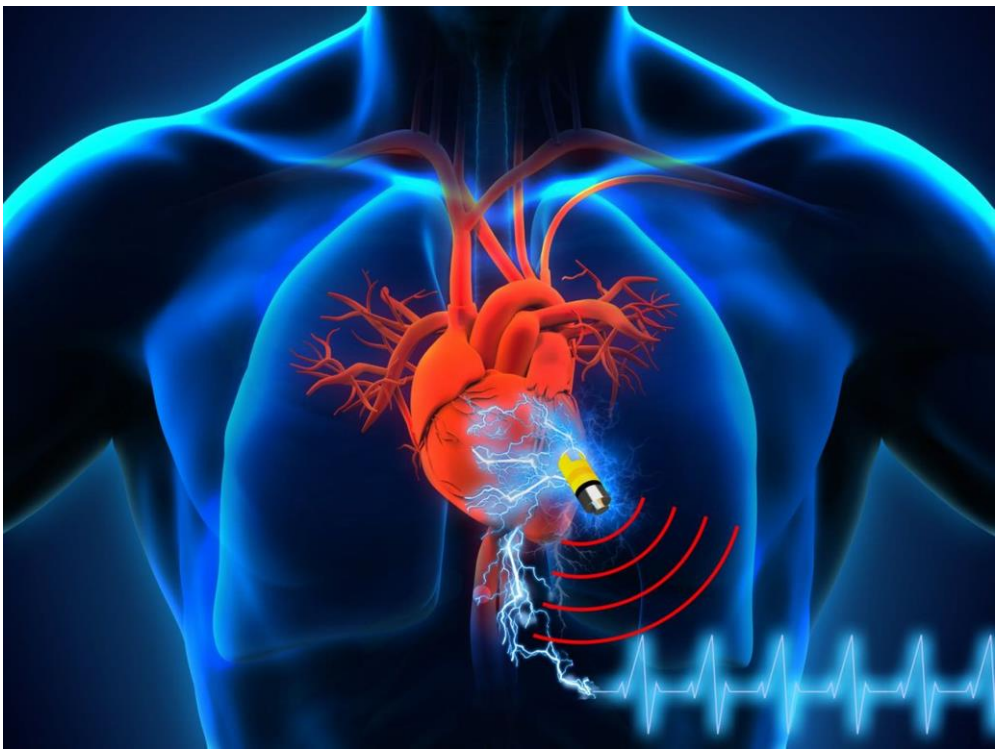
- 2:17 – expressive section – likely hitting the strings and body of the bass together (5)
- 2:43 – big chord slide-in's (5) – a signature of Jaco
- 2:57 – "A" section, lyrics come in, bass supports with solid bass line, nice bass chords at end of each section (x2) (Principle 3)
- 3:32 – "B" section (17), nice driving, supportive, percussive bass line
- 3:44 – dancing chords, into big bass chords
- 4:00 – "C" section (3), bass line evolves a bit, walks around more, exploring
- 4:35 – "B" section again, chords have slight harmonic overtones (Principle 7)
- 4:47 – bass builds with nice dancing chords, ending with big bass chord slides
- 5:04 – "C" section, bass line really evolves, walking and sliding
- 5:08 – nice big slide
- 5:14 – amazing melodic high riff, with high slide – another signature of Jaco – the pinnacle
- 5:20 – "C" section again (20)
- 5:36 – nice harmonics – yet another signature of Jaco (17)
- 5:39 – nice advanced evolution of the "B" section, driving bass with lots of percussive octave action, plus nice complimentary horn-like second bass track
- 5:51 – nice dancing chords into a big, high chord slide, chords have more obvious harmonic overtones
- 6:11 – chords with vibrato/rolling finger action (18)
- 6:16 – nice high harmonics (17)
- 6:29 – expression, fooling around
- 6:35 – listen closely to the quiet chord back and forth, likely done on fingerboard alone with right hand or left hand tapping

Listen up here: https://www.youtube.com/watch?v=sTxSOJKzgl4

Quite possibly the highest density of Inventive Principles ever committed to tape. I still swoon every time I hear it.

