Systematic Innovation

e-zine

Issue 135, June 2013

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Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.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

Defining ‘Step-Change’

One of the main problems of defining things in simple terms is that those simple terms never seem to full capture the inherent complexities of what you’re trying to define. Defining innovation as ‘successful step-change’ is the best we’ve managed in the last twenty-two years, but it only works as a definition if you know what successful is and what step-change is. Generally speaking, we’ve found that people – particularly newcomers – readily understand the ‘successful’ half of the definition. Alas, the same doesn’t always hold true when it comes to the ‘step-change’ half.

The main idea behind ‘step-change’, of course, is that there has been some kind of discontinuous jump from a previous solution to the new one. For those that are able to think in terms of S-curves – and it’s amazing today to see the number of people that are – innovation is all about a jump from one curve to another.

So far so good. The new problem is that the context in which S-curves get used is when we’re talking about industry-size shifts in the way the world works. Almost everyone would look at the evolution of telephony and agree that the jump from land-lines to cellular solutions was indeed a jump. But what about the ‘smaller’ jumps, the ones that didn’t transform their industry, aren’t they just optimization? When the first touch-screens came out, weren’t they just a better version, an ‘optimization’ of a keypad phone.

Or what about when we look at the cold exhaust nacelle of the Boeing Dreamliner (Figure 1), isn’t that just an ‘optimized’ version of a normal engine nacelle.

Figure 1: ‘Conventional’ Versus Fluted Engine Nacelle

Or, even more subtle, how about when, looking at the front of the jet-engine, we started to see fan blades with funny kinks in them (Figure 2). Surely no-one would argue that this was any kind of step-change, would they?

As it happens, we would. And not just because we’re being contrary or awkward.

First up, step-change is contextually related. The emergence of mobile phones represented a step-change for all of us, so it’s easy to see that’s what it was: we did things one way, and now we’ve shifted to a new way that doesn’t involve wires anymore.

Now imagine you’re walking along a jetway to get into your small, cramped Dreamliner Economy seat and you see the fluted nacelle. That probably doesn’t look like much of a step-change to you. Neither did it look like a step change to Boeing when Rolls-Royce presented it. It was ‘merely’ a cool design feature that might help give you a couple of

percentage points better fuel economy. But now put yourself in the position of all those people that spend their lives designing and making engine nacelles. To them, the fluted Dreamliner design is absolutely a step change: they used to do things one way, and now there's a clearly better way.

Figure 3: GE90 Fan Blades

The exact same thing happens with the Figure 2 fanblade, only on an even more subtle level. The shape of this blade has barely changed relative to the generation that came before. How can putting a funny kink in the blade count as a step-change?

Answer, because, as the aerodynamicists of the world will all know, knowing how and how much of a kink to put into a complicated beast like a fan-blade requires a level of flow modelling capability that represents a massive step-change from the way that blades had previously been designed. Without wishing to get too technical, the GE90 fan-blade required a fully 3D, Navier-Stokes modelling capability and it wasn't so long ago (in jet engine terms at least) that there wasn't sufficient computing power or knowledge of how to learn from the results of the predictions it allowed designers to make. The advent of fully-3D computational fluid dynamics has meant that every aerodynamicist on the planet has had to re-learn their trade. For them it's about as big a step-change as they'll ever experience.

So?

I think (hope!) two things come out of this discussion which hopefully, together make it very clear what 'step-change' is all about in our innovation definition:

1) As hinted, step-change is contextually dependent, the relevance being determined by the *designers* of whatever it is that's being innovated. Put another way, just because something doesn't look like a step-change to you doesn't mean that it didn't revolutionize someone's world.
2) Once looking at a new solution from the right contextual level, the next important test of whether a step-change has happened or not is whether *an assumption or 'rule' was successfully challenged*? The prevailing assumption, for example, amongst nacelle designers was 'straight edges are best'. What the Dreamliner exhaust designers did was banged their fists on the table and said, 'I don't believe you, why are straight edges best?' they challenged what turned out to be a very poor assumption and as a result came up with a very elegant, more efficient, lighter, quieter, simpler design.

