Systematic Innovation

e-zine

Issue 206, May 2019

In this month's issue:

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

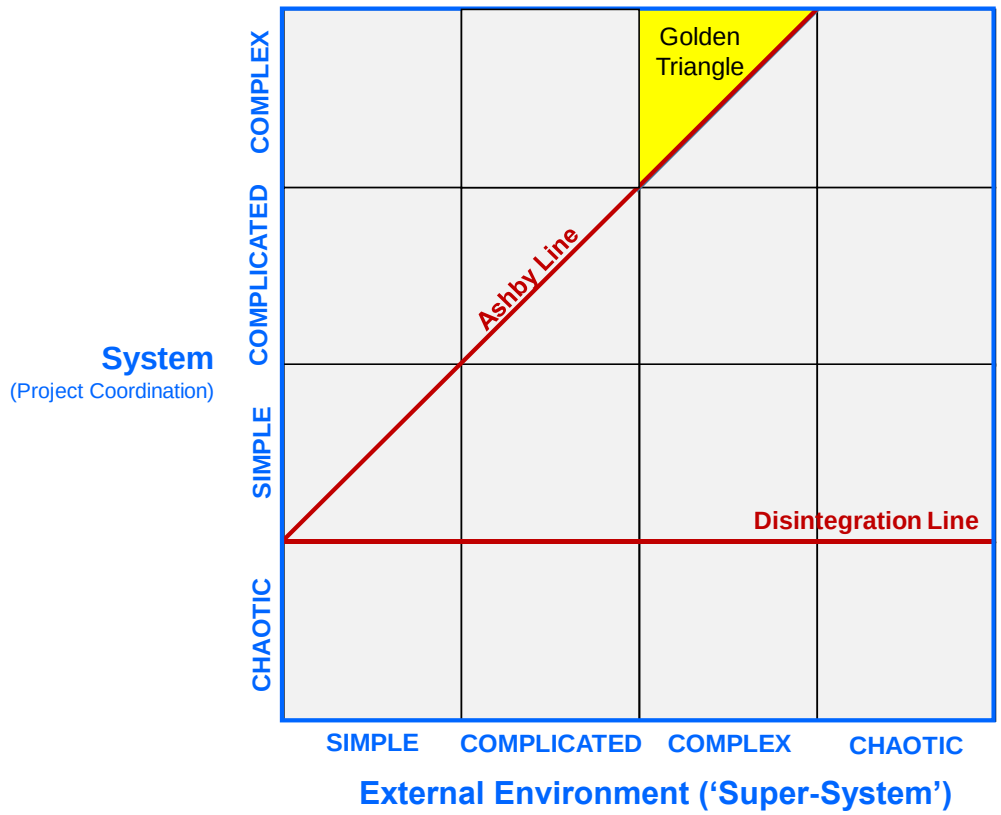
Readers' comments and inputs are always welcome.
Send them to **darrell.mann@systematic-innovation.com**

The Innovation ‘Golden Triangle’

98% of all innovation attempts end in failure. 98% of all TRIZ-originated innovation attempts end in failure. 98% of all Design-Thinking-originated innovation attempts end in failure. The same 98% figure applies to almost every problem-solving tool, method or strategy available to prospective innovators.

98% of innovation attempts fail because 100% of innovation problems are complex and 98% of the people tasked with conducting the work either didn’t understand that or weren’t using tools commensurate with the complexity.

So what did the 2% of successful attempts do? The clear answer is that they knowingly – or, sometimes, accidentally – found themselves in the right place at the right time with the right solution at the right price for the right customer. Getting all of these things right all together is a challenging task for which there is no ‘formula’, other than a recognition that the innovation project needs to be coordinated ac-cording to the demands of the ‘Golden Triangle’ region of our Complexity Landscape Model:



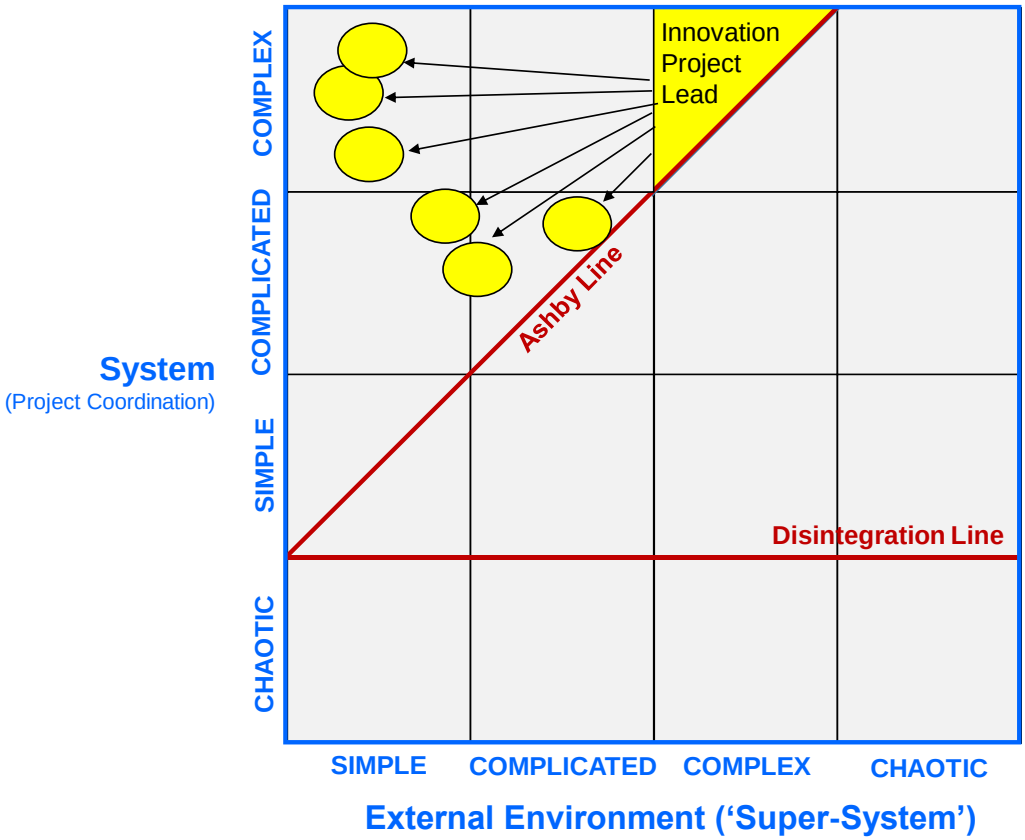
What this means is that, because the super-system environment is complex, the innovation team leadership need to coordinate the project with the requisite level of capability. The ‘system’ needs to be lead with appropriate understanding of how complex systems behave, and such that the tools, methods and strategies brought to bear over the course of the project are commensurate with the level of complexity of the task at hand.

The Golden Triangle is a relatively small area of the overall Complexity Landscape, but it is the portion where *every* innovation project will find itself.

That last sentence is a pretty big statement. And as such probably demands some justification and explanation. Two things are important to bring into the discussion. The first relating to how the various different tasks that need to be performed during the project are managed, and the second relating to a higher-level view of the typical trajectory of innovation projects as they relate to the 'Hero's Journey'.

Task-Level

Just because the innovation project leaders need to be capable of surviving (and thriving) in the Golden Triangle, doesn't mean they can expect every member of the team to be there with them. At least not all of the time. A big part of – particularly – the early stages of an innovation project will be about managing the unknowns (see the lead article in the February 2019 ezine, Issue 203). Some of these will require the team to fully embrace the complexities of the outside world. Especially of the customer. But many will not demand this happens. Some will, for example, be able to be conducted as laboratory experiments where the 'external environment' can be heavily constrained. Some, to take another example, will be 'classic' TRIZ contradiction-solving tasks. Overall, the Project lead is likely to find themselves coordinating a constellation of tasks that will look something like this:

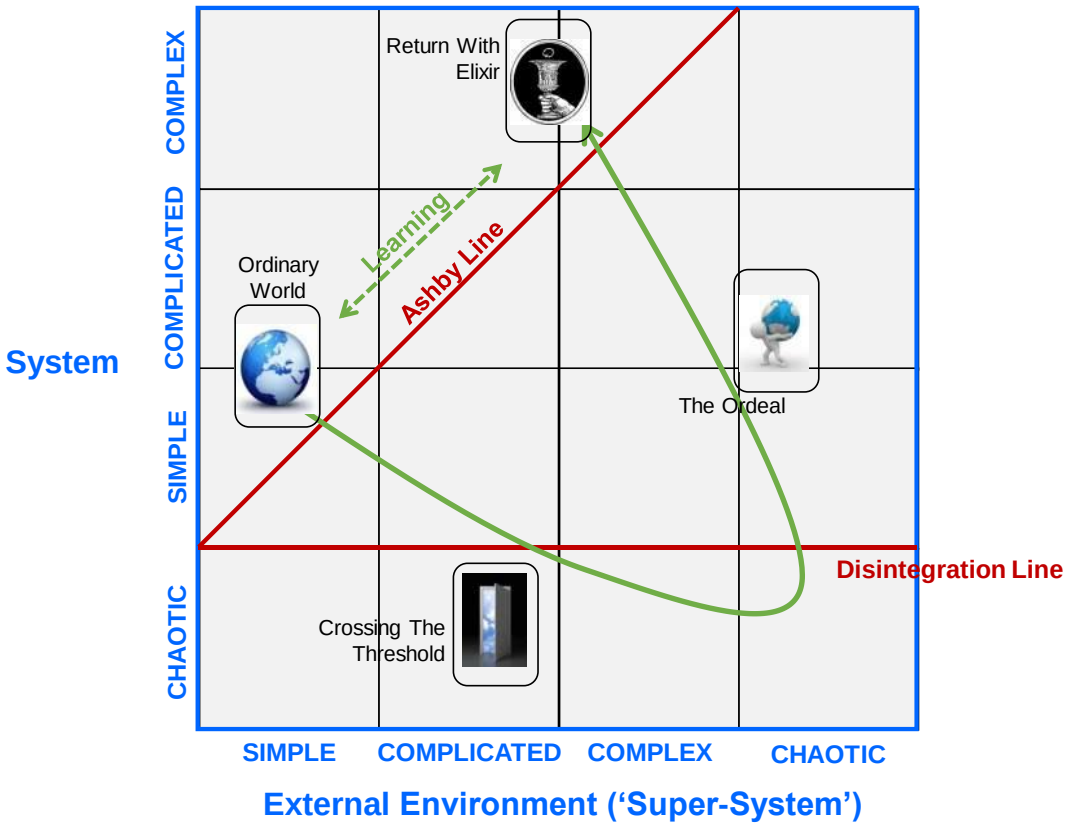


In this way, the project is better able to take due account of the level of capability of different members of the team and different parts of the organisation. The only critical factor, then, is that each of those tasks is managed with the requisite level of capability. i.e. they are placed above the Ashby Line and in the 'Resilience Zone' discussed in last month's article of that name.

Hero's (Complex) Journey

Life rarely goes to plan. Shit happens. Shit especially happens in the nebulous, turbulent netherworld between the s-curve we just left and the new one we're trying to reach. If Joseph Campbell was right with his Hero's Journey model, and if we're right thinking it is

totally relevant to the innovator's journey, when we plot a typical Hero's Journey trajectory onto the Complexity Landscape Model, it will look something like this:

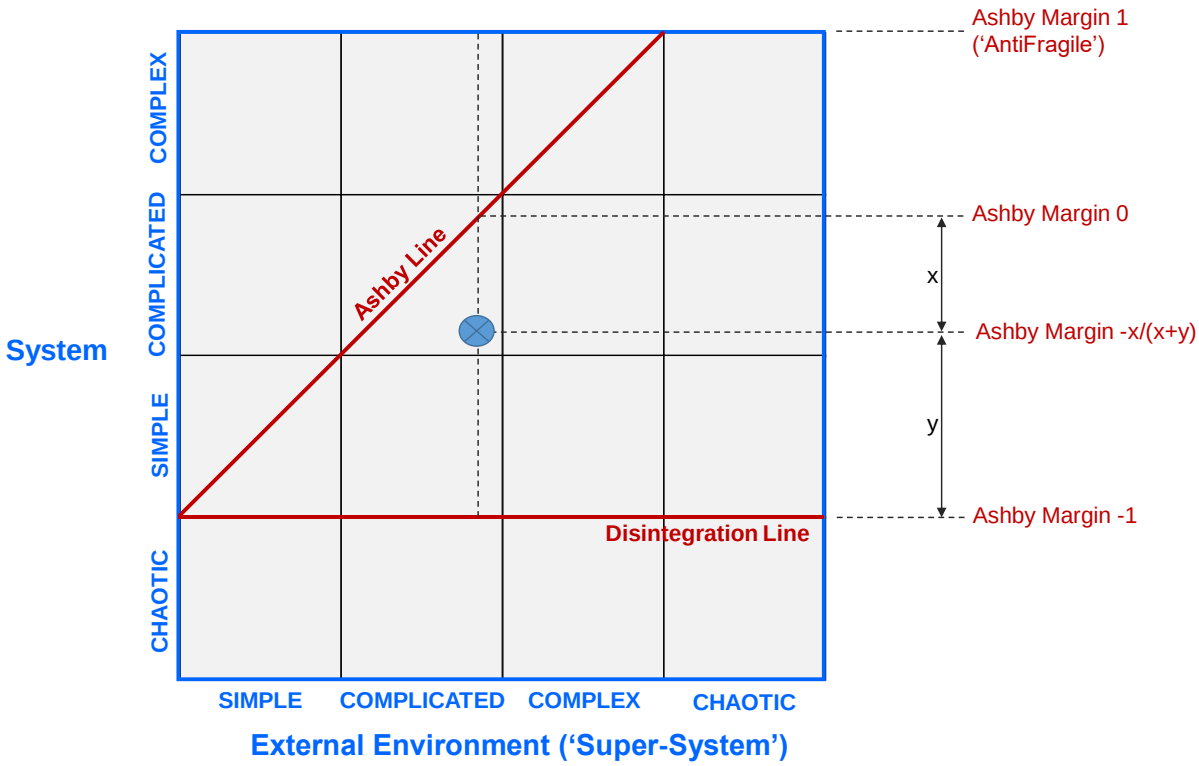


More details can be found about why this trajectory looks the way it does can be found in the article 'Hero's (Complex) Journey' on Darrell's blog site. More relevant here is that a typical innovation project is going to inevitably find itself below the Ashby Line for much of the time, and, again by definition, during the most difficult parts of the Journey, both the 'system' and the surrounding environment will be in chaos. This is the reality. A reality that the innovation project leader is expected to navigate through. The best – only? – way that the leader can hope to do this in any kind of repeatable manner is to spend as much time as they possibly can looking at what's going on from the perspective offered from the Golden Triangle.

If the leader does their job right, and the project ends up in the 2% of successful ones, like Campbell's Journey, it is likely that the point the team ends up in will be closer to the Golden Triangle than they were at the beginning of the Journey. In both Campbell's and the innovation project leader's terms, this shift is all about the new knowledge acquired. As such, each successful innovation project should create an increase in the Innovation Capability Maturity of those that went on the journey.

So Far, So Good…

Ultimately, its all very well being able to plot how things are supposed to be on a hypothetical Landscape model, but its only really of any practical use to an innovation team, or team-leader, or organisation if its possible to actually measure where we are on the map. This is an issue we've been devoting quite a bit of research time to in the past few months. We're now at the point where we know its definitely possible to make meaningful measurements of both a team's level of complexity capability and that of the environment surrounding them. The plan is to call the relevant measurement, the 'Ashby Margin'. Here's how we see the measurement being performed:



The Ashby Margin covers a range from -1 to 1. A system that finds itself sitting on or below the Disintegration Line will have an Ashby Margin of -1; a system sitting on the Ashby Line will have an Ashby Margin of 0; a system with an Ashby Margin of +1 sits right at the top of the Resilience Zone, at a point where, taking the lead from NN Taleb, we might consider that system to be 'AntiFragile'.

Next month, we'll dig deeper into how we set about making the measurement. Spoiler alert: it will have something to do with PanSensic.

Physical Contradictions: Solving Or Managing?

"No problem can be solved from the same level of consciousness that created it."
Albert Einstein

For me, the physical contradiction part of TRIZ/SI still remains the weakest part of the toolkit. Something has been niggling at the back of my mind ever since I read Polarity Management (Reference 1) over a decade ago. Author, Barry Johnson, was an early advocate of the importance of contradictions in the problem-solving world. Unlike TRIZ, however, Johnson's view was that contradictions were in effect only 'solvable' in the sense that the two ends of the contradiction had to be made visible and then 'managed'. A big part of the TRIZ story, of course, is that the innovator's primary job is to 'eliminate' contradictions. All I've seen and done in the last 25 years confirms the truth of that belief. But at the same time, I'm also very conscious every time I attempt to teach newcomers the mechanics of the physical contradiction solving process that more often than not the recommended solutions are more about 'managing' than 'eliminating' the contradiction at hand. To take one of the more cringe-worthy examples: I still find myself using spectacles as a way of illustrating the various different contradiction 'solving' strategies, and describe the use of two pairs of spectacle to solve the 'focus close and focus distant' contradiction as a 'separation in time' strategy. If I, as a wearer have to carry around two pairs of glasses to allow the possibility of both reading and driving, have I 'solved' the contradiction? Or am I merely 'managing' it? The reality, my discomfort tells me, is that this separation in time strategy is much more about managing the problem. I achieve the final outcomes I want, but I do it at the expense of an inconvenient side-problem.