Investments – Battery-Less Implants



Scientists have developed a new energy storage device which operates using fluids in the human body, and could lead to longer-lasting, battery-free pacemakers and other implantable medical devices. The bio-friendly energy storage system called biological super-capacitor is powered by charged particles, or ions, from the body's fluids like blood serum and urine. Pacemakers – which help regulate abnormal heart rhythms -and other implantable devices have saved countless lives.

However, they are powered by traditional batteries that eventually run out of power and must be replaced, meaning another painful surgery and the accompanying risk of infection. In addition, batteries contain toxic materials that could endanger the patient if they leak. Now, researchers from University of California, Los Angeles (UCLA) and the University of Connecticut in the US propose storing energy in those devices without a battery. The super-capacitor they invented charges using electrolytes from biological fluids like blood serum and urine, and it would work with another device called an energy harvester.

It converts heat and motion from the human body into electricity – in much the same way that self-winding watches are powered by the wearer's body movements. That electricity is then captured by the super-capacitor. "Combining energy harvesters with super-capacitors can provide endless power for lifelong implantable devices that may never need to be replaced," said Maher El-Kady, a UCLA postdoctoral researcher. Modern pacemakers are typically about 6 to 8 millimetres thick, and about the same diameter as a 50-cent coin; about half of that space is usually occupied by the battery.

The new super-capacitor is only 1 micrometre thick – much smaller than the thickness of a human hair – meaning that it could improve implantable devices' energy efficiency. It also can maintain its performance for a long time, bend and twist inside the body without any

mechanical damage, and store more charge than the energy lithium film batteries of comparable size that are currently used in pacemakers.

The new bio-supercapacitor comprises a carbon nanomaterial called graphene layered with modified human proteins as an electrode, a conductor through which electricity from the energy harvester can enter or leave. The new platform could eventually also be used to develop next-generation implantable devices to speed up bone growth, promote healing or stimulate the brain, said Richard Kane from UCLA, who led the study published in the journal Advanced Energy Materials.

Generational Cycles – ‘Old Millennials’

This month we play a game of Spot The Post-Quarter-Life-Crisis-Millennial. We talked about this phenomenon back in Issue 148. Quarter-Life Crises (QLCs) are something that only Hero generations seem to experience with any great force.

A friend of SI found this blog. Written by a person, I believe we can fairly reliably say has been through his QLC and is comparing himself with those of his cohort who have not. See if you can spot the signs:

There’s a sensation you get when you hear the name of a group you’re a member of. If someone says “Bostonian” or “liberal” or (sorry) “Patriots fan,” my brain perks up a little. Oh, they’re talking about me. *Over the last few years, though, I’ve found I’m getting less and less of that ping from the term* millennial.

Technically speaking, I’m definitely a millennial. I was born in 1983, which means I’m part of the generation, whether one uses the Census Bureau’s definition (born 1982–2000) or Pew’s (about 1981–1997). But the more I hear about millennials, the less I recognize myself. And I’m not alone on this front: In 2015, for example, Juliet Lapidos — born the same year I was — may have put it best in a column for the New York Times *headlined “Wait, What, I’m a Millennial?” “I don’t identify with the kids that Time magazine described as technology-addled narcissists, the Justin Bieber fans who ‘boomerang’ back home instead of growing up,” she writes. And I’ve had plenty of conversations with other people my age who feel the same way. Many, many people who are in their late 20s and early 30s simply don’t feel like they are a part of the endlessly dissected millennial generation. As it turns out, there are good reasons for this. Old Millennials, as I’ll call them, who were born around 1988 or earlier (meaning they’re 29 and older today), really have lived substantively different lives than Young Millennials, who were born around 1989 or later, as a result of two epochal events that occurred around the time when members of the*

older group were mostly young adults and when members of the younger were mostly early adolescents: the financial crisis and smartphones' profound takeover of society. And according to Jean Twenge, a social psychologist at San Diego State University and the author of Generation Me: Why Today's Young Americans Are More Confident, Assertive, Entitled—and More Miserable Than Ever Before*, there's some early, emerging evidence that, in certain ways, these two groups act like different, self-contained generations. ("Early" because there's still a fair amount we don't know about the youngest Young Millennials given how, well, young they are.)*

