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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

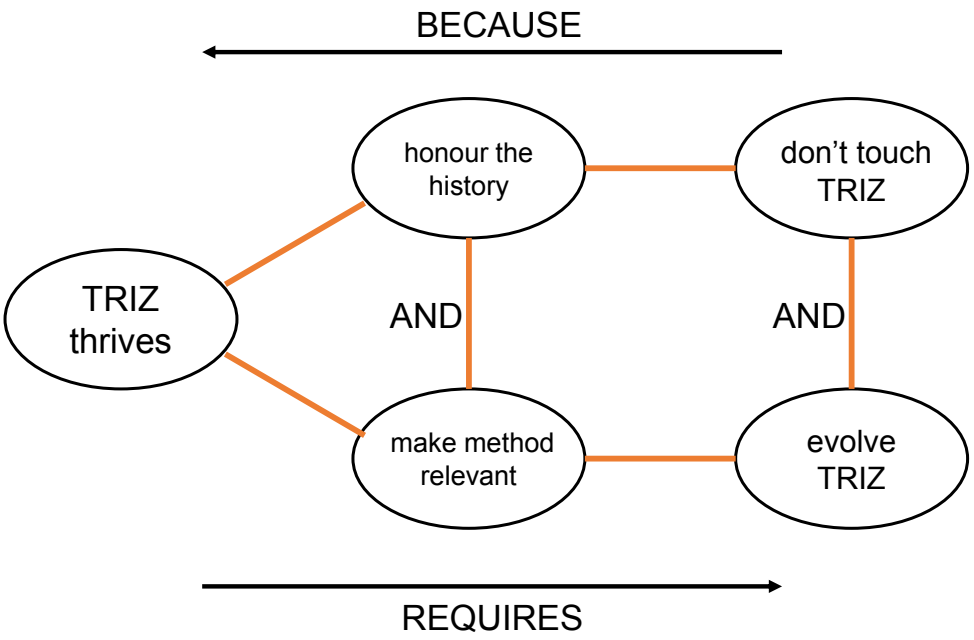
Does The TRIZ Community Use TRIZ?

"Take my advice – I'm not using it."

It would be fair to say that in most parts of the world, TRIZ has been in something of a tailspin for the last few years. For the last few months, the TRIZ community – if there can be said to be such a thing when half of the TRIZniks refuse to be in the same room as the other half – has decided something must be done to put things right.

Why don't we, someone helpfully suggested, put together a coherent glossary of TRIZ terms so that newcomers to the tools or method all know where they're starting. Everyone agreed. Or rather they said they agreed. It took about a week before someone injected into the discussion, 'hey, that isn't a TRIZ word', and another couple of days for the whole glossary idea to crumble into an irrelevant nothing.

Just before the collapse happened, I decided to make a small experiment. 'Maybe,' I interjected into the argument, 'maybe what we have here is a contradiction? Maybe the word should go in the glossary *and* not go in the glossary?' In a naïve attempt to help visualize the situation I drew this:



My question received four types of response:

1) Hear, hear (the minority, sadly)
2) Yes, but the word still isn't a TRIZ word (the majority, even more sadly)
3) That isn't a TRIZ template
4) What do you mean 'contradiction'

It's the fourth of those response types that provoked the investigation surrounding this article. How could it possibly be that senior people inside the Community weren't able to recognize a contradiction? Really? I literally had to pinch myself to make sure I wasn't in the middle of some kind of Twilight Zone nightmare. One of the central pillars of TRIZ and they couldn't see it?
And then I realized that a version of the same basic problem is endemic.

For example. The ‘traditionalists’ that tell the rest of the community ‘don’t touch TRIZ’, do they understand that another pillar of TRIZ is Function. The same people that will happily tell their TRIZ-eager students, ‘no-one wants a drill, they want a hole’, will in the very next sentence try to sell those same students a drill called TRIZ.

We see a similar thing when TRIZniks answer questions like, ‘should I use TRIZ or X?’ (where X is one of the million other problem solving methodologies available on the planet) with an answer that basically tells the poor unfortunate that asked the question, ‘don’t be an idiot, TRIZ is all that is ever needed’. Again completely failing to see that some problems require Functions that classical TRIZ doesn’t contain.

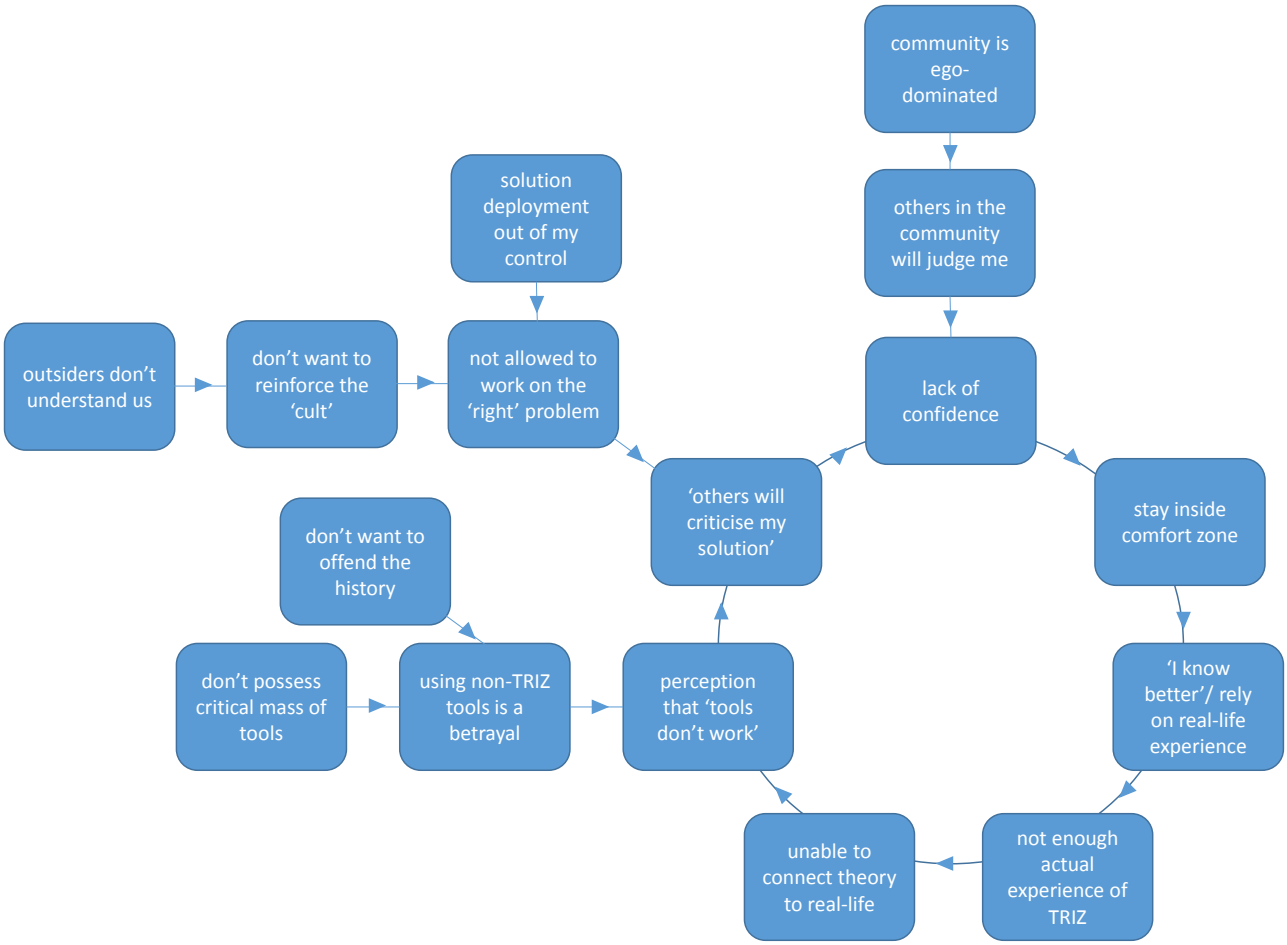
And, biggest of all, if the world’s most powerful problem solving process (TRIZ) is on decline at a time when three-quarters of the world is in crisis and in desperate need of problem solving tools, how come the Community isn’t able to deploy the toolkit to try and solve the problem? If you didn’t laugh, you’d probably drown in your own tears.

When I first off tried exploring these issues with a few people in the Community, the consistent answer I received was that ‘because we’re all so steeped in TRIZ thinking, it has now become automatic’. I think the basic sentiment was that the TRIZ Community has collectively achieved unconscious competence. Somehow that didn’t seem to fit the data. Or rather, if it did, then it could only be indicative of a collective death wish.

And that didn’t sound right either. So we decided to compile a list of reasons why the TRIZ community is apparently so reluctant to use TRIZ. In no particular order, here’s the list we ended up with:

a) Lack of confidence in the tools
b) Others in the Community will judge me and my ability (or otherwise) to use the tools
c) ‘I know better’/my real-life experience of solving problems will help me solve whatever problem it is that I’m working on.
d) TRIZ is perceived by the outside world as a cult and I don’t want to reinforce the cult’ism
e) Outsiders to TRIZ don’t understand TRIZ, so in order to better connect to the outside world, we should avoid using confusing TRIZ jargon and tools
f) A nagging doubt that the tools don’t work
g) TRIZ will help us to understand what the real problem is, but most times we’re unable to work on that real problem
h) It’s one thing to work out the solution, but quite another to successfully deploy that solution, and in most cases the deployment is out of our control
i) People find it difficult to connect the theory to real life
j) TRIZ doesn’t contain a critical mass of problem definition or solution generation tools
k) Using non-TRIZ tools is a betrayal of TRIZ’s history
l) Whatever solution I might suggest will be criticized by everyone else because i) they know it’s not ideal, and 2) they would inevitably have done it better
m) Since Altshuller’s passing, the Community is very ego-dominated with everyone vying to be ‘the authority’
n) People prefer to stay inside their comfort zone
o) Members of the Community don’t have very much actual real world problem solving experience
p) People don’t want to offend the TRIZ history

After building this list, the only sensible next step – despite knowing we'd be stepping out of TRIZ tradition yet again – seemed to be to construct a Perception Map. Here's what that looked like when we'd connected all the dots:



Whichever way you look at it, that vicious cycle is pretty vicious.