The more I think about it, the more I'm convinced that all of the 'separation' strategies available to physical contradiction 'solvers' are versions of this same thing. We look to separate the two opposing poles of the contradiction using the conditional differences made possible using space, time, or – more recently (References 2, 3) – 'interface'. The template sheet that concludes the Reference 3 article essentially forces the problem solver to focus on just these three separation strategies:

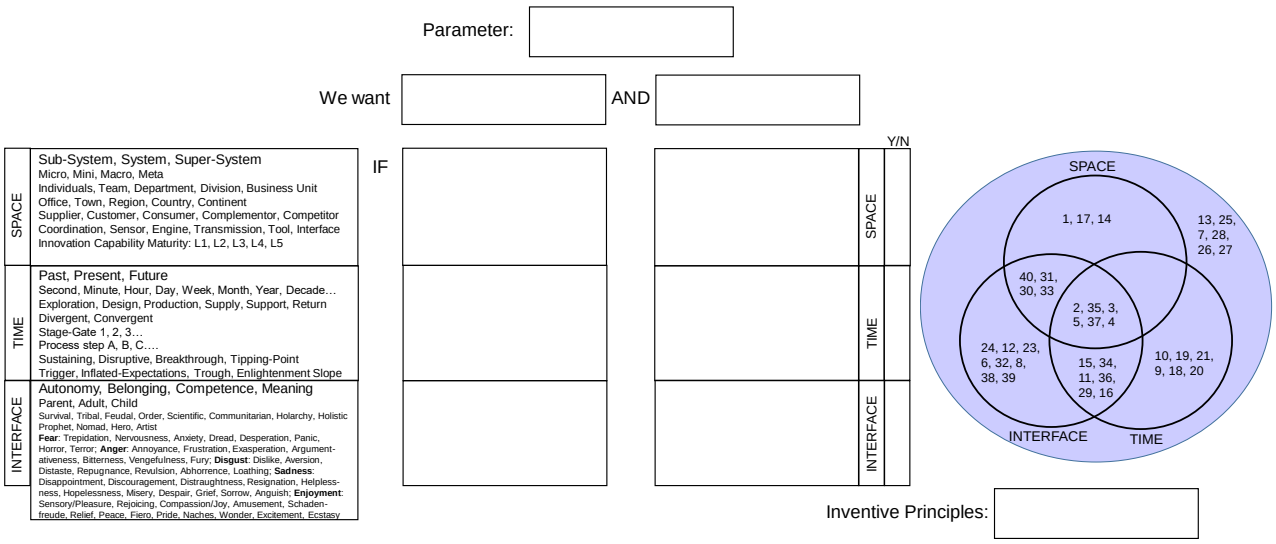


Figure 1: Physical Contradiction Template (PCT)

The Venn Diagram on the right hand side of the template offers up a small number of Inventive Principle suggestions – 13, 25, 7, 28, 26 and 27 – if the problem-solver determines that they are unable to separate the contradiction in any of space, time or interface dimensions, but in effect this list is very often interpreted as an emergency back-up or after-thought by users. This is a shame since in many ways, it is what happens once a problem-solver determines that none of the separation strategies (or the Inventive Principle recommendations that accompany them) is offering up a 'good enough' answer.

If we go back to the manner in which the Physical Contradiction story is presented in the Hands-On Systematic Innovation book, problem-solvers are presented with a table that lists a number of 'Transition' strategies after the three Separation options:

Contradiction Solution Route	**Inventive Principles Used To Tackle This Type of Contradiction**
Separation in Space	1. Segmentation 2. Taking out 3. Local Quality 17. Another Dimension 13. Other Way Around 14. Curvature 7. Nested Doll 30. Flexible Shells/Thin Films 4. Asymmetry 24. Intermediary 26. Copying
Separation in Time	15. Dynamics 10. Preliminary/Prior Action 19. Periodic Action 11. Beforehand Cushioning 16. Partial or Excessive Action 21. Skipping 26. Copying 18. Mechanical Vibration 37. Thermal Expansion 34. Discarding & Recovering 9. Preliminary Anti-Action 20. Continuity of Useful Action
Separation on Condition	35. Parameter Changes 32. Colour Changes 36. Phase Transition 31. Porous Materials 38. Strong Oxidants 39. Inert Atmosphere 28. Mechanics Substitution/Another Sense 29. Pneumatics & Hydraulics
Transition to Alternative System	
1. Transition to Sub-System	1. Segmentation 25. Self-Service 40. Composite Materials 33. Homogeneity 12. Equi-Potentiality
2. Transition to Super-System	5. Merging 6. Universality 23. Feedback 22. Blessing In Disguise
3. Transition to Alternative System	27. Cheap Short Living
4. Transition to Inverse System	13. The Other Way Round 8. Counter-Weight

Table 12.1: Physical Contradiction Solution Strategies
(work from top-down when looking for solutions)

The idea – as indicated in the footnote at the bottom of the table - is that users effectively work through the list as a menu. With, again, the 'Transition' elements ending up being an 'if all else fails' after-thought.

And so, here's the problem. Per the Einstein quote at the head of this article, these 'Transition' strategies are actually the most powerful. Further, I'm now convinced that all of the Separation strategies are 'merely' about 'managing' the contradiction, and that if the problem-solver is looking to genuinely 'solve' (i.e. eliminate) the contradiction, then it is *only* the Transition strategies that will enable such jumps.

In the spectacle story, for example, the most powerful answers are the ones that take us in the direction of laser surgery (transition to the super-system) or, slightly more radical, some kind of gene therapy that prevent hardening of the lens that tends to occur as we age (transition to the sub-system), or even having computer screens that automatically re-focus what's on the screen to compensate for the eyes' failings (transition to the inverse system).

This blinding flash of the obvious (twenty years in the making!) suggests that we have the whole physical contradiction 'solving' story the wrong way around. Shouldn't we be looking to actually eliminate the contradiction before we compromise and accept that we will merely 'manage' the problem?

If you've read any of my articles before, you'll know that I spend a lot of time attacking people who spend their time asking either/or questions. And now I've kind of done the exact same thing myself. Should we look to manage before we solve? Or should we look to solve before we manage? Answer: both. It depends on our circumstances, right? If we're looking for a quick fix, we probably start with – or 'just' – the Separation strategies. If we need a genuine breakthrough and have the freedom to go outside the confines of our current system (*"No problem can be solved from the same level of consciousness that created it."*), we should probably start with – or 'just' use – the Transition strategies.

Either way, we ought not to be thinking about the Transition strategies as an after-thought. Which in turn means the SI research team has had to think a lot harder about how we best help problem-solvers to get the best out of them. The HOSI Table, in other words, is not good enough. And neither is the Figure 1 Venn Diagram.

Here's what we now think it ought to look like, once we take out the 'after-thought' thinking of the previous models and actually start to examine how physical-contradiction-solvers have achieved their solutions:

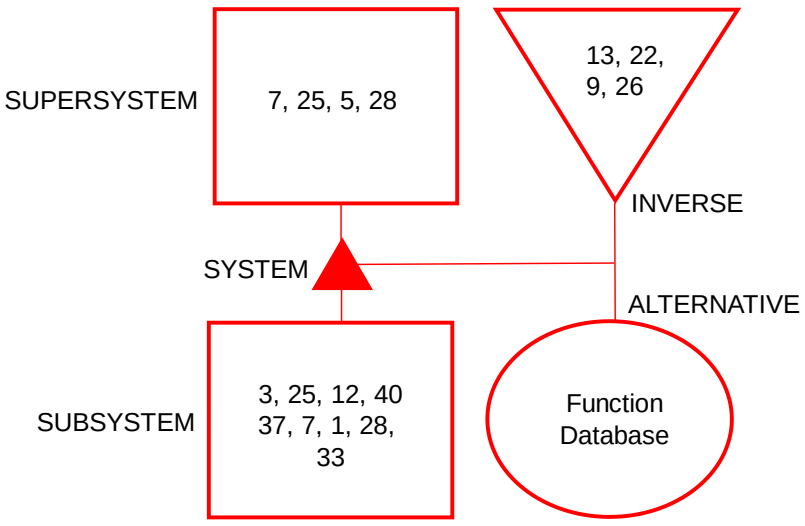


Figure 2: Solution Strategies Associated With The Four System Transition Directions

The Inventive Principles within each of the first three options represent a ranked list of possibilities, based on the frequency with which each Principle has been used to achieve a breakthrough. The fourth, 'Transition to Alternative' option now becomes a hint to stop thinking about Inventive Principles and to connect instead to some form of Function Database to explore other possible ways and means of delivering the intended function(s).