Let's start with technology. Millennials, we hear over and over again, are absolutely obsessed with social media, and live their entire social lives through their smartphones. I tweet too much, sure, but I've never blasted a 'gram (did I say that right?); even thinking about learning how to Snapchat makes me want to take a long, peaceful nap; and I still feel bad whenever I haven't heard a distant friend's voice on the phone for a while. I miss out on nothing, in terms of real-world socializing, by sticking to Facebook and texting. I still prefer to read things — particularly long things — on paper. And again, almost all my friends (there are a few social-media-obsessed exceptions) feel similarly. On this front, we are decidedly different from Young Millennials, and to the extent the social-media-obsession stereotype is accurate, it simply doesn't apply to us in the same way.

Then there's the more substantive issue of how millennials (supposedly) live and structure their lives, and how they relate to the prevailing economic tides. Millennials are way less likely to follow "traditional" trajectories with regard to careers and marriage, both anecdotes and some data suggest. They often flit from job to job without staying in one place too long — they're "The Job-Hopping Generation," says Gallup — and are much more likely, relative to previous generations when they *were in their 20s, to live at home and to put off family formation for a long time. (It should be said that there's some controversy here — just last week Pew released some numbers suggesting millennials aren't any job-hoppier than Generation X was at the same age.)*

Again, this just doesn't resonate, either for me or for most of my friends who are my age. We're so normal! Yes, some of us have been hit harder than others by bad career luck or missteps, or by the massive national catastrophe of student debt, but for the most part we've had very "traditional" career paths. Now in our 30s, those of us who have had the most successful career trajectories are taking on many of the same young management roles that similarly privileged, middle-class boomers and Gen-Xers did when they reached those ages. I'm not married, but I'd say that more than half of my good friends are.

Everyone's having kids; those who can afford it are buying houses. It's just bizarre to hear countless accounts of the unique nature of this generation — my *generation, supposedly — and to then log onto Facebook and see so many people settling into exactly the lives expected of people in their 30s. Nothing about our collective experiences as adolescents and young(ish) adults, overall, feels that different from the stories we've heard about how members of past generations grew up and carved out* their *personal and professional niches. (I've already used the term* privileged *in this paragraph, but it's worth pointing out that privilege colors this entire discussion: Suffice it to say there are plenty of economically disadvantaged people who never have a fair shot at a good, remunerative career of any sort. In terms of my own life and the lives of my friends/colleagues, I can only speak to one, mostly middle-class slice of the millennial experience.)*

To be sure, the dissociation I'm feeling from my own generation is partly an inevitable artifact of the artificial way we construct generations in the first place. Generations are usually defined as anyone who was born within a span of about 18 years or so, and a lot

happens in 18 years. The baby-boomers, for example, consist of those who were born from 1946 to 1964, or thereabouts — their oldest members were born not long after America's world-historical triumph in World War II, while their youngest grew up during the 1960s, a period of crescendoing turmoil in American civic and political life. The youngest and oldest boomers grew up in very different worlds.