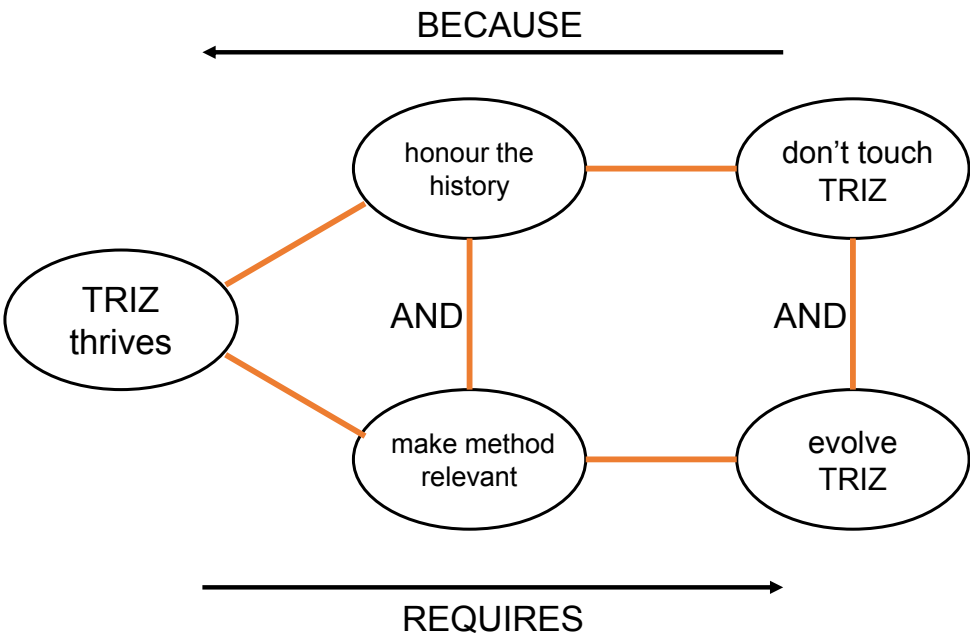
The good news, when I put my TRIZ Hat on, is that I know that every vicious problem is eminently solvable.

The not so good news is that, when I put my 'Real-Life' Hat on, I know there are a million and one problems to work on and some are eminently more solvable than others. When I put my Carl von Clausewitz Hat on (I look good in the mirror!) I know that I'm supposed to make sure that whatever problem I choose to work on, I am in possession of a Critical Mass of resources.

Now, despite the fact that two-thirds of the TRIZ Community has effectively barred themselves from ever drawing a Perception Map, a small part of me wonders if the collective unconscious competence of the Community somehow implicitly recognizes the vicious circle we've shown here, and implicitly knows that the Community doesn't possess said Critical Mass of resources to break it.

I would love it if that turned out to be true. In my heart of hearts, however, past experience tells me that the collective unconscious competence is a tad closer to collective unconscious incompetence.

Ever the optimist, however, if it does turn out that the unconscious competence also implicitly recognizes that we can't elephants in one mouthful, and that what's needed is a 'sense of progress'. Maybe, if this hypothesis turns out to be right, the Community can't break itself out of its vicious cycle with today's resources, but that shouldn't stop it working on a problem that helps get there eventually. Like the problem at the start of this article:



I'm 100% certain the Systematic Innovation team alone doesn't have the resources to solve this problem. But I'm also 99% certain 'the Community' as a whole does. Everything about this problem is contained completely within the Community. If we can't collectively solve this one it's either because:

a) We're idiots
b) A critical mass of non-idiots within the Community do actually wish to kill it.

As to answering that question, I'm sealed my answer in an envelope. And I have my fingers crossed that activities in the coming months will, at the very least, reveal which of the answers is the truth.

Darrell's offer, relating to the challenge posed in this article: If any ezine reader has any comments, suggestions pertaining to things that might be missing from the Perception Map, changes to the Perception Map or even solution suggestions, he will very happily compile, integrate and circulate them in an update to the article. Contact him at the usual address: darrell.mann@systematic-innovation.com.

PanSensic: Brand Personality Tools

Segmentation, segmentation, segmentation. I have a theory that pretty much every business book on the planet is saying the same thing, just looking at the same data through different segmentation lenses. You say tomayto, I say tomato, but we both basically mean the same base ingredient of Spaghetti Bolognese. Copyright law has a lot to answer for. By way of example, we've had occasion in recent months to look at tools for measuring 'brand personality'. To say there are a lot of them wouldn't be a big exaggeration. On one level the variety of options on offer isn't such a bad thing. One of the main philosophical tenets of the PanSensic offering is to be able to offer users lots of different lenses to look through in the hope that one or two will reveal the insight that enables them to act with the confidence that they have meaningfully seen something no-one else has. So being able to assess the 'personality' of your brand, or your company's brand by looking at lots of different models can't be a bad thing…

…unless, that is, if the collective lenses start to reveal conflicting messages. Or, worse yet, that they deliver a result that offers no clues about what or how to change things to your advantage.

It's that second issue that we turn our attention to in this article.

By way of starting somewhere, perhaps one of the most widely used of the brand personality models is the one developed by Jennifer Aaker (Reference 1). The Aaker Brand Personality Model has its foundations in fundamental human psychology research, and has the big plus point that it segments the personality world into just five, easy to remember, dimensions – Figure 1:

Figure 1: Aaker Brand Personality Model Dimensions

Couple this model with a radar plotting tool, a means of ranking one company relative to its competitors, and a few trend graphs and users are able to construct all sorts of pretty pictures, and learn, for example, that the Royal Bank of Scotland has a higher 'Ruggedness' score than Goldman Sachs (really?). Or that Credit Suisse is more 'Competence' oriented than HSBC. Figure 2 illustrates some typical output. It all looks

very compelling. Especially to marketing executives it would seem. But where did the data come from? How was the scoring done? And, most important of all, what can an individual marketer at, say, HSBC do to get more of their customers to think of them as more 'Sophisticated'?

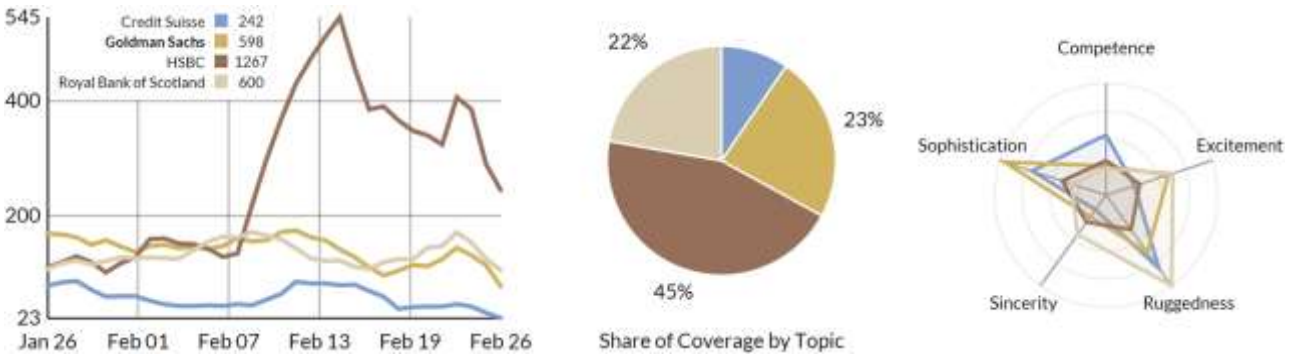


Figure 2: Some Pretty Brand Personality Comparison Graphics

The answer to the first pair of questions is easy: a bunch of 'consumers' have filled out a number of Likert-scale type questionnaires. The answer to the last question is somewhat more nebulous, usually coming down to 'try something and see what happens'.

Solving the Likert-scale problem is precisely what all of the PanSensic tools are about: 'reading between the lines' of what people *mean* when they score 'Sincerity' as a 6 on a 9-point scale requires us to capture and analyse narrative content.

Solving the 'what do we do to improve?' problem requires a much more segmented view of the world. A view that in the traditional Likert-world isn't usually available to us. Invariably for the simple reason that getting lots and lots of different stakeholders to fill in questionnaires is time-consuming and very expensive.