Overall, then, that means once we have encountered and formulated a physical contradiction, we have two overall routes to explore – one about managing the contradiction and one about solving it:

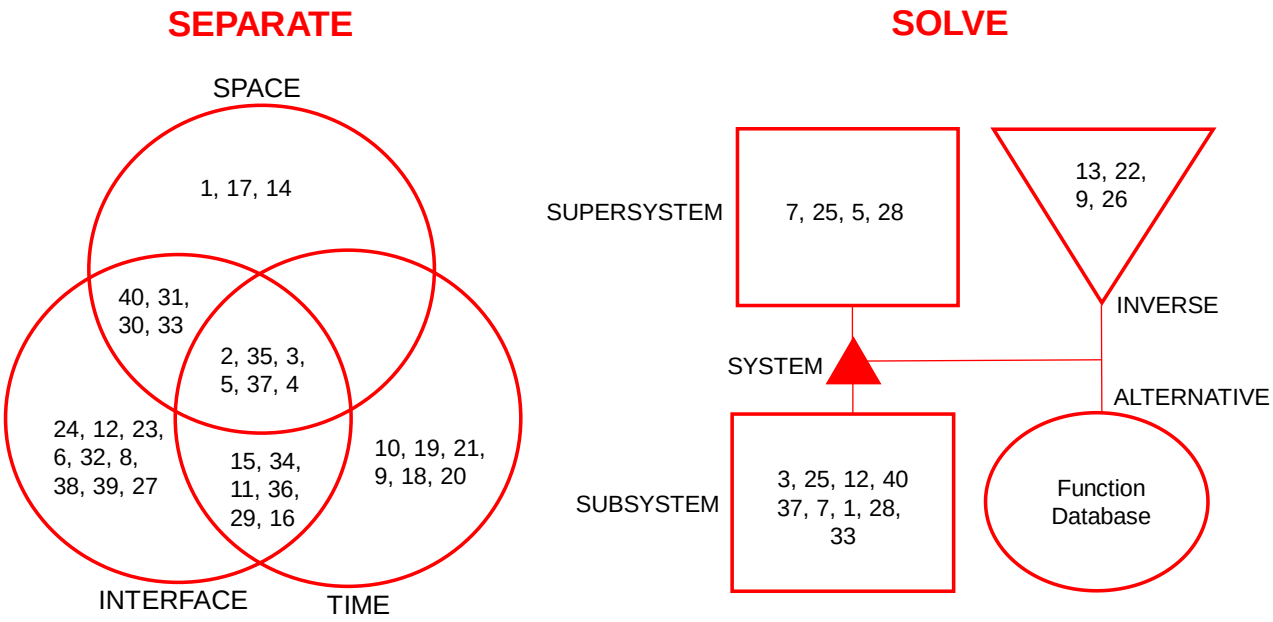


Figure 3: Overall Physical Contradiction Strategy Options

I think I might be speaking more about this model in future ezine articles. My instincts tell me we're finally somewhere close to properly cracking the physical contradiction story, and bringing it up to the same level as the rest of the 21st Century TRIZ toolkit. In the meantime, I'd love to hear from any brave souls that decide to give it a try.

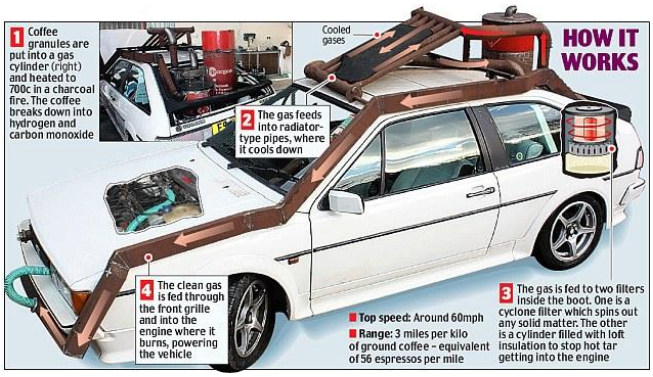
References

1) Johnson, B., 'Polarity Management: Identifying and Managing Unsolvable Problems,' HRD Press, 1996.
2) Systematic Innovation E-Zine, 'Re-Thinking Physical Contradictions #1: Technical Problems', Issue 181, April 2017.
3) Systematic Innovation E-Zine, 'Re-Thinking Physical Contradictions #2: Business Problems', Issue 191, February 2018.

Not So Funny – The Coffee Panacea

Upon learning this month that caffeine makes perovskite photovoltaics more stable, thus enhancing their commercial potential in the next generation of solar-cells (https://spectrum.ieee.org/energywise/green-tech/solar/java-takes-the-jitters-out-of-solar-cells), it made us wonder what other miracles coffee was capable of achieving. Turns out quite a lot.

Like rethinking the automotive industry. Forget electric vehicles. Spent coffee-grounds is the fuel of the future. Here was the pioneering solution:



Say hello to the Teesdale Conservation Volunteers (TCV) who, in 2010 designed and built the “car-ppuccino” – a 1988 Volkswagen Scirocco which was modified to run on used coffee grains. Martin Bacon, who runs TCV from a base near Barnard Castle, County Durham, drove the car from London to Birmingham and in doing so, broke the record for longest journey by a coffee-powered car.

No doubt still feeling the after-effects of the caffeine, Mr Bacon subsequently bought a 1974 Rover SD1 3500 for £250 and turned it into a caffeine fuelled “express-o” car. The car is powered using the gasification principle – which was used by hundred of thousands of vehicles during the Second World War, but despite being much cleaner than conventional engines, is considered to restrict speed.

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Looks pretty slick to me.

But, anyway. If it’s possible to power a car, it must also be possible to power a house. Sure enough, someone, somewhere already solved your problem. Albeit, it is a rather small house:

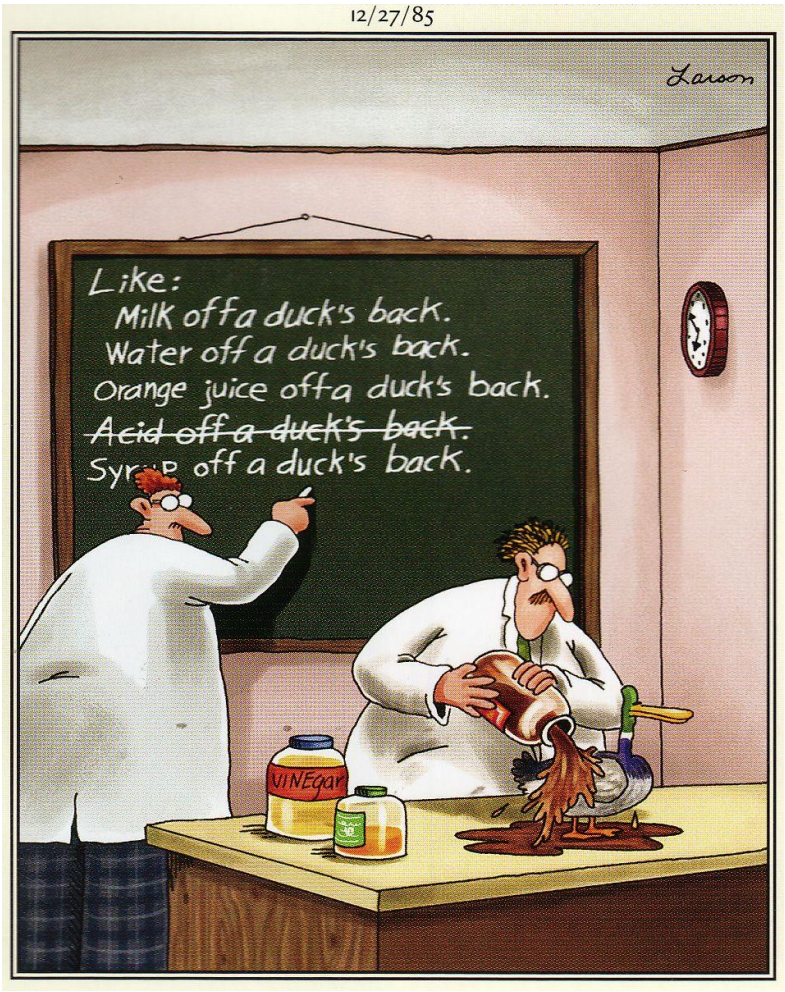
Luxury tiny house builder New Frontier Tiny Homes has teamed up with Dunkin' Donuts, actress Olivia Wilde and a sustainable biochemical company to produce the unique promotional project. The Home That Runs on Dunkin' consists of a very well made but essentially standard tiny house that runs from a biofuel generator fueled by a coffee ground compound. It's not just a case of pouring a cup of joe into the generator, sadly, otherwise, I’d’ve been at the front of the queue to buy one. Refining the coffee grounds into fuel is a complex process tackled by a firm called Blue Marble Biomaterials. In all, it takes around 170lb of used coffee grounds to produce just one gallon of fuel. Which, if I’ve done my sums right, means the occupant could just about live a steady-state life in which the energy from the used grounds heats the next cup of joe.