All of which just leaves us to remind ourselves that each and every one of the trends and trend stages defined in the Evolution Potential story collectively represent ALL of the step-changes that we have ever seen. Which means that another definition of innovation is that it involves at least one jump by at least one part of a system along at least one of the

trends. All we need now is for everyone on the planet to understand Evolution Potential and the Trends of Evolution…

Workshop Entropy – A Different Kind Of Agenda

In recent months, a period when we've been running an awful lot of facilitated problem finding/solving workshops with clients, it's become apparent that while the specific agenda for these sessions is bespoke to every different situation, there has also been a unified trajectory that all of them have followed. A few months experience doesn't necessarily demonstrate something that might be applicable universally, but we think, given the successful outcomes achieved at the workshops, there's definitely something worth sharing. More importantly, experience has told us, sharing the trajectory with workshop participants at some point during the workshop has also been helpful in enabling them to understand why some of the 'stranger', more abstract, things in the workshop have been there and what they've been there to do.

The basic model starts with a graph of entropy versus time as illustrated in Figure 1. Entropy in this model, rather than being 'actual entropy' is more akin to people's perception of the level of order in their environment. Across this 'apparent entropy' spectrum, we've then divided the world into four different domains, inspired by the Cynefin framework (www.cynefin.com), to represent different bands of entropy. At the top of the graph, low entropy equates to a worldview that characterizes things as 'simple':

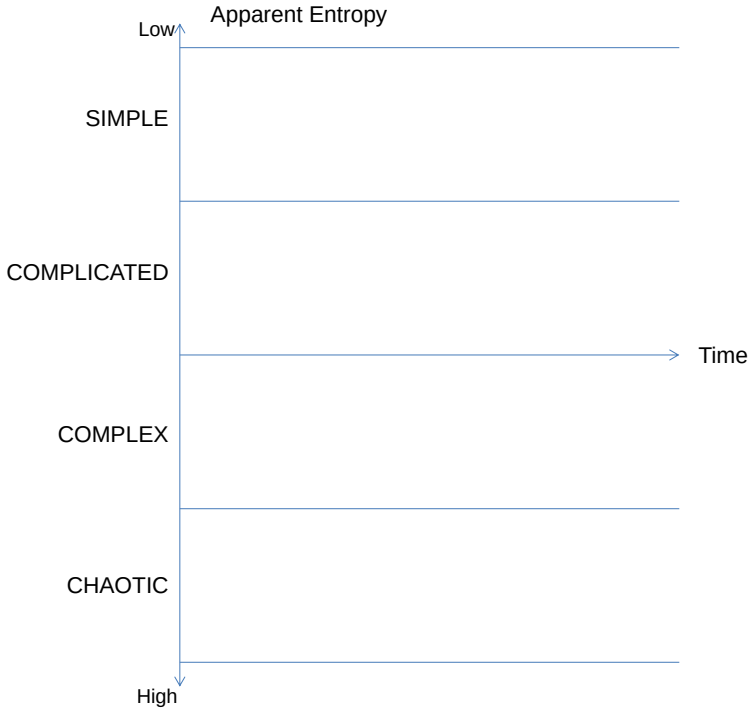


Figure 1: Four Zones In Entropy-Time Graph

At the next highest level of entropy comes 'Complicated'; then Complex, then, finally, representing the highest level of entropy comes a worldview Cynefin characterizes as 'Chaotic'.

The horizontal, time, axis is then intended to allow us to think about the passage of time through the workshop. In actual fact, we tend to start a little bit earlier than that, by thinking about the moment when our alarm clocks go off in the morning. When we first wake up each day, assuming we had a half decent night's sleep, we're at our lowest level of

entropy. For those first few minutes, we're rested, our brains have emptied themselves of all of the previous day's junk and, generally speaking, life is pretty simple – Figure 2:

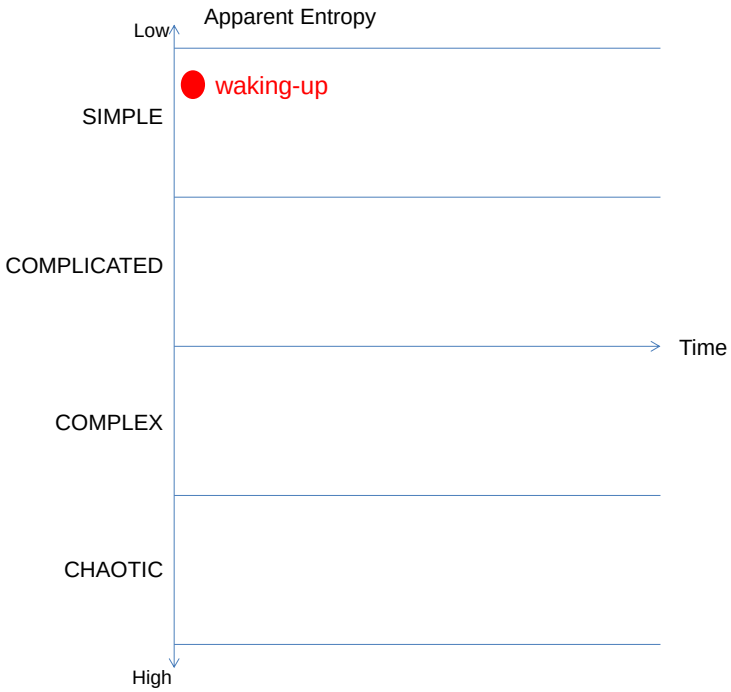


Figure 2: Waking-Up

Sadly, for most of us, it doesn't take too long before we start to think about all the stuff we have to do during the day. From getting ourselves up and dressed, to preparing the kids' breakfasts, to dispatching them to school, to navigating ourselves through all the traffic to get to work on time for that dumb 'creativity' workshop we've been sent to. Life has suddenly become its usual 'Complicated' self again. Fortunately, though, over the years we've developed all sorts of rules of thumb that allow us to get what needs to be done, done in approximately the right amount of time with the minimum number of tears and forgotten briefcases. There's lot to do, but we know how to do it… we're ready for the start of the workshop – Figure 3.

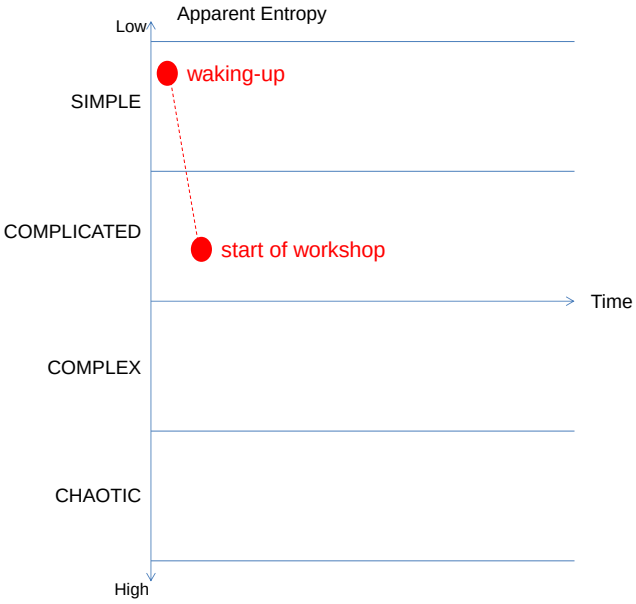


Figure 3: Getting To The Workshop Requires Navigating Complicated Stuff

Next-up, this being a Systematic Innovation workshop, something that many people won't have encountered before, much as the facilitator might try to eliminate jargon, there's little doubt that the participants are pretty quickly heading towards a bunch of stuff that doesn't feel much like their normal complicated world at all. Perhaps they're asked to think about customer outcomes. Or construct a TrenDNA or perception map. Suddenly people find themselves looking at each other and wondering, 'what's all this stuff?' and 'we seem to be making the problem worse'. They just entered the 'complex' zone – Figure 4. Not helped when the facilitator starts talking about keeping an open mind, and 'gathering clues' and divergent thinking and how we shouldn't worry about all of the 'yes, buts'.