One of the first attractions of PanSensic in this kind of situation is that it is able to tap in to lots and lots of already existing narrative data. Internal email traffic, social media discussion of a brand, corporate messaging all tend to exist in abundance. Taken together, these three narrative sources allow a Marketing function to simply and effectively triangulate their current 'as is' situation:

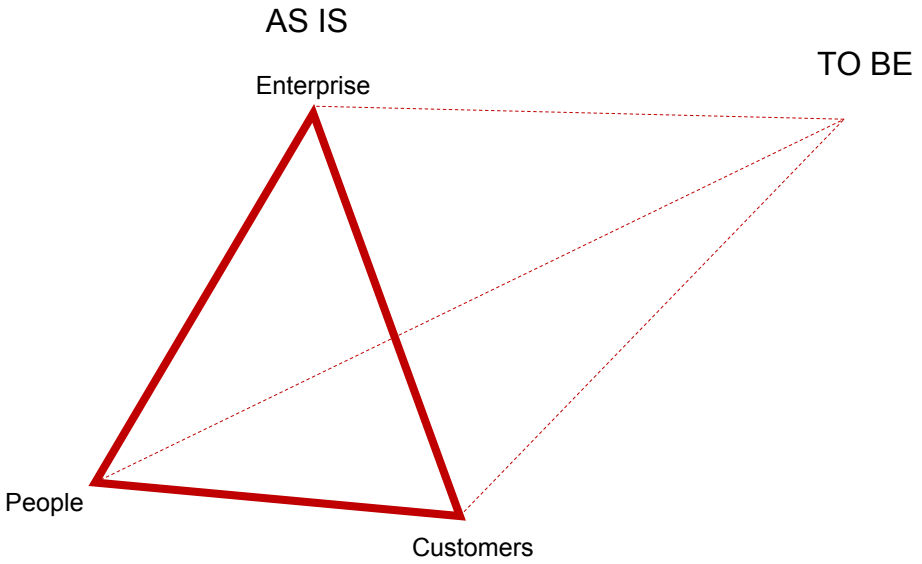


Figure 3: Brand Personality – Creating The Ability To 'Act With Confidence'

Knowing how to get your Brand Personality moving in the direction you want, first and foremost requires a Brand Manager to know where they are going. Defining this 'To Be' destination of a Brand evolution programme is all about looking at the ontolog(ies) of the given Personality measurement lens(es) that is being used and deciding which of the various words are important to the brand. If we're using the Aaker model, for example, the Brand needs to have a clear understanding of how they desire to be viewed by the outside world. Do we wish to be seen as 'Sophisticated'? Or a combination of Energetic and Competent? Or something else?

Fundamentally this desired end point is a point. In terms of the Figure 3 graphic, the three key stakeholders at the 'To Be' point have all become aligned.

So much for where we're trying to get to. When we then shift our attention to the 'As Is' it is conceivable that the enterprise messaging, what customers are saying and what the people inside the organisation are saying are not in alignment. Knowing that they are different, and knowing *how* they are different, then, allows a Brand to, for the first time, start meaningfully acting to close the gap between today and desired tomorrow: if customers perceive you as one thing, your employees as something else and neither matches your intent, then you now at least now *what* needs to be done.

Working out the *how* then becomes about finding and tailoring language and particular narrative stories consistent with the desired end-goal. Again, the instrument ontolog(ies) we've used to make the measurements readily offers up a series of key-words and phrases and story-lines we should consider using to reframe a Brand Personality.

Any such shifts, of course, now become prone to the inevitable vagaries present in any complex adaptive system: the future cannot be designed, it 'emerges'. The best a Brand owner can hope to do in this kind of complex environment is to provoke the system with a change, evaluate what happens and learn from that feedback to design the next change iteration.

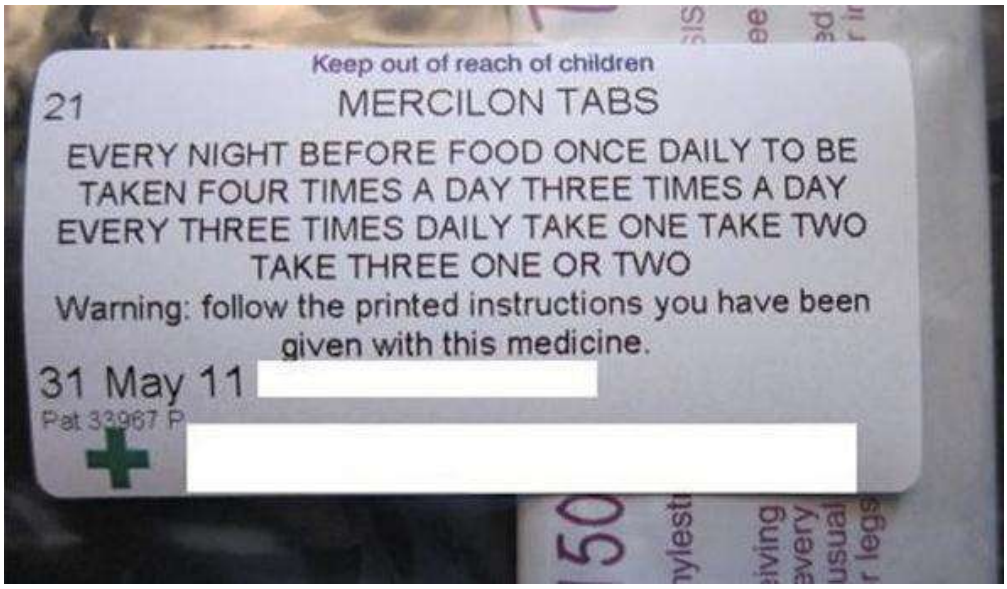
Traditionally this tends not to happen because not many Marketers have a deep enough understanding of complex systems, but more pragmatically too because we find ourselves back at the Likert-questionnaire problem: it's expensive to do the surveys and users get very jaded and bored with them very quickly and so we're unable to run surveys on a continuous basis. Consequently the needed feedback loop isn't there. Perhaps the biggest contribution PanSensic now offers actually, thanks to the way it scrapes data the moment it is created, is the ability to create a series of very rapid and accurate feedback loops. Brand managers can experiment with a change in messaging and learn within weeks, or maybe days or hours, whether it is having any impact on the Personalit(ies) of their brand. Irrespective of the particular measurement system – whether it be Aaker's or any of the myriad alternatives - once the ontology is built into your PanSensic lenses, it becomes possible to look through those lenses in real time to see how your world is changing.

Reference

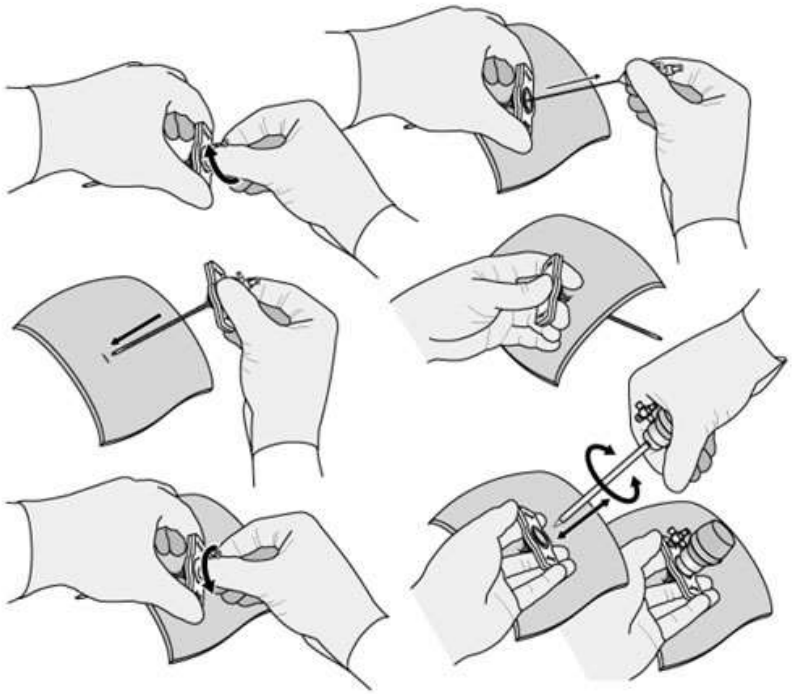
1) Aaker, J.L., 'Dimensions Of Brand Personality', Journal Of Brand Marketing, August 1997, 34, 3.

Not So Funny – Bad Instructions

We recently had occasion to do a short study on reasons for hospital admissions. It was a surprise to learn that an extraordinary percentage were due to patients using their medications incorrectly. And then, upon closer inspection, it didn't seem so surprising any more:



Okay, so people have stopped reading instructions anyway, so maybe this kind of thing isn't such a big problem. Make everything instinctive. Or if that's not possible, use pictures. Something like this:



What could possibly go wrong?

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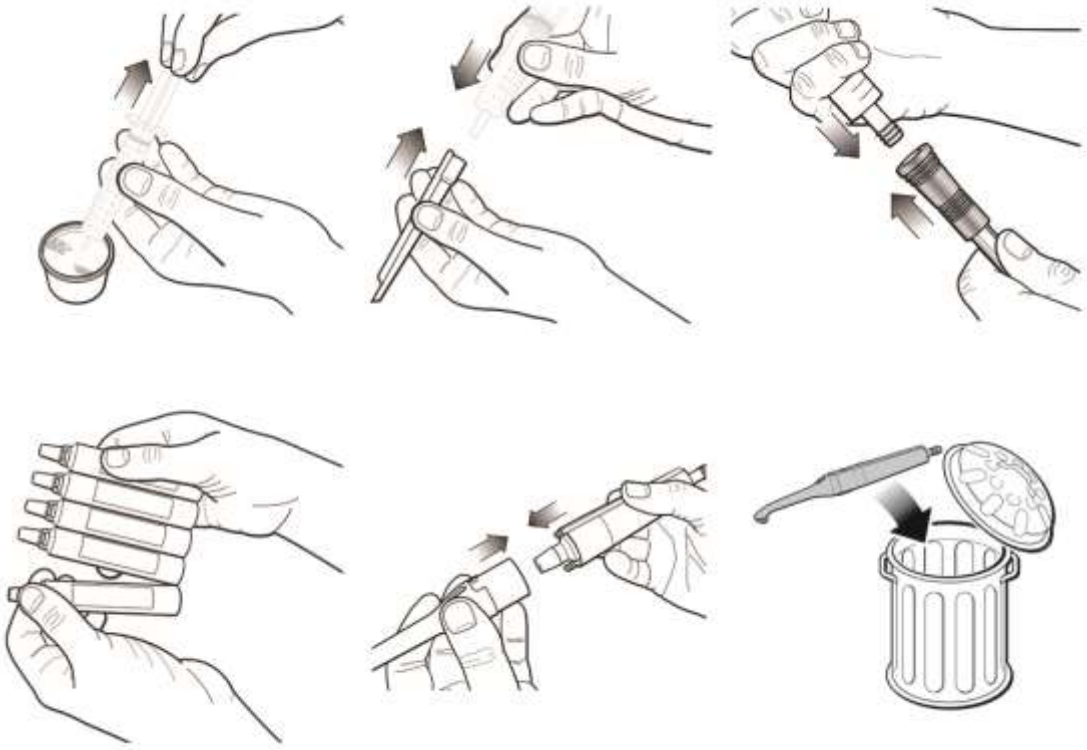
Maybe the safest course of action is to follow these instructions…



…at least this one avoids harm. Assemble the medication delivery system, then put it directly in the trash. I half wonder whether this one is like an IKEA assembly instruction version of the Placebo Effect?