Okay, now let’s try zooming-in. What else does coffee help to stabilize? How about tea? Enter the ‘Dirty Chai’… green tea latte with a shot of expresso. Which, apparently, Starbucks will allow discerning customers to order these days. Not sure they will serve it up in a jam-jar though… even though, at the time of writing, this is still legal in the UK. (I am willing to start a petition to ban the practice, if anyone is interested.) It’s all part of a

save-the-planet initiative I think. By my calculations, less jam would probably offer up more of a win-win.

Here, meanwhile, is what Gary Larson had to say on the caffeine-stabilisation-synergy story:

Speaking of Gary Larson, I'm reminded of one of my favourite of his cartoons, the 'x off a duck's back' gem from 1985. Like coffee off a duck's back… cappuccino off a duck's back… decaff-soy-Americano off a duck's back… you get the idea…



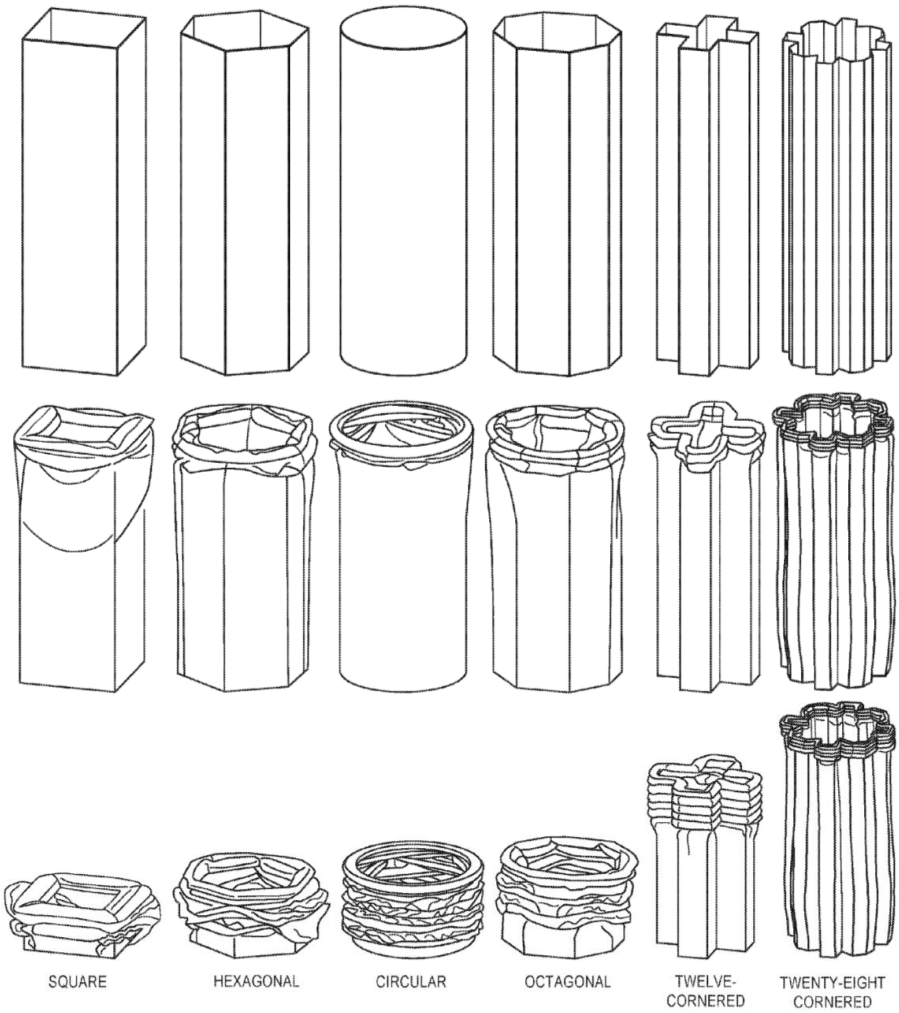
Which then leads on to the question of, in addition to ducks, what are the other one-plus-one-is-greater-than-two coffee synergies?

For a while, I had high hopes for the nuclear industry…

But then my first experimental results weren't that promising…

Back to the drawing board, I guess…

Patent of the Month – Strengthening Member



We head to the Motor City for our patent of the month this month, to a trio of inventors at Ford. Their strengthening-member patent, US10,279, 842, was granted on 7 May. Here's what the trio has to say about the problem being addressed:

It is desirable, for vehicle strengthening members, to maximize impact energy absorption and bending resistance while minimizing mass per unit length of the strengthening member. Impact energy absorption may be maximized, for example, by assuring that the strengthening member compacts substantially along a longitudinal axis of the strengthening member upon experiencing an impact along this axis. Such longitudinal compaction may be referred to as a stable axial crush of the strengthening member.

When a compressive force is exerted on a strengthening member, for example, by a force due to a front impact load on a vehicle's front rail or other strengthening member in the engine compartment, the strengthening member can crush in a longitudinal direction to absorb the energy of the collision. In addition, when a bending force is exerted on a strengthening member, for example, by a force due to a side impact load on a vehicle's front side sill, B-pillar or other strengthening member, the strengthening member can bend to absorb the energy of the collision.

Conventional strengthening members rely on increasing the thickness and hardness of side and/or corner portions to improve crush strength. However, such increased thickness and hardness increases weight of the strengthening member and reduces manufacturing feasibility. It may be

desirable to provide a strengthening assembly configured to achieve the same or similar strength increase as provided by the thickened sides and/or corners, while minimizing mass per unit length of the member, and maintaining a high manufacturing feasibility.

Which looks something like this when mapped on to the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Energy used by Stationary Object (17)

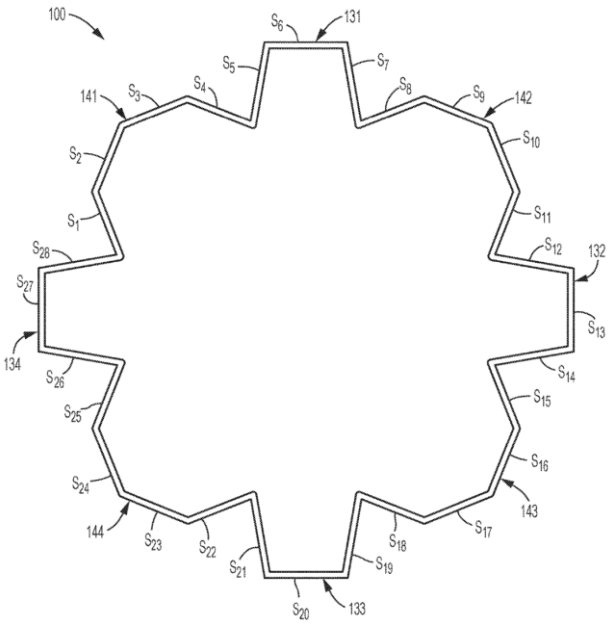
WORSENING PARAMETERS YOU HAVE SELECTED:

Length/Angle of Stationary Object (4)

SUGGESTED INVENTIVE PRINCIPLES:

4, 17, 9, 19, 3, 16

When we see a list of Inventive Principle recommendations like this, it should give us a pretty strong clue that the answer lies primarily within the realms of geometry – Asymmetry (Principle 4), Another Dimension (17) and Local Quality – and that's pretty much what the inventors' solution comprises. At first sight, the solution, in fact, is all about geometry, and more specifically the cross-sectional profile, where we see evidence of all three Principles:



Of particular interest, I think is the combination of 'internal' and 'external' folds, and 'acute' and 'obtuse' angles. Looking at the presence of Principle 19, Periodic Action amongst the list of recommended solution strategies, I also wonder whether the buckling that eventually takes place in all structures when subject to enough longitudinal compression load is being controlled by the new geometry better than it is in other cross-sectional profiles. Buckling, in other words, doesn't happen in a linear fashion, it happens through periodic phases of collapse followed by consolidation. Looking at the collapsed images at the beginning of the article, it looks as though these periods of collapse-and-consolidation are constrained by the geometry to occur more often and thus in a more controlled fashion.

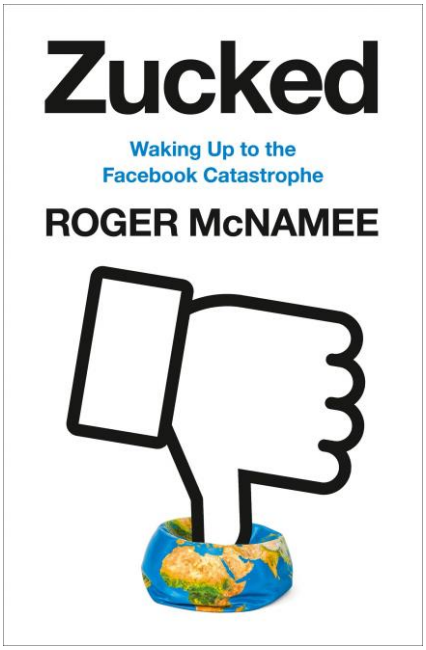
There’s nothing to this effect in the invention disclosure description. What that description does say, however, is something inventors want to see with all their designs: unexpected non-linear benefits:

…the strengthening member having a twenty-eight-cornered cross section could sustain a much higher crushing force for a given resulting crushing distance as compared with the square, hexagonal, circular, octagonal, and twelve-cornered cross sections. Specifically, the twenty-eight-cornered cross section in accordance with the present teachings achieved about a 145% increase in averaged crush force and/or crash energy absorption as compared with the octagon. A person having ordinary skill in the art would have expected that a strengthening member with four lobes and four protrusions in accordance with the present disclosure would have performed similarly to a strengthening member with a corrugated cross section, which is known to have relatively poor energy absorption and undesirably open in a flower-like fashion when crushed, as evidenced by, for example, the strengthening members with corrugated cross sections shown in U.S. Pat. No. 8,459,726, which is hereby incorporated by reference. Accordingly, the substantially increased energy absorption provided by the strengthening member with a twenty-eight cornered was an unexpected result.