But this time around might be different. When I emailed Twenge to ask about the possibility of meaningful differences between older and younger millennials, she quickly highlighted those two events: the financial collapse of 2008 and the rise of smartphones around that same time (the iPhone was introduced in 2007). Their impact can't be overstated, and because of precisely when *they hit, it really might be the case that in 2017 a 33-year-old is more different from a 23-year-old than at any other point in recent history. (That could explain why Twenge is working on a book about those born in the 1990s, and how they're "vastly different from their Millennial predecessors," as the publicity language puts it.)*

Take the financial crash. Many Old Millennials were either already in the workforce by then, or close enough to entering it that we were able to "sneak in" before the crisis had fully unfurled itself. Which means we were raised and educated during a period in which we were promised that if we followed the rules in certain ways, there would be gainful employment waiting for us in our early or mid-20s — which there often was. The same definitely cannot be said of Young Millennials. The crisis permanently rejiggered the world for them. They grew up, like us Old Millennials, assuming that things would more or less work out if they followed the rules laid out by adults, only to have the rug pulled out from under them entirely during a very formative period in their lives.

This is a big deal, to have your expectations about your life so violently reoriented as a teenager or young adult. And while plenty of older millennials were affected, too — especially as the ramifications of the crisis rippled outward — the crisis really did hit Young Millennials in a different way. "Early millennials grew up in an optimistic time and were then hit by the recession, whereas late millennials had their worldview made more realistic by experiencing the recession while during their formative years," explained Twenge. According to Twenge, this has led to certain differences between older and younger millennials that manifest in the data. For example, she's found some evidence from survey data that younger millennials "are more practical — they are more attracted to industries with steady work and are more likely to say they are willing to work overtime" than older ones. Us Old Millennials could afford to develop views on work and work-life balance that were a bit more idealistic.

Then there are smartphones and social media, which hit the two halves of the generation in massively different ways. "Unlike [Young Millennials]," wrote Lapidos, "I am not a true digital native. The Internet wasn't a fact of nature. I had to learn what it was and how to use it. I wrote letters home when I was at summer camp. I didn't have a mobile phone until I was 19." For us Old Millennials, the social aspects of our middle- and high-school-years were lived mostly offline. Sure, AOL Instant Messenger was a pretty big deal when it first caught on, but most of us didn't even have cell phones until college, and smartphones until after. Think about all the stuff you go through between the ages of 12 and 22 in terms of your development as a person. Now think about how many of those experiences are affected by the presence or absence of a cell phone and social media.

According to Twenge, there's a bit less hard data on how smartphones drove an intragenerational wedge than there is on the subject of the Great Recession — she's working on this question, but doesn't yet have hard answer. But it would be shocking if this

technological revolution didn't *carve out some important differences between Old and Young Millennials. While there are certainly plenty of overhyped, underscientific opinions about how social media affects people, there's little question that it has* some *effect (there is some evidence that extensive Facebook usage is correlated with unhappiness, for example, including some fairly meaty recently published research). Twenge said that she thinks the fact that younger millennials spend so much more time on social media might be able to explain, for example, why they seem to be more susceptible to certain forms of psychological distress, including depression. That said, "What we don't have yet is research connecting these two areas of research" — that is, research making a stronger, more rigorous connection between generational differences between social-media use and rates of psychological distress.*

What all this suggests is that there's very little to be gained from lumping together all millennials in one group. Again, to a certain extent you can say this about any generation, but some genuinely unique and unusual stuff helped create the current divide. While the Old and Young Millennial categories aren't carved in stone, and there is certainly some overlap (especially for those who were influenced by older siblings), it doesn't benefit anyone to act like a 33-year-old and a 23-year-old came up in the same general climate, or with access to the same types of world-altering technology. No: These are profound differences. For the good of both us Old Millennials and our Young Millennial siblings and friends, let's stop acting like we're all in the same boat.

How did you do?

The age – born in 1983 – was a fairly obvious clue.

'No more boomeranging'

'hit harder than others by bad career luck or missteps… (i.e. one variant of the Crisis)… 'traditional" career paths (i.e. the result of thinking through why the Crisis happened… we all have to make choices in life)

'Everyone's having kids; those who can afford it are buying houses'… the other likely sources of Crisis.