Poor instructions, thankfully, don't just restrict themselves to the healthcare sector. I have kind of a sneaking admiration for this one. The number of times this happened to me on my way to the seaside I can't tell you. Finally, someone's done something about it:

This one's a fairly safe bet though:

Personally, I tend to allow at least a minute.
And, I practically made this next one into a living mantra:

I will not make cucumber. I will not make cucumber. I will not make cucumber….
I also endeavour to never do this either:

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I suspect, however, given half the chance that this greedy fisher would chose not to follow this instruction set. He's got other problems…

…like trying to work out what everyone is saying about him behind his back. Life can be cruel sometimes. But then there's such a thing as karmic balance. With that in mind, I think this is my favourite instruction set:

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If I ever get a dog, I want one like this.

Hold on a minute, a late entry. This is the winner:

Patent of the Month – Plasma Encapsulation

We head to the University of Texas for our Patent of the Month this month. US9,120,125 was granted to Richard Timmons and Ceren Susut on the 1st of September. The invention is focused in the area of particle encapsulation. A technology that has been around for a long time, but which is only just beginning to enter the mainstream. Probably because the manufacture technology has been a limiting factor. Up until now. Here's what the inventors have to say about the manufacture challenge:

Particle encapsulation, in which a particle is surrounded or coated by at least one layer of a surface, has many beneficial uses. Unfortunately, current methods of encapsulation generally require a number of technical steps and result in encapsulated products with poor stability. In addition, most methods result in low product yields, due, in part, to the limited tolerance of the starting materials to industrial operating conditions and the numerous technical difficulties associated with the encapsulation process, with product recovery and inadequate recycling from the reaction systems.

Particle encapsulation, for example, offers a method in which a particle may be introduced to an environment in a more controlled manner. The control is generally imposed by varying different aspects of the coating, such as its composition. Such control generally falls into one of two categories: temporal control and distribution control. Temporal control introduces the particle to the environment over an extended time period or at a pre-specified time. Here, the aim is to match the rate of particle introduction to the rate of particle elimination from the environment. Thus, the particle concentration appears to be regulated and often for a much longer time. This technique is particularly beneficial when introducing a particle into a biologic system for therapeutic purposes, because the overall therapeutic index is improved.

Distribution control, on the other hand, provides for the introduction of a particle at at least one specific environmental location. Such control may be desired when the particle is not required or presents/encounters problems when introduced to the entire environment. In biologic systems, distribution control may reduce or eliminate the occurrence of undesirable side effects.

Current approaches to particle encapsulation include layer-by-layer assembly of polyelectrolytes, emulsion-solvent evaporation processes, formation of hydrogel films, and the preparation of systems based on thiolated polymers, sol-gel carriers, and granulation techniques. While current approaches do provide satisfactory results for introducing particles to an environment; these approaches are complex, involve a number of technical steps, generate large amounts of waste products, and are often inadequate in truly controlling the introduction of the particle into the environment.

Clearly, then, there remains a need to provide for more efficient compositions, systems and methods for introducing particles to an environment in which the particle introduction may be better controlled temporally and/or site-specifically.

Here's how we might map this cluster of related problems onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Trainability/Operability/Controllability (34)

WORSENING PARAMETERS YOU HAVE SELECTED:

Loss of Substance (25) and Manufacturability (41) and Productivity (44) and System Complexity (45) and Control Complexity (46)

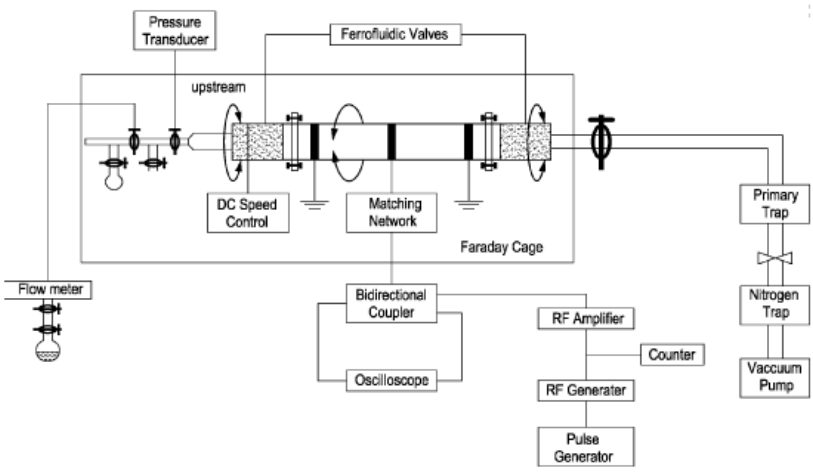
SUGGESTED INVENTIVE PRINCIPLES:

5, 1, 28, 24, 29, 12, 3, 25, 2, 17, 10, 37, 4, 15, 34, 36, 32, 13, 23, 26

The title of the disclosure probably gives away the main inventive step contained in the invention: the inventors solve the negatives of current manufacture processes by making use of a plasma (Principle 28, with possibly a bit of Principle 36 thrown in for good measure). Here's the solution as described in the main Claim of the patent:

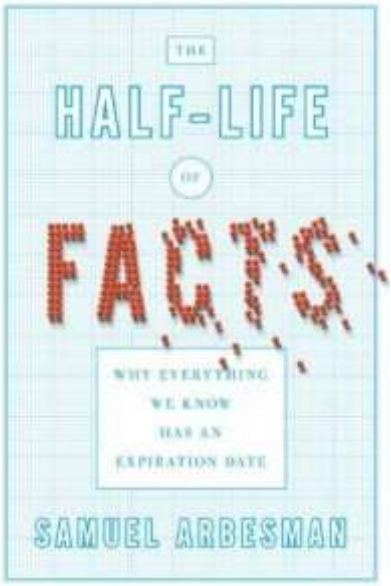
Encapsulated particles comprising one or more constituents disposed in a duty cycle tuned cross-linked polymeric coating to form the encapsulated particles wherein the one or more constituents are released from the encapsulated particles when the encapsulated particles are placed in a target environment, wherein the duty cycle tuned cross-linked polymeric coating provides a controlled release of the one or more constituents from the encapsulated particles in the target environment: wherein the encapsulated particles are formed by the method comprising: placing particles in a reaction chamber of a plasma reactor; supplying a carbonaceous composition to the reaction chamber; forming a cross-linked polymeric coating on one or more of the particles by plasma enhanced chemical vapor deposition of the carbonaceous composition under predetermined reaction conditions, wherein the predetermined reaction conditions comprise a predetermined duty cycle, power input, and coating time that is selected to provide a desired amount of cross-linking to the polymeric coating; wherein the cross-linked polymeric coating provides a desired controlled release profile of the one or more constituents from the encapsulated particles.

…which tells us to also add a little bit of Principle 24, Intermediary ('carbonaceous composition') to the mix. Simple when you know how.



Best of the Month – The Half-Life Of Facts

"Facts change all the time. Smoking has gone from doctor recommended to deadly. We used to think the Earth was the center of the universe and that Pluto was a planet. For decades we were convinced that the brontosaurus was a real dinosaur."



Knowledge, like milk, has an expiry date. That's the key message behind our Best of the Month winner, Samuel Arbesman's book The Half-life of Facts: Why Everything We Know Has an Expiration Date.

The main thesis of the books is that we're bombarded with studies that all eventually seem to say the opposite of what previous studies have told us is true. Caffeine is good for you one day and bad for you the next. Using mobile phones fries your brain, and then doesn't; children should be encouraged to play-out and then need to be cossetted all the time. What we think we know and understand about the world is constantly changing. Nothing is immune. While big ideas are overturned infrequently, little ideas churn regularly.

As scientific knowledge grows, we end up rethinking old knowledge. Abresman calls this "a churning of knowledge." But understanding that facts change (and how they change) helps us cope in a world of constant uncertainty. We can never be too sure of what we know. In introducing this idea, Abresam writes:

Knowledge is like radioactivity. If you look at a single atom of uranium, whether it's going to decay — breaking down and unleashing its energy — is highly unpredictable. It might decay in the next second, or you might have to sit and stare at it for thousands, or perhaps even millions, of years before it breaks apart.

But when you take a chunk of uranium, itself made up of trillions upon trillions of atoms, suddenly the unpredictable becomes predictable. We know how uranium atoms work in the aggregate. As a group of atoms, uranium is highly regular. When we combine particles together, a rule of probability known as the law of large numbers takes over, and even the behavior of a tiny piece of uranium becomes understandable. If we are patient enough, half of a chunk of uranium will break down in 704 million years, like clock-work. This number — 704 million years — is a measurable amount of time, and it is known as the half-life of uranium.