My only doubt beyond this lovely result is how come 28-cornered is the absolute best configuration? I think TRIZ tells us that there are still plenty of degrees of freedom to evolve the design that haven’t as yet been exploited. Consider that your lateral-thinking exercise for the month… what else could/should be done to further increase the energy-absorption-thickness(/weight) ratio?

Meanwhile, let’s not take anything away from the Ford team. What they’ve hit upon looks like it has the potential to chop a significant amount of weight out of, not just automotive, but structures across a range of different domains.

Best of the Month – Zucked



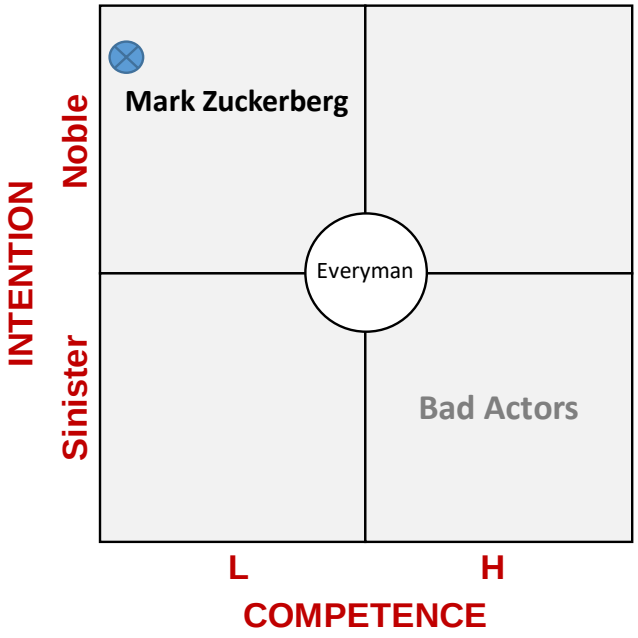
“Move Fast, Break Things”. The Facebook corporate motto. An, as it turns out, iconic example of reaping what you sow. A strategy that Roger McNamee amply demonstrates, not only allowed the most rapid rise of any corporate entity ever, but also the simultaneous destruction of democracy, facts, critical thinking and innovation. Not to mention the death of thousands of innocent victims and irreparable emotional harm to countless others. Yes, folks, roll-up, roll-up for the anti-Zuckerberg Festival season.

I originally thought this book was going to be a hatchet job. Whenever any entity gets too big, someone is bound to come along and find an audience willing to have a pop at the tall poppy. But no, McNamee tells a compelling story that gets validated along the way by some of the smartest brains on the planet.

Move Fast, Break Things, Apologise, Repeat. Mark Zuckerberg is revealed as a supremely smart, well-intentioned, but ultimately supremely naïve individual. A man who, alongside COO, Sheryl Sandberg, utterly dominates the Facebook culture. Step one, recruit young, hungry and equally naïve coders, get them to buy into your ‘connect the world’ vision (in a manner strikingly similar to the Hitler Youth of the 1930s). Step two, set in place success metrics that ensure everyone does anything that accrues more of the population to spend more and more of their time giving Facebook their most personal data. Step three, illegally sell that data to anyone that potentially helps achieve step two goals. Step four remain utterly naïve when ‘bad actors’ begin to abuse said personal data. Step five, apologise. Step six, refer to Step two. Repeat. Each time apologising to a higher and higher level of authority. And each time – so far – getting away with it. Destroying democracy? Oops. Did I do that? Sorry! Now, let’s see if we can get even more people using Facebook – the problem must be that we haven’t connected enough people yet.

After you’ve read this (essential) book, check out the Carole Cadwalladr TED talk (https://www.ted.com/talks/carole_cadwalladr_facebook_s_role_in_brexit_and_the_threat_to_democracy?language=en) to get a deeper insight into how the naivety played out in the Brexit story.

Then, assuming you agree with McNamee (and Cadwalladr), get yourself off Facebook.
Then tell all your friends to do the same.
Tell them all to send Zuck a copy of ‘Law Of Unintended Consequences 101’.
As Zuck knows, bad news spreads at least seven time faster than good. Especially in such a frictionless environment as Facebook.



Wow In Music – No Me, No You, No More

I was reading the inspiring book, 'Your Song Changed My Life', by Bob Boilen a few weeks ago. In the book, Boilen interviews a number of my favourite artists asking them, per the book's title, which music changed their lives. One of the artists being interviewed was Justin Vernon – better known to most as Bon Iver. Unlike almost all of the other interviewees in the book, Vernon chose a very recent song. A song he'd produced for British trio, The Staves, not long before his Boilen interview took place. As such, the song in question – No Me, No You, No More – is the most up-to-date life-changing song in the whole book.

Here's what Vernon had to say about the song and its recording in his famous converted-veterinary-clinic recording studio in Wall Creek, Wisconsin:

"I couldn't quite understand just what didn't hit me right about the guitar part, and so we just kind of ended up making a loop off of one of the girls' voices, just a kind of a drone note. And they just sat in the control room, just started working through an arrangement. They went out on th mics, and they just sang the entire thing to a drone with no click-track. It was just one of those magical moments like that. I'd say this has probably only happened two or three times in my life. At certain moments when they were doing this take, it felt like I was kind of out of my body. At that moment, I realized that there are certain people that you come across in your life, and with this particular experience, these people seemed to be people I was meant to know, and our friendships have grown to be so special – one-in-a-lifetime type friendships. But that particular moment just took me away and really reminded me of so many of the things you forget about when you're out on tour and you make records. The Staves were just another record that I was making in a line of… records that I wanted to make, and to kind of just be picked up and removed from the earth for a second – that was pretty incredible."

The (Principle 20) drone Vernon accidentally created is certainly, I think, a part of the wow the song evokes. But partly, too, it's how the drone (Principle 19) fades in and out of focus as the song's lyric progresses. The real wow, however, comes from the contrast between the drone and the intertwining voices of the three sisters. From the Everly Brothers onwards, there has always been something special about the way in which siblings are able to tune in to the voice of the others to achieve a timbre synergy. And we certainly get that in spades with the Staves. One plus one plus one is definitely greater than three here.

SYSTEM ATIC INNOVAT ION

Their sound is simultaneously deeply familiar and at the same time really pushes different harmonic structures and vocal movements that don't really make any traditional sense.

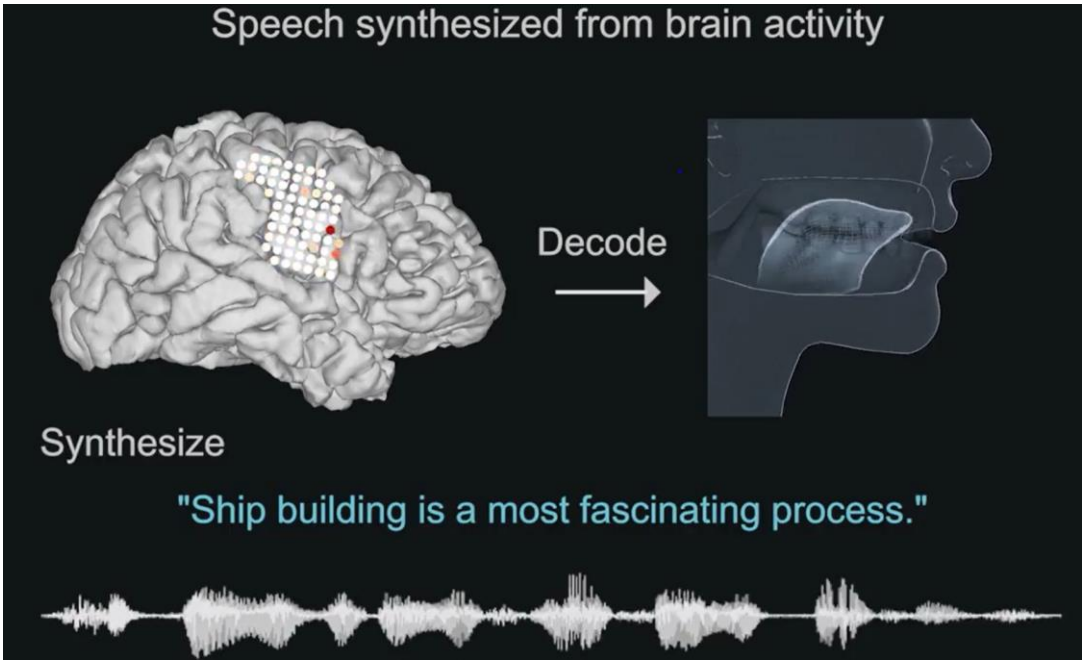
Then we get the words themselves. They open with this…

I can't go back to life before
Before I knew that you didn't love me no more
You didn't need me no more
You didn't love me no more
You didn't want me at all

The genius of which is the (Principle 4) non-rhyming 'at all' in the last line after the '…ore' pattern has been set in the listener's expectations from the first four lines.