Beyond that, what is still apparent – pre or post Crisis – is the staggering sense of entitlement (writing to Twenge for example) and 'it's not my fault'.

Here's why we have archetypes. They're archetypally true.

Biology – Naked Mole Rat

Deprived of oxygen, naked mole-rats can survive by metabolizing fructose just as plants do, researchers report in the journal *Science*. Understanding how the animals do this could lead to treatments for patients suffering crises of oxygen deprivation, as in heart attacks and strokes.

"This is just the latest remarkable discovery about the naked mole-rat – a cold-blooded mammal that lives decades longer than other rodents, rarely gets cancer, and doesn't feel many types of pain," says Thomas Park, professor of biological sciences at the University of Illinois at Chicago, who led an international team of researchers from UIC, the Max Delbrück Institute in Berlin and the University of Pretoria in South Africa on the study.
In humans, laboratory mice, and all other known mammals, when brain cells are starved of oxygen they run out of energy and begin to die.

But naked mole-rats have a backup: their brain cells start burning fructose, which produces energy anaerobically through a metabolic pathway that is only used by plants - or so scientists thought.

In the new study, the researchers exposed naked mole-rats to low oxygen conditions in the laboratory and found that they released large amounts of fructose into the bloodstream. The fructose, the scientists found, was transported into brain cells by molecular fructose pumps that in all other mammals are found only on cells of the intestine.

"The naked mole-rat has simply rearranged some basic building-blocks of metabolism to make it super-tolerant to low oxygen conditions," said Park, who has studied the strange species for 18 years.

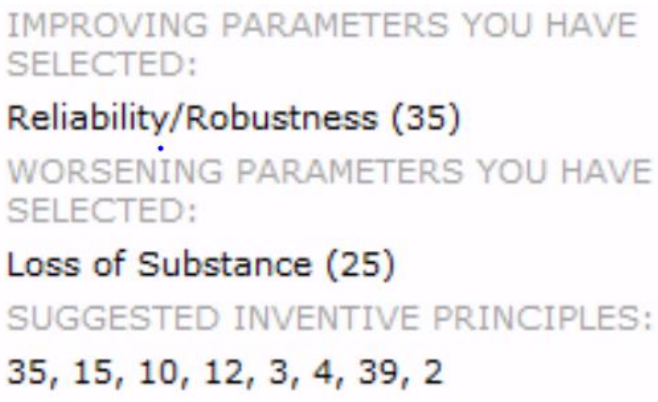
At oxygen levels low enough to kill a human within minutes, naked mole-rats can survive for at least five hours, Park said. They go into a state of suspended animation, reducing

their movement and dramatically slowing their pulse and breathing rate to conserve energy. And they begin using fructose until oxygen is available again.

The naked mole-rat is the only known mammal to use suspended animation to survive oxygen deprivation. The scientists also showed that naked mole-rats are protected from another deadly aspect of low oxygen – a buildup of fluid in the lungs called pulmonary edema that afflicts mountain climbers at high altitude.

The scientists think that the naked mole-rats' unusual metabolism is an adaptation for living in their oxygen-poor burrows. Unlike other subterranean mammals, naked mole-rats live in hyper-crowded conditions, packed in with hundreds of colony mates. With so many animals living together in unventilated tunnels, oxygen supplies are quickly depleted.