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It turns out that facts, when viewed as a large body of knowledge, are just as predictable. Facts, in the aggregate, have half-lives: We can measure the amount of time for half of a subject's knowledge to be overturned. There is science that explores the rates at which new facts are created, new technologies developed, and even how facts spread. How knowledge changes can be understood scientifically.

This is a powerful idea. We don't have to be at sea in a world of changing knowledge. Instead, we can understand how facts grow and change in the aggregate, just like radioactive materials. This book is a guide to the startling notion that our knowledge — even what each of us has in our head — changes in understandable and systematic ways.

Why does this happen? Why does knowledge churn? In Zen and the Art of Motorcycle Maintenance, Robert Pirsig writes:

If all hypotheses cannot be tested, then the result of any experiment are inconclusive and the entire scientific method falls short of its goal of establishing proven knowledge.

About this Einstein had said, "Evolution has shown that at any given moment out of all conceivable constructions a single one has always proved itself absolutely superior to the rest," and let it go at that.

… But there it was, the whole history of science, a clear story of continuously new and changing explanations of old facts. The time spans of permanence seemed completely random, he could see no order in them. Some scientific truths seemed to last for centuries, others for less than a year. Scientific truth was not dogma, good for eternity, but a temporal quantitative entity that could be studied like anything else.

A few pages later, Pirsig continues:

The purpose of scientific method is to select a single truth from among many hypothetical truths. That, more than anything else, is what science is all about. But historically science has done exactly the opposite. Through multiplication upon multiplication of facts, information, theories and hypotheses, it is science itself that is leading mankind from single absolute truths to multiple, indeterminate, relative ones.

With that, let's dig into how this looks. Arbesman offers an example:

A few years ago a team of scientists at a hospital in Paris decided to actually measure this (churning of knowledge). They decided to look at fields that they specialized in: cirrhosis and hepatitis, two areas that focus on liver diseases. They took nearly five hundred articles in these fields from more than fifty years and gave them to a battery of experts to examine.

Each expert was charged with saying whether the paper was factual, out-of-date, or disproved, according to more recent findings. Through doing this they were able to create a simple chart (see below) that showed the amount of factual content that had persisted over the previous decades. They found something striking: a clear decay in the number of papers that were still valid.

Furthermore, they got a clear measurement of the half-life of facts in these fields by looking at where the curve crosses 50 percent on this chart: 45 years. Essentially, information is like radioactive material: Medical knowledge about cirrhosis or hepatitis takes about forty-five years for half of it to be disproven or become out-of-date.

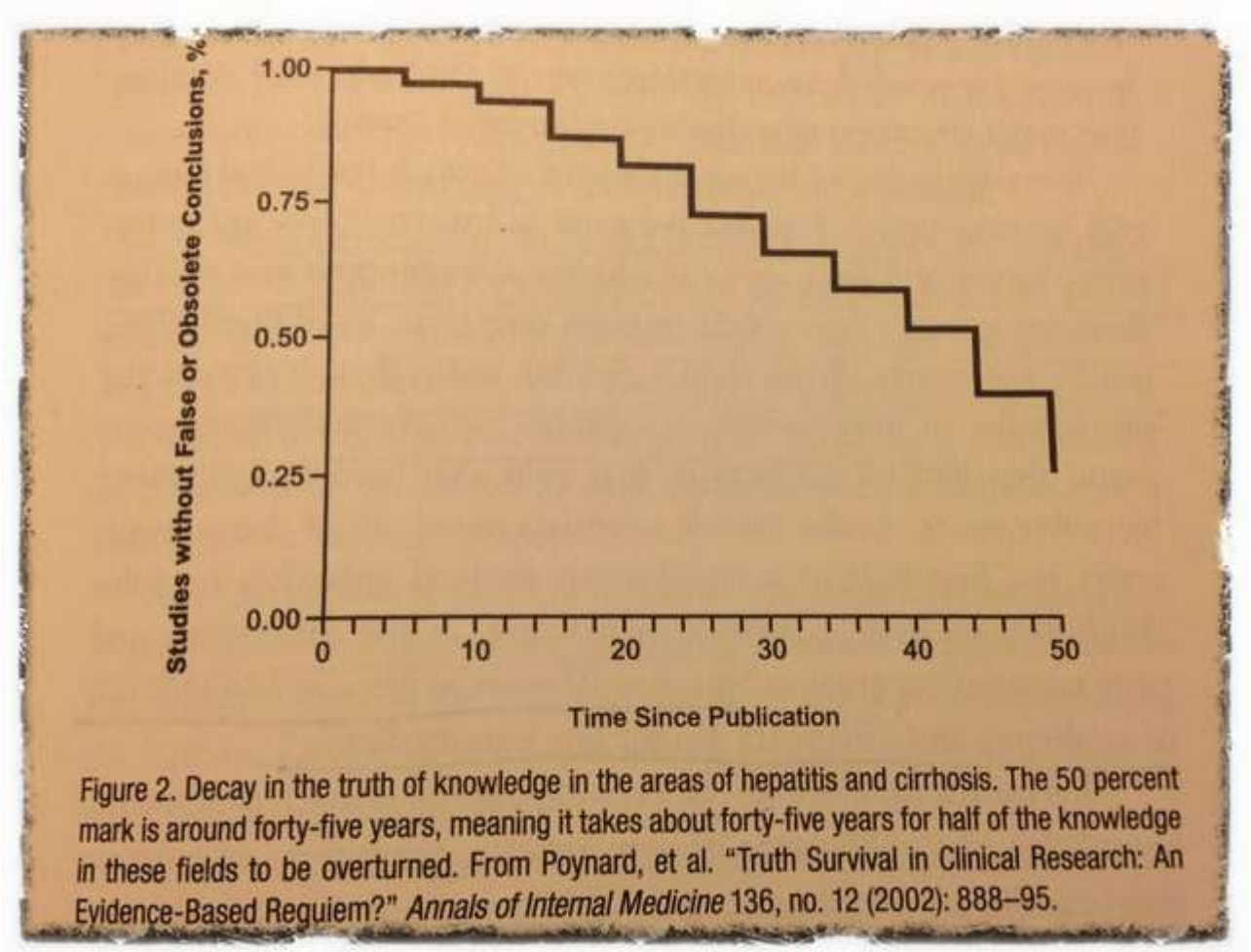


Figure 2. Decay in the truth of knowledge in the areas of hepatitis and cirrhosis. The 50 percent mark is around forty-five years, meaning it takes about forty-five years for half of the knowledge in these fields to be overturned. From Poynard, et al. "Truth Survival in Clinical Research: An Evidence-Based Requiem?" *Annals of Internal Medicine* 136, no. 12 (2002): 888–95.

Old knowledge, however, isn't a waste. It's not like we have to start from scratch. "Rather," writes Arbesman, "the accumulation of knowledge can then lead us to a fuller and more accurate picture of the world around us."

Isaac Asimov, in a wonderful essay, uses the Earth's curvature to help explain this:

"When people thought the earth was flat, they were wrong. When people thought the earth was spherical, they were wrong. But if you think that that thinking the earth is spherical is just as wrong as thinking the earth is flat, then your view is wronger than both of them put together."

When our knowledge in a field is immature, discoveries come easily and often explain the main ideas. "But there are uncountably more discoveries, although far rarer, in the tail of this distribution of discovery. As we delve deeper, whether it's intro discovering the diversity of life in the oceans or the shape of the earth, we begin to truly understand the world around us."

So what we're really dealing with the long tail of discovery. Our search for what's way out at the end of that tail, while it might not be as important or as Earth-shattering as the blockbuster discoveries, can be just as exciting and surprising. Each new little piece can teach us something about what we thought was possible in the world and help us to asymptotically approach a more complete understanding of our surroundings.

In an interview with the Economist, Arbesman was asked which scientific fields decay the slowest-and fastest-and what causes that difference.

Well it depends, because these rates tend to change over time. For example, when medicine transitioned from an art to a science, its half-life was much more rapid than it is now. That said, medicine still has a very short half-life; in fact it is one of the areas where knowledge changes the fastest. One of the slowest is mathematics, because when you prove something in mathematics it is pretty much a settled matter unless someone finds an error in one of your proofs.

One thing we have seen is that the social sciences have a much faster rate of decay than the physical sciences, because in the social sciences there is a lot more "noise" at the experimental level. For instance, in physics, if you want to understand the arc of a parabola, you shoot a cannon 100 times and see where the cannonballs land. And when you do that, you are likely to find a really nice cluster around a single location. But if you are making measurements that have to do with people, things are a lot messier, because people respond to a lot of different things, and that means the effect sizes are going to be smaller.

Arbesman concludes his economist interview:

I want to show people how knowledge changes. But at the same time I want to say, now that you know how knowledge changes, you have to be on guard, so you are not shocked when your children (are) coming home to tell you that dinosaurs have feathers. You have to look things up more often and recognise that most of the stuff you learned when you were younger is not at the cutting edge. We are coming a lot closer to a true understanding of the world; we know a lot more about the universe than we did even just a few decades ago. It is not the case that just because knowledge is constantly being overturned we do not know anything. But too often, we fail to acknowledge change.

Some fields are starting to recognise this. Medicine, for example, has got really good at encouraging its practitioners to stay current. A lot of medical students are taught that everything they learn is going to be obsolete soon after they graduate. There is even a website called "up to date" that constantly updates medical textbooks. In that sense we could all stand to learn from medicine; we constantly have to make an effort to explore the world anew—even if that means just looking at Wikipedia more often. And I am not just talking about dinosaurs and outer space. You see this same phenomenon with knowledge about nutrition or childcare—the stuff that has to do with how we live our lives.