Then, finally, when we step back again, I'm left thinking about Justin Vernon's words. I'd seen the Staves in concert before they made If I Was, the album on which No Me, No You, No More features as the third track. I thought the harmonies were great. I bought their first album on the back of what I heard that night. Somehow it had lost something. There are two kinds of group in the world: those that can play live and can't capture the experience on record, and there are those that can't play live, but produce great records. On the evidence of their first album, The Staves seemed to be clear contenders for the first category. But then they had the great insight to get in touch with Justin Vernon, and go take themselves to a converted veterinary clinic in Wall Creek to get well and truly out of their comfort zone. It's a long way from Watford to Wisconsin. No Me, No You, No More says to me it was the smartest career move The Staves could ever have made.

Investments – Prosthetic Voice



“In my head, I churn over every sentence ten times, delete a word, add an adjective, and learn my text by heart, paragraph by paragraph,” wrote Jean-Dominique Bauby in his memoir, “The Diving Bell and the Butterfly.” In the book, Mr. Bauby, a journalist and editor, recalled his life before and after a paralyzing stroke that left him virtually unable to move a muscle; he tapped out the book letter by letter, by blinking an eyelid.

Thousands of people are reduced to similarly painstaking means of communication as a result of injuries suffered in accidents or combat, of strokes, or of neurodegenerative disorders such as amyotrophic lateral sclerosis, or A.L.S., that disable the ability to speak.

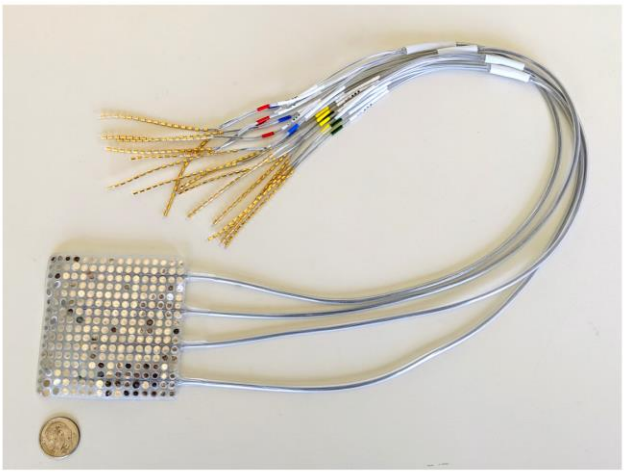
Now, scientists are reporting that they have developed a virtual prosthetic voice, a system that decodes the brain’s vocal intentions and translates them into mostly understandable speech, with no need to move a muscle, even those in the mouth. (The physicist and author Stephen Hawking used a muscle in his cheek to type keyboard characters, which a computer synthesized into speech.)

“It’s formidable work, and it moves us up another level toward restoring speech” by decoding brain signals, said Dr. Anthony Ritaccio, a neurologist and neuroscientist at the Mayo Clinic in Jacksonville, Fla., who was not a member of the research group.

Researchers have developed other virtual speech aids. Those work by decoding the brain signals responsible for recognizing letters and words, the verbal representations of speech. But those approaches lack the speed and fluidity of natural speaking.
The new system, described last month in the journal Nature, deciphers the brain’s motor commands guiding vocal movement during speech — the tap of the tongue, the narrowing of the lips — and generates intelligible sentences that approximate a speaker’s natural cadence.

Experts said the new work represented a “proof of principle,” a preview of what may be possible after further experimentation and refinement. The system was tested on people

who speak normally; it has not been tested in people whose neurological conditions or injuries, such as common strokes, could make the decoding difficult or impossible.
For the new trial, scientists at the University of California, San Francisco, and U.C. Berkeley recruited five people who were in the hospital being evaluated for epilepsy surgery.



The ECoG Electrode Array is made up of intracranial electrodes that record brain activity. University of California, San Francisco

Gopala Anumanchipalli, a neurologist at U.C.S.F., holding an array of electrodes similar to those used in the current study.
University of California, San Francisco

Many people with epilepsy do poorly on medication and opt to undergo brain surgery. Before operating, doctors must first locate the “hot spot” in each person’s brain where the seizures originate; this is done with electrodes that are placed in the brain, or on its surface, and listen for telltale electrical storms.

Pinpointing this location can take weeks. In the interim, patients go through their days with electrodes implanted in or near brain regions that are involved in movement and auditory signaling. These patients often consent to additional experiments that piggyback on those implants.

Five such patients at U.C.S.F. agreed to test the virtual voice generator. Each had been implanted with one or two electrode arrays: stamp-size pads, containing hundreds of tiny electrodes, that were placed on the surface of the brain.

As each participant recited hundreds of sentences, the electrodes recorded the firing patterns of neurons in the motor cortex. The researchers associated those patterns with the subtle movements of the patient’s lips, tongue, larynx and jaw that occur during natural speech. The team then translated those movements into spoken sentences.

Native English speakers were asked to listen to the sentences to test the fluency of the virtual voices. As much as 70 percent of what was spoken by the virtual system was intelligible, the study found.

“We showed, by decoding the brain activity guiding articulation, we could simulate speech that is more accurate and natural sounding than synthesized speech based on extracting sound representations from the brain,” said Dr. Edward Chang, a professor of neurosurgery at U.C.S.F. and an author of the new study.

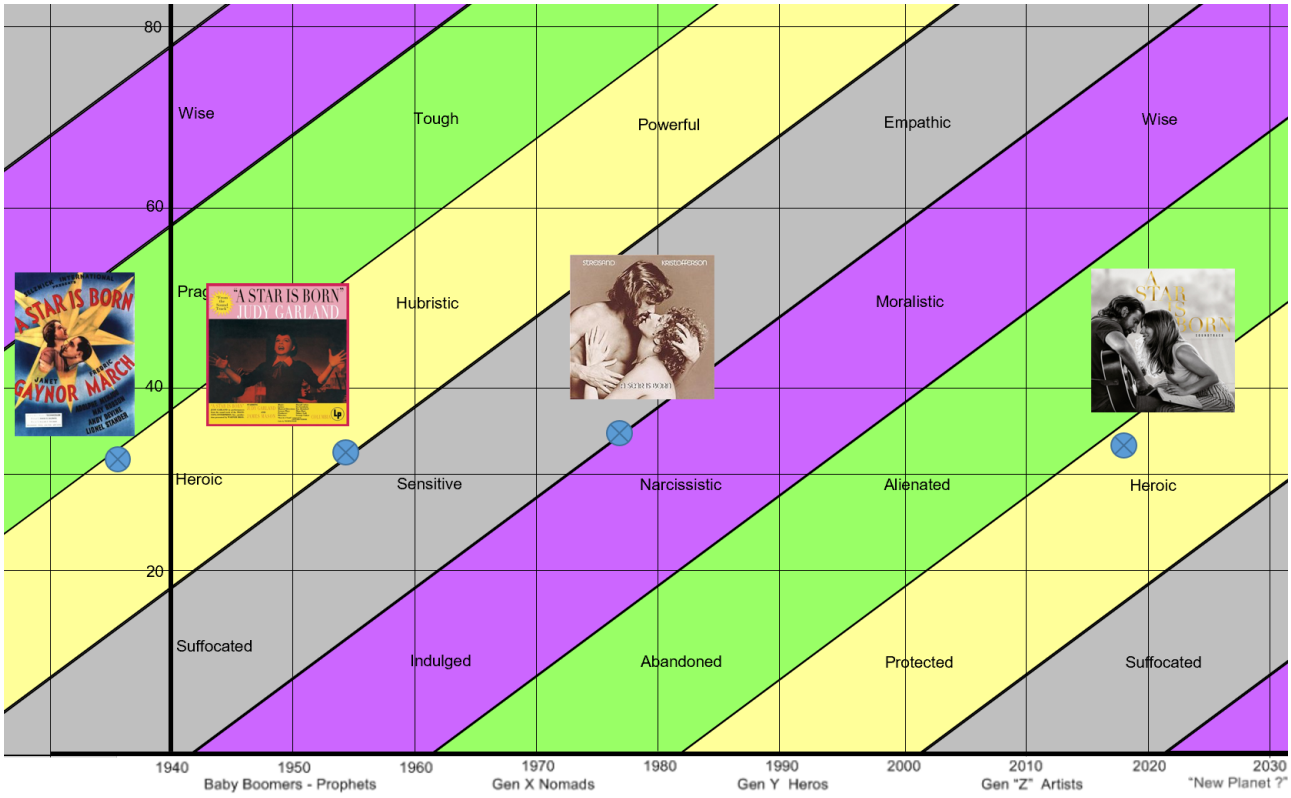
Previous implant-based communication systems have produced about eight words a minute. The new program generates about 150 a minute, the pace of natural speech.