From a conflict resolution perspective, the naked mole rat's challenge is to survive when there is insufficient oxygen. A nice easy problem to map onto the Contradiction Matrix. The result looks something like this:



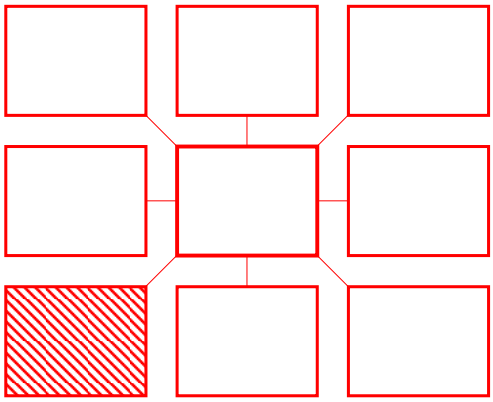
The switch to fructose consumption is a classic Principle 35, Parameter Change step-change. Similarly, the 'suspended animation'/slowing down of metabolism represents a good illustration of Principle 15. Not to mention that the whole story is about Principle 39 and making use of 'inert atmosphere's.

Now, about those two big front teeth…

Journal Reference:
Thomas J. Park, Jane Reznick, Bethany L. Peterson, Gregory Blass, Damir Omerbašić, Nigel C. Bennett, P. Henning J. L. Kuich, Christin Zasada, Brigitte M. Browe, Wiebke Hamann, Daniel T. Applegate, Michael H. Radke, Tetiana Kosten, Heike Lutermann, Victoria Gavaghan, Ole Eigenbrod, Valérie Bégay, Vince G. Amoroso, Vidya Govind, Richard D. Minshall, Ewan St. J. Smith, John Larson, Michael Gotthardt, Stefan Kempa, Gary R. Lewin. **Fructose-driven glycolysis supports anoxia resistance in the naked mole-rat**. *Science*, 2017; 356 (6335): 307 DOI: 10.1126/science.aab3896

Short Thort

"True character is revealed in the choices a human being makes under pressure - the greater the pressure, the deeper the revelation, the truer the choice to the character's essential nature."
Robert McKee



"We pass through the present with our eyes blindfolded. We are permitted merely to sense and guess at what we are actually experiencing. Only later when the cloth is untied can we glance at the past and find out what we have experienced and what meaning it has."
Milan Kundera

News

Design Creativity Conference
Darrell will be keynoting at the ICDC event in Bath in 31st January to 2nd February 2018. Check out http://www.icdc2018.org.uk/ for more details.

ICSI Conference, Beijing
Darrell's keynote address at Asia's big Systematic Innovation conference is now confirmed as 'Using SI To Accurately Map Future Markets & Scenarios'. His tutorial session is confirmed as 'Systematic Service Innovation'. The SI team has also – for the first time – submitted an entry into the Competition. Fingers-crossed on that one. The event will take place over the period 11-14 July. Register at http://i-sim.org/icsi2017/index.html.

University Of Warwick
You wait an age for a bus and then two come along at the same time… having finally got the SI curriculum accredited as a full Masters degree at the University of Buckingham, we have now got our first Masters Module accredited at the University of Warwick. The new Module will be five days and will, in effect, correspond to our Level 1 and Level 2 Certification programme. The first official Module is scheduled to run during the week beginning 2 October. More details as we get closer to the date.

"PanSensic & PatentInspiration"
We are happy to announce that Philips Austria will be hosting a Special Seminar exploring the synergies between PanSensic ('find the right problem') and PatentInspiration ('find the right solution'). The one day event will take place on 14 November in Villach…

Innovationkongress 2017
...two days before the TRIZ day at Austria's big innovation conference of the year. The conference takes place 14-16 November, also in Villach, with the TRIZ day being scheduled for the whole of the 16th. Darrell will be presenting a keynote, 'Evolving TRIZ - Solving The Efficacy-Complexity Contradiction To Deliver Tangible Innovation Success'. More details at: www.innovationskongrss.com

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

- IT – Innovation Mentoring Programme
- Mining – ICMM Assessment
- Government/Food – Long Term National Strategy Project
- FMCG – Patent 'Invent Beyond' Study
- FMCG NPD Project
- Industry – Lean/Innovation Capability Building Project
- O&G – ICMM Assessment & Capability Journey Design Project
- Tourism – Innovation Scheme Design Project
- Retail – PanSensic Study
- Automotive – SI Certification workshops