Even when we find new information that contradicts what we thought we knew, we're likely to be slow to change our minds. "A prevailing theory or paradigm is not overthrown by the accumulation of contrary evidence," writes Richard Zeckhauser, "but rather by a new paradigm that, for whatever reasons, begins to be accepted by scientists."

In this view, scientific scholars are subject to status quo persistence. Far from being objective decoders of the empirical evidence, scientists have decided preferences about the scientific beliefs they hold. From a psychological perspective, this preference for beliefs can be seen as a reaction to the tensions caused by cognitive dissonance.

A lot of scientific advancement happens only when the old guard dies off. Many years ago Max Planck offered this insight: "A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it."

While we have the best intentions and our minds change slowly, a lot of what we think we know is actually just a temporary knowledge to be updated in the future by more complete knowledge. I think this is why Nassim Taleb argues that we should read Seneca and not

worry about someone like Jonah Lehrer bringing us sexy narratives of the latest discoveries. It turns out most of these discoveries are based on very little data and, while they may add to our cumulative knowledge, they are not likely to be around in 10 years.

The Half-life of Facts is a good read that help puts what we think we understand about the world into perspective.

Wow In Music – Adagio For Strings

The Adagio for Strings (AFS), composed by Samuel Barber in the eve of World War II and premiered under the direction of Arturo Toscanini at a live radio broadcast in 1938, is one of the most famous classical music pieces ever composed. It is also known as one of the saddest pieces ever written. Both Oliver Stone and David Lynch used AFS in the movies Platoon and The Elephant Man, respectively. Generally speaking, feelings evoked by this music involve sorrow, and regret. For no other reason, AFS is many times played at funerals.

What is curious about sad music, however, is that it doesn't necessarily induce the listener to experience sadness. On the contrary, people often report a sensation of soothing and comfort, more related with catharsis than with grief. In my Psychology of Music classes I like to ask students to write down words that occur to them whilst listening to AFS. Doing this exercise myself, these are some of the expressions that occur to me: 'simple, profound, calm, inner self, beauty, human, life, gratitude, warm, friend, and sadness'. From a music analysis perspective, AFS uses many of the resources commonly found in sad music, such as the minor key (a B-flat), a very slow tempo and (in this case, the sombre) timbre qualities of the strings. That seems a somewhat simplistic explanation to the many psychological effects this music can produce on us (albeit they offer up informative illustrations of Inventive Principles 35, 19B and 35 again respectively).

In fact, as explained by neuroscientists, music is processed by emotion and reward centres in the brain. According to Prof David Huron, a well-known researcher in the area, our brains react to listening to sad music by releasing prolactin, a hormone usually associated with pregnancy and lactation but also released when we are sad or weeping, helping us to cope with difficult situations. Other hormones also released are oxytocin and dopamine, involved with pleasure (love, sex, and food, for instance). The result of listening to sad music (when we are not necessarily experiencing any sad event), is that it fools the brain into releasing prolactin, with its benefits but without the actual psychic pain.

Sometimes, it seems a bit daunting to me to think that, ultimately, the way we experience the world is so dependent on the chemicals that flow in our body. Of course, that is not enough to diminish or efface the beauty we see (or hear) in artwork. What seems really incredible, after all, is how music such as AFS is able to guide and unite us through emotional paths full of beauty and compassion.

Investments – Smartphone Microscope

New technology that transforms a cell phone into a powerful, mobile microscope could significantly improve malaria diagnoses and treatment in developing countries that often lack the resources to address the life-threatening disease, says a Texas A&M University biomedical engineer who has created the tool.

The add-on device, which is similar in look and feel to a protective phone case, makes use of a smart phone's camera features to produce high-resolution images of objects 10 times smaller than the thickness of a human hair, says Gerard Coté, professor of biomedical engineering and director of the Texas A&M Engineering Experiment Station's Center for Remote Health Technologies and Systems. Coté's development of the instrument, known as a mobile-optical-polarization imaging device (MOPID), is detailed in the online scientific journal *Scientific Reports*, published by Nature.

MOPID, Coté explains, is capable of accepting a small cartridge containing a patient's blood-smear sample. The sample is then imaged using polarized light in order to detect the presence of hemozoin crystals, Coté notes. Hemozoin crystals are the byproduct of the malaria parasite, and they occur in the blood of an infected host. As polarized light bounces off of these crystals, they appear as tiny bright dots when observed through the phone's camera lens -- enabling an instant, accurate diagnosis.

While polarized light has been the preferred option for malaria detection due to its increased sensitivity, its implementation into mainstream microscopy has been hindered by its complex configurations, maintenance, size and cost -- up until now.

"What we've achieved with MOPID is the design of a polarized microscope platform using a cell phone, which can detect birefringence in histological specimens infected with the malaria parasite," Coté says. "It's a simple, low-cost, portable device that we believe is more sensitive than the standard microscope that uses white light and just as accurate as the more costly and complex benchtop version of a polarized microscope."

MOPID could represent a significant advancement in the detection methods for malaria, a disease that the World Health Organization estimates was responsible for 584,000 deaths

in 2013, along with an estimated 198 million new cases in that span of time. Given those numbers, a dire need exists for a low-cost, accurate and portable method of detection, particularly in areas of the world with few resources, Coté says. Many of these regions, he notes, suffer from misdiagnoses due to inadequate or even nonexistent medical infrastructures -- and the consequences can be devastating. While failure to treat malaria can be fatal, the administering of unnecessary malaria medications as a result of misdiagnoses can results in new, drug-resistant strains of the disease in addition to increasing costs for malaria medications, Coté notes.

Coté's solution takes advantage of existing mobile phone technology and networks -- something to which a whopping 75 percent of the world has access. This ever-increasing access to mobile networks and the fact that most mobile phones are equipped with advanced camera features make mobile phones the ideal platform for advanced imaging applications such as MOPID, Coté says.

The MOPID system has demonstrated both the resolution and specificity to detect malaria with both iOS- and Android-based devices and requires less user expertise than traditional microscopy, Coté says. That user-friendly aspect, coupled with the system's portability and expected low cost of about $10 per unit, makes it an easily adoptable technology in low-resource areas ravaged by malaria, he adds.

What's more, analysis of a blood sample can be instantaneously made with the patient in the field without the need for a mobile network, says Coté, who notes that a network is only required for transmitting the images to a central location for further analysis or storage.

"These factors increase the likelihood of adoption of the technique in developing countries where cost, complexity and lack of expertly trained technicians can often prohibit the use of a polarized microscopy technique or even traditional laboratory microscopy as the standard of diagnosis," Coté says.

For now, Coté and graduate student Casey Pirnstill are continuing to refine the design of the system by making it more compact as well as improving its durability. Plans for in vivo field-testing are scheduled to take place in Rwanda, Africa in the near future, Coté notes.

On a more general note, expect this evolved application of a smartphone to be the first in a likely tsunami of equivalent phone-based healthcare disruptions.

Reference:
Casey W. Pirnstill, Gerard L. Coté. **Malaria Diagnosis Using a Mobile Phone Polarized Microscope**. *Scientific Reports*, 2015; 5: 13368 DOI: 10.1038/srep13368

Generational Cycles – So…

Depending on your opinion of the TV show "Friends," Chris Roberts has had either a fun or a cruel task. Roberts, a student in anthropology and linguistics at the University of Toronto, was assigned to watch every episode of the first eight seasons of the show. Roberts had a linguistic reason for the marathon. He was listening to the way "Friends" used intensifiers -- words like "very," "really" and "so." Roberts and his professor, sociolinguist Sali Tagliamonte, co-authored a study of "Friends" that eventually appeared in an old issue of the journal American Speech.

Sociolinguists study not only the way people speak but also the social judgments and perceptions we make based on the way people speak. Tagliamonte says in the article that she's interested in intensifiers because they occur naturally -- speakers don't tend to give them a lot of thought -- and they vary among cultures and generations.

The study for American Speech focused on intensifiers that accompany adjectives, as in "really hot" and "so happy." About one out of every five adjectives appearing Friends contained an intensifier.

On "Friends," the word "so" made up 45 percent of all intensifiers, followed by "really" at 25 percent, "very" at 15 percent, "pretty" at 6 percent and "totally" at 2 percent.

According to Tagliamonte this marked a sea-change shift relative to previously recorded intensifier usage norms. She reported that, prior to Friends, "very" made up nearly 40 percent of all intensifiers in British English, followed by 30 percent for "really," 10 percent for "so" and around 3 percent each for "absolutely" and "pretty."