The researchers also found that a synthesized voice system based on one person's brain activity could be used, and adapted, by someone else — an indication that off-the-shelf virtual systems could be available one day.

The team is planning to move to clinical trials to further test the system. The biggest clinical challenge may be finding suitable patients: strokes that disable a person's speech often also damage or wipe out the areas of the brain that support speech articulation. Still, the field of brain-machine interface technology, as it is known, is advancing rapidly, with teams around the world adding refinements that might be tailored to specific injuries.

"With continued progress," wrote Chethan Pandarinath and Yahia H. Ali, biomedical engineers at Emory University and Georgia Institute of Technology, in an accompanying commentary, "we can hope that individuals with speech impairments will regain the ability to freely speak their minds and reconnect with the world around them."

Generational Cycles – A Star Is (Re-) Born



The Star Is Born story has become an iconic one: Fading star discovers and nurtures the next generation star, and then dies. It is a classic Hero's Journey tale. One with, quite literally, a death of the 'old' way and a succession of the new. It is the jump from one s-curve to the next writ large. Hollywood has remade the story five times already, four using the title, A Star Is Born. Looking at the four, we see a number of interesting patterns. Firstly, the ages of the new stars at the time they made their respective versions of the film:

Janet Gaynor – 31
Judy Garland – 32
Barbra Streisand – 34
Lady Gaga – 32

Then look at the Generations map above and what that means in terms of their place in generational history. Lady Gaga was a year or two too late with her 2018 version (but then, it did have a longer gestation period as is common in modern-day Hollywood), but all four occurred at a generational transition point.

With that in mind, it is also telling that the generational hand-over between the old and new generations fits with the patterns of the generations: Bradley Cooper's jaded, alienated, authenticity-locked Nomad, handing over to Lady Gaga's Hero. Kris Kristofferson's sensitive artist handing over to narcissistic Streisand (who also produced the film) in the 1976 version. Heroic James Mason handing over to sensitive Judy Garland in the 1954 version. Alienated Frederic March handing over to heroic Janet Gaynor in 1937.

Note too how there wasn't a version to catch the generational shift in the mid-1990s. A reluctance of the narcissists to hand over to the alienated Nomad next generation

perhaps? Personally, I’d vote for someone to fill in the gap. One of narcissists-supreme, Crosby, Stills or Nash handing over the reins to Ari-Up of the Slits maybe?

Biology – Spittlebug

The froghoppers, or the superfamily Cercopoidea, are a group of hemipteran insects in the suborder Auchenorrhyncha. Adults are capable of jumping many times their height and length, giving the group their common name. They are perhaps best known, however, for their plant-sucking nymphs, 'spittlebugs' which encase themselves in foam in springtime.

The foam is a lovely solution to a safety problem. Spittlebugs are prey for a number of larger insects. By making a cloud of (unpleasant tasting) bubbles around themselves, they manage to avoid nearly all these predators. The foam is a great way of making a little go a long way. The spittlebugs suck on the sap from their host plant. The sap is quite low on nutrients, so the nymphs have to process a lot of it. Up to 150 times their body weight in a day sometimes. Rather than just excreting the spent sap, the nymphs transform it into the foam and thus get a two-for-one benefit: nutrients and protection.

From a contradiction perspective, the protection part of the problem looks something like this:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Safety/Vulnerability (38)

WORSENING PARAMETERS YOU HAVE SELECTED:

Amount of Substance (10)

SUGGESTED INVENTIVE PRINCIPLES:

35, 31, 13, 9, 5, 30, 40

Inventive Principles 31 (Porous Materials) and 30 (Flexible Shells & Thin Films) both point us directly to the foam solution. Principles 9, Prior-Counteraction and 5, Merging also

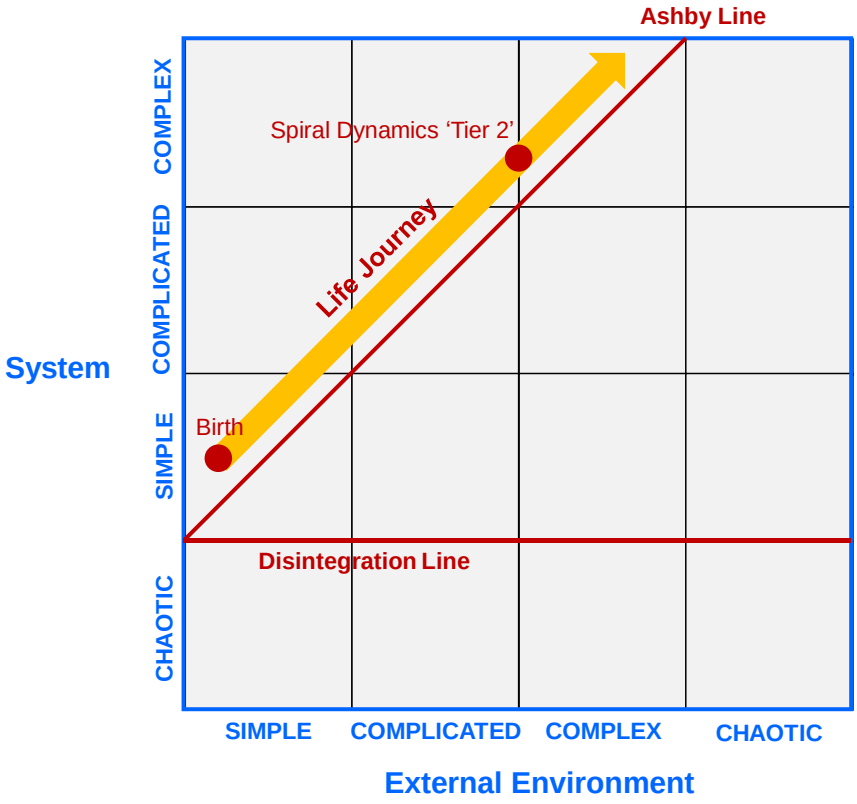
make for a pretty good proxy for the two-for-one benefit. Principle 40 points towards the addition of the foul-tasting additive that makes the foam unappealing to predators.

Biologists have recently realized that the spittlebug tends to come out of the foam to breathe. Then, when a predator appears, the nymph disappears into the foam again. Where, if the predator hangs around for a long time, the cunning spittlebug is still able to breathe by piercing some of the foam bubbles and breathing the air they contain. Does that make it a three-for-one solution? Protection, way of processing waste and emergency air-supply. Who'd'a thunk of that?

Lovely video: https://www.nytimes.com/video/science/100000006346172/how-the-spittlebug-builds-its-bubbly-fortress.html?playlistId=100000002331748

Short Thort

"It is because Humanity has never known where it was going that it has been able to find its way."
Oscar Wilde



News

Dublin
The link if anyone wishes to book for the 'Future-Proofing Enterprise' workshop in Dublin on 12 June: http://www.irdg.ie/future-proofing-enterprise-jun12/

TRIZ Games
Anyone that hasn't done so yet might want to consider submitting an abstract for the second volume of TRIZ Games. The deadline is officially the end of this month… but you know how the TRIZ world works by now. Check out https://www.synnovating.com/call-for-chapter-triz-games-book. Meanwhile, we're pleased to say that our 'Oblique StrateTRIZ: Enabling Peak Creativity' effort did make it before the official deadline. Call it a first.

ICSI10
Just a quick reminder that the 10th International Conference on Systematic Innovation is taking place at the University of Liverpool from 8-11 July. The UK SI team now look like we'll be presenting four papers, one keynote, at least one competition entry and a tutorial session. All in all, its shaping up as the biggest TRIZ event of the year. And you get to do the Beatles Tour. Check out the agenda and details here… http://www.i-sim.org/icsi2019/.

Innovation In Music
Looks like we'll be presenting a TRIZmeta paper at the UK's big music innovation conference, which, this year, will take place at the University of West London from the 5th to the 7th of December.

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

Education – 'Equity' Strategy Workshop
Education – 'Designing Meaningful Research' Seminar
Government – Strategic Study
Power – SI Certification Workshops
Conglomerate – Innovation Skills For 'Future Leaders' Workshop Series
Agriculture – Proof Of Concept Demonstrator Project
Agriculture – Bulletproof IP Project
Automotive – Future Trends Workshop