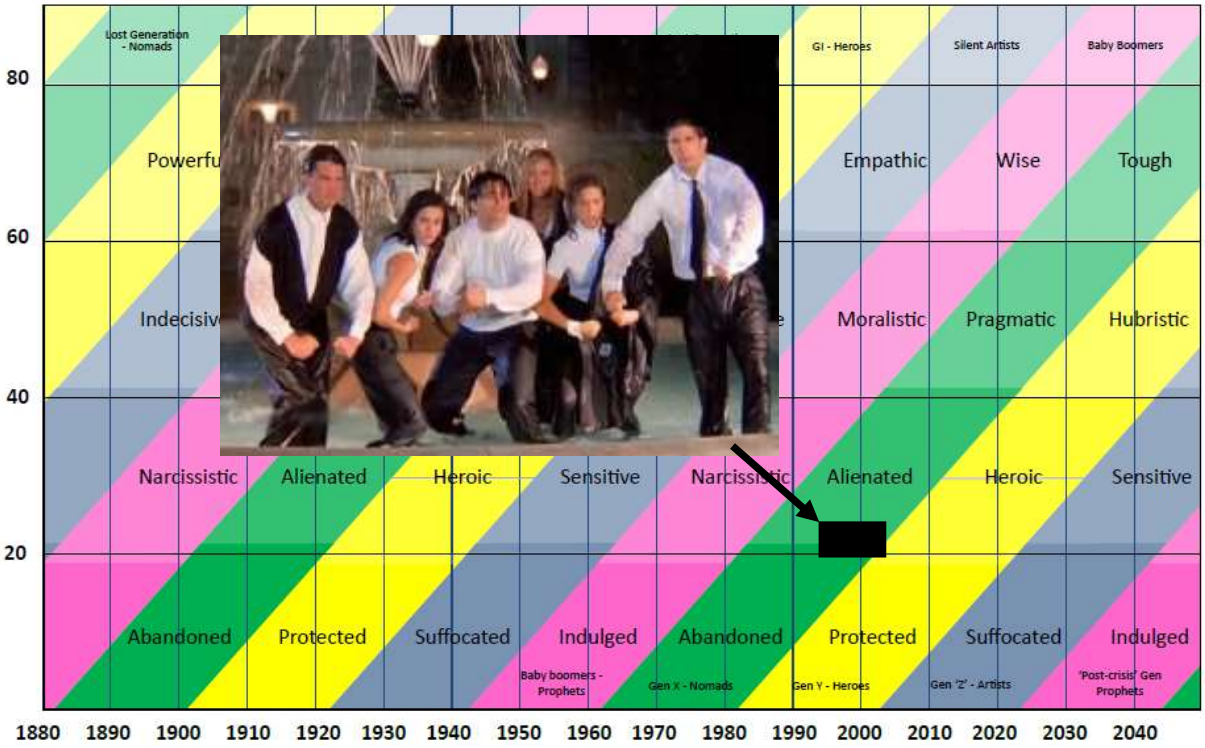
"I think the movement is towards a new intensifier," Tagliamonte said. "Either the `Friends' actors pushed it, or maybe they just picked up on it in vernacular culture and used it. This is just speculation. If they can influence how everybody wore their hair, why not intensifiers?"

Friends, turned out to be the Generation X sitcom. Running from 1994 to 2004 it hit the second half of the Nomad generation during their late teens and early twenties. In many ways it's also a good illustration of how everything influences everything else in societal situations: Friends influenced GenX behaviour and the writers of the sitcom then mimicked the societal behaviour they could see among twenty-somethings. Use of the word 'so' seems like an excellent illustration of the mutual-influence idea.

Other things that made Friends into a definer of Nomads (the generation, remember, that doesn't wish to be defined)…

1) Beyond its glamour, "Friends" is widely lauded as the first true "ensemble" show - a series with no clear star or centre, a cast of equals with no authority figure in sight.
2) Like any durable sitcom, 'Friends' steered clear of politics and current events - a critical component for a series' "timelessness" and appeal through endless reruns and historical flux. In an apartment blocks away from the World Trade Center, there was no mention of terror or hijacked planes - and after Sept. 11, ratings soared as viewers flocked to a world unchanged. It was, in other words, half-an-hour a week of empathising escapism.

3) All of the characters aspire to being ‘cool’, but viewers quickly learn they’re not.
4) They’re all struggling with careers, Chandler is bewildered by his meaningless job; Ross loved his but there’s nowhere for him to go next; and the other friends couldn’t have earned more than $15,000 a year between them. Joey was an out-of-work actor, Monica a part-time chef, Rachel a coffee shop barista/aspiring fashionista, and Phoebe a part-time masseuse
5) Sex is unnatural. Ross and Chandler were frustrated and unwilling semi-celibates, while Joey seemed to believe that game-playing was the only way of getting women into bed. On the other hand, Rachel, Monica, and Phoebe’s relentless umming and ah-ing over the respective merits of this guy's muscles and that guy's chat-up lines seemed to compound that idea that dating was far from a natural process. Friends was the show that turned mating into bureaucracy. Men Are Pathetic; Women Are Neurotic.



So, maybe, getting back to the initial point, Generation X is the ‘So Generation’? Here’s another aspect of the word that may or may not be indicative of the Nomad archetype. You decide:

Do we live in the Age of So?
The phenomenon was illustrated on Radio 5 Live’s Drive *programme a while back, when Peter Allen interviewed Steve Robertson of BT OpenReach about the expansion of superfast broadband:*
Allen: ‘What will actually happen?’
Robertson: ‘So, what will happen is that we’re either going to be taking fibre to their home or to their business…’
Allen: ‘And how expensive is all this?’
Robertson: ‘So, we’ve already committed two and a half billion pounds…’
Within minutes listeners were emailing to express irritation at this growing habit of starting every answer with the word ‘so’. Offenders tend to be PR spokesmen — though even politicians are doing it. Witness Grant Shapps on the Today *programme, asked about housing benefit changes: ‘So, I think there are three things…’ What’s going on here?*

Part of the answer might be the need to belong. 'It's called "accommodation",' says Dr Penelope Gardner-Chloros, of the department of applied linguistics and communication at Birkbeck College. 'We accommodate, and converge with, the group of people we want to belong to. Someone using "so" like this may well be doing it because they've heard other people doing it. It spreads like the flu.' Or like an episode of Friends?

'It's a good way of giving yourself time to think,' says the PR consultant Cherry Chappell. 'Even a short word like "so" gives you that fraction of a second you need to plan your answer. And it has a more positive feel than similar mechanisms, such as "let me just say", "erm" or "like".'

But that doesn't alter the fact that it makes no grammatical sense. Chappell offers a more nuanced argument. '"So" might also be used to deflect a pointed question, or as a way of carrying on making your point if your interviewer has interrupted. Some Today interrogators try to throw their interviewees with sparky interruptions.'

True, though usually because their question hasn't been answered. During the 2010 volcanic ash cloud, Justin Webb asked a spokesman for National Air Traffic Services whether all flights might be grounded. 'So, as you know there's a volcanic ash cloud…' 'So, as I said, safety's our number one priority…', 'So, we have restricted flights…' Only when Webb persisted did the 'so' get dropped. 'Yeah, I mean, volcanic ash poses serious hazards…' said the spokesman, before conceding that a total ban was possible.

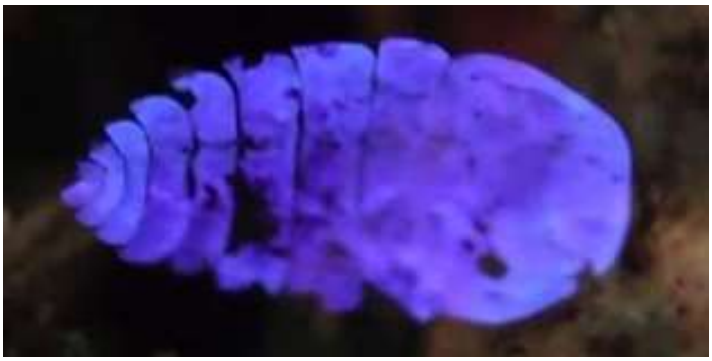
Perhaps that is the point. Rather than deflecting a question, could 'so' be a tool for covering up that you're deflecting it? 'The word is a marker of cause and result,' says Dr Gardner-Chloros. 'Someone who starts an answer with "so" is marking that what he's saying is coherent with what came before — the question. He's saying what he wants to say, like a politician — but trying to make it sound like it's an answer to the question.'

If this is the case, then So-sayers are planting the seeds of their own linguistic destruction. As the technique grows in popularity, we will come to recognise it more easily. It will take on the status of Harrison Ford's tests in Blade Runner, used to tell androids from humans. Hear someone start an answer with 'so', and you'll know you're about to be spoonfed some pre-cooked PR-speak. A more sophisticated version of the old joke about knowing a politician is lying because his lips are moving.

Or could it be that So-sayers are deliberately — though subconsciously — sabotaging their own answers? As they trot out the soundbites, toeing a company line so often their toe gets blisters, do they yearn to rebel? 'Yes,' runs the subtext, 'I am aware how artificial this all is. That's why I'm deliberately starting every reply with a word that doesn't belong there. Can we all take that as a sign that I'm only doing this job because I've got a mortgage to pay? When I'm down the pub I talk normally, you know.'

None of this, of course, applies to people who use 'so' at the start of sentences that aren't intended to answer any question at all. Sentences that are intended to start a conversation, possibly, or come, a propos of nothing, out of a previously silent nowhere with no particular destination in mind. That will be the engineers practicing their largely-absent social skills, and nothing to do with Generational cycles at all. So there.

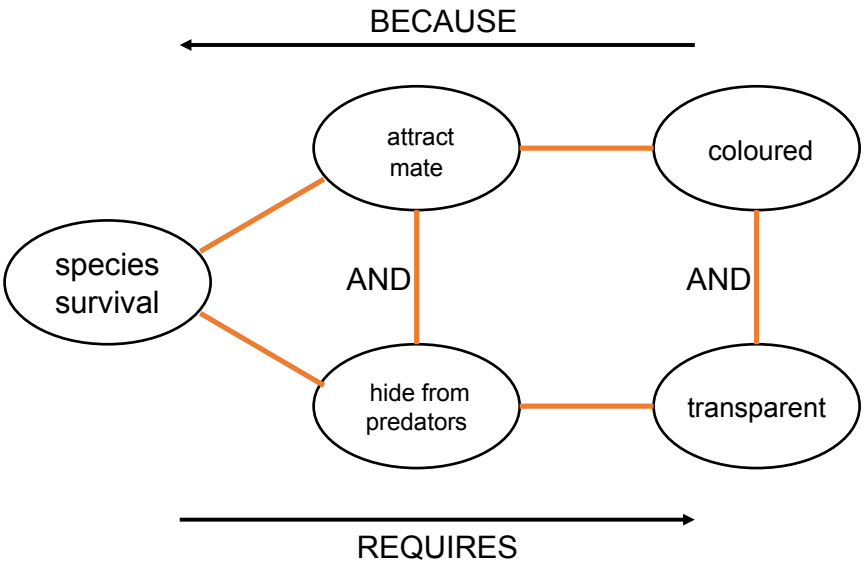
Biology – Sea Sapphire



Tiny ocean creatures known as sea sapphires (known scientifically as Sapphirinidae) perform a sort of magic trick as they swim: One second they appear in splendid iridescent shades of blue, purple or green, and the next they may turn invisible (at least the blue ones turn completely transparent). How do they get their bright colors and what enables them to "disappear?" New research at the Weizmann Institute has solved the mystery of these colorful, vanishing creatures. The findings, which recently appeared in the Journal of the American Chemical Society, could inspire the development of new optical technologies.

Sapphirinidae belong to a subclass of crustaceans called copepods; and they live in fresh or salt water. These animals are barely visible to the human eye, ranging from around one to several millimeters in length. It is the male Sapphirinidae that display striking, iridescent colors, whereas the female is transparent. Scientists think that their unique magic trick could help Sapphirinidae escape predators when necessary, but still display their flashy colors when a female of the species -- or possibly another male -- is nearby.

It's a classic physical contradiction: the male sea sapphire wants to be visible *and* invisible:



The scientists investigated the makeup of a crystal layer on the backs of male Sapphirinidae of several species. They first measured the reflectance, which determines the color, and then, using a microscope technique called cryo-SEM, observed the organization of the crystals along with the cellular material holding them in place.

These colors are due to iridescence -- the result of light reflecting off periodic (repeating) structures. These multilayer reflectors -- a type of structure known to scientists as a photonic crystal -- are composed of thin, transparent crystals of guanine. Guanine is more generally known as one of the nucleic acid bases found in DNA.

The research group found that the guanine plates in Sapphirinidae are stacked in incredibly precise periodic arrays. What gives each species its unique color? Their analysis revealed that the main factor determining whether an animal will be yellow, blue or purple is the spacing between plates, which is controlled by the thin layer of cellular material separating them.

The researchers also showed how this complex arrangement of plates enables some Sapphirinidae to disappear from sight: When certain species of male Sapphirinidae rotate their backs to the light at a 45-degree angle as they perform a spiral swimming maneuver, the wavelength of the reflected light is shifted out of the visible light range and into the invisible ultraviolet. In contrast, light hitting straight-on returns the beautiful blue color. In the ocean's light, which comes from above, the tiny creature can control its visibility, from neon to none, just by adjusting its rudder.

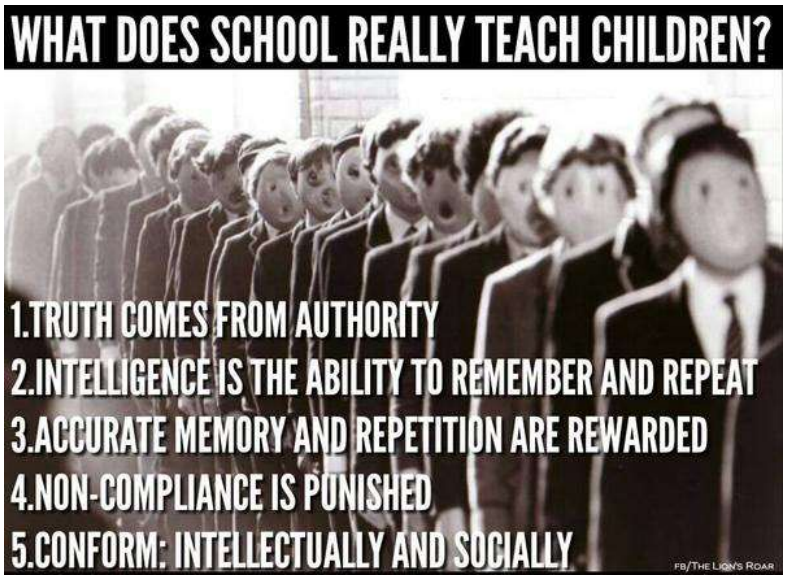
The spacing between the plates acts as a sort of "tuning" for the wavelength of the light and thus the organism's color: The closer the plates are to one another, the shorter the wavelength, that is, the bluer the light, reflected from them. This sophisticated strategy for manipulating light, say the scientists, could be used in the design of artificial photonic crystal structures -- nanoscale structures that can manipulate the flow of photons. These could have many potential uses including adaptive or changeable reflective coatings, optical mirrors and optical displays.

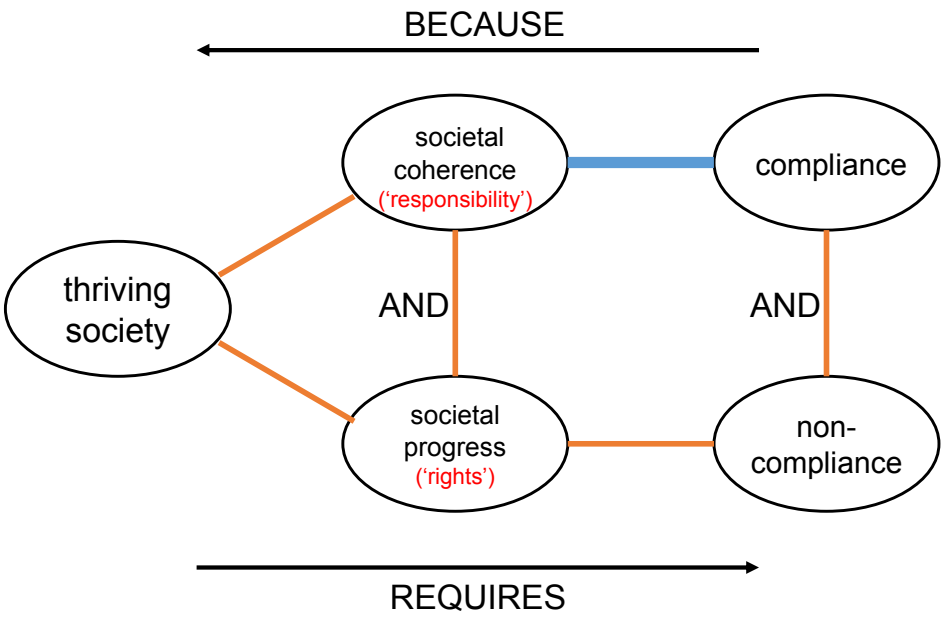
Here, meanwhile, is what the Matrix+ software wizard has to say about how human engineers have solved similar visible/invisible problems:

Principles 2 (separated layers of guanine), 24 (thin layer of cellular material separating the guanine layers), and 17 (45 degree angle orientation) seem to be the trio that best describe what the evolved sea-sapphire solution.

Read more here:
Dvir Gur, Ben Leshem, Maria Pierantoni, Viviana Farstey, Dan Oron, Steve Weiner, Lia Addadi. **Structural Basis for the Brilliant Colors of the Sapphirinid Copepods**. *Journal of the American Chemical Society*, 2015; 137 (26): 8408 DOI: 10.1021/jacs.5b05289

Short Thort





"In the law receiver's perspective (the corporate, employer, employees, citizens, legal fraternity, and the society at large) paramount quandary is of "right interpretation. Interpretation of statutes and promulgations receives a major blow when it comes to swift compliance within a short time period of intense promulgations."
Henrietta Newton Martin

News

IMechE '21st Century TRIZ' Workshops
We are happy to confirm that the next IMechE one-day TRIZ Introduction workshop will be running as scheduled in London on November 4. Dates for 2016 have also been published as May 10 and November 8. Who said the public workshop was dead?

Matrix2010 Japan Edition
Our good friend Professor Nakagawa has now made Matrix 2010 available to readers in Japan as both a separate fold-out sheet and incorporated into the Japanese edition of Hands-On Systematic Innovation. Hmm. Maybe we should do that in the English version too?

PanSensic Website
pansensic.com has had a rather lovely facelift. More to come in the coming weeks, but you can already find a nice collection of papers and case studies on the 'Articles' page.

DTU Evening Talk
Darrell has been invited to give an evening talk on 2 March. Not sure yet whether the topic will be Systematic Service Innovation or something braver like 'The History of Denmark, 1930-2030'. The latter being coloured no doubt by the latest findings from the GenerationDNA research. Surely the book will be published by next March?!...

GenerationDNA Workshop
…speaking of which, now that all of the builders have finally left The Old Vicarage, we're able to start re-instituting our in-house workshop series. We already have an away-day session scheduled for a private client brave enough to allow us to iron out any wrinkles, so by the time we run a first public event in January, we have worked out how to get the catering to arrive somewhere vaguely around lunchtime and all those other minor details. Anyway, the first workshop will be a 'friends and family' GenerationDNA session, and it will happen on Tuesday 19 January.

Australia AULIVE Workshops
We heartily recommend anyone in Sydney on 8-9 October or Brisbane on 3-4 December attends good friend Simon Dewulf's latest workshop. Readers of this publication will know him best from the PatentInspiration software… or maybe stories of 4am handstands in Belgian bars… the two workshops are where you get to see the software woven into a broader innovation picture. Check out details at the AULIVE website or download the flyer from ours. Be there or be square.

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

Chemical – Innovation strategy project
Tourism – Innovation strategy definition & workshop series
Automotive – Technology foresighting study
Chemical – R&D pipeline filling
Medical Devices – Innovation Capability Maturity assessment
Transport – PanSensic consumer insight study
Automotive – Problem solving projects
Entertainment – PanSensic market evolution study
NGO – Strategy study
FMCG – Patent portfolio valuation study (ApolloSigma)