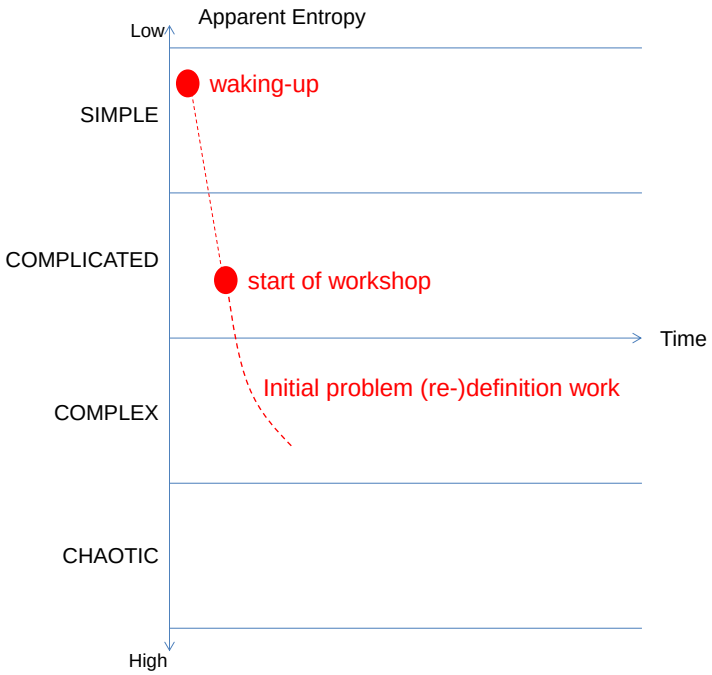


Figure 4: Initial Problem (Re-)Definition Work Forces User To Think About Complexity

If things are going to (the facilitator's) plan, the end of this first phase is likely to produce some kind of insight. Certainly no answers, but, hey, we've drawn a map, and it looks like it makes 'some' kind of sense.

But then what happens? The facilitator starts talking about Contradictions and Evolution Potential and makes us do an exercise that has nothing to do with the problem we were just starting to make progress on. Then we get shown a big table full of random numbers. Then – worst of all – we're told to think about some of those numbers and they're supposed to help us generate some ideas that will help solve our problem. What's a 'Nested Doll'? What does the facilitator mean when he says, 'don't worry about the quality of your ideas, it's all about quantity', an instruction that flies in the face of everything you've ever been told before. People start looking at each other; at the clock on the wall… is it time for a break yet?

Complexity has just become Chaos. The facilitator isn't saying anything. We're on our own. We don't know what we're doing. The workshop world just shifted again to the one shown in Figure 5. There don't appear to be any rules any more, people begin to realize. We've got to report something back to the other groups in 20 minutes though. Gulp. Maybe we should just start to think about some of these weird things…

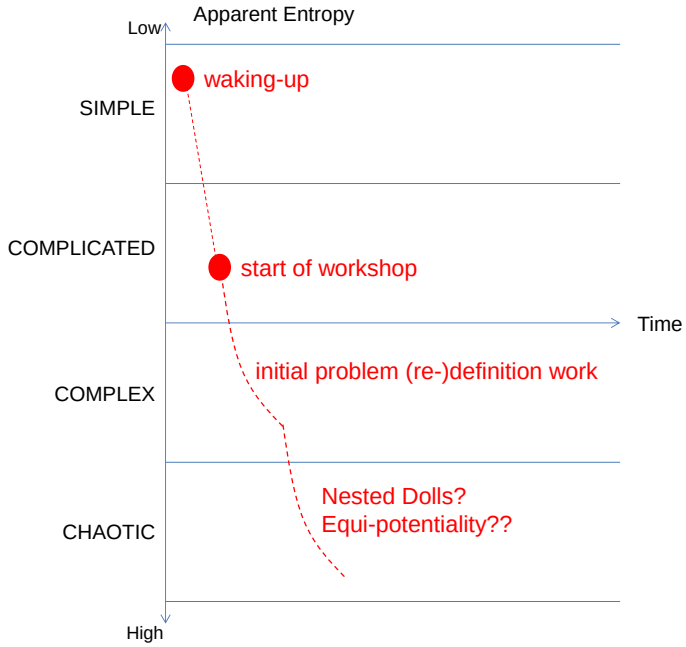


Figure 5: 'We Have No Idea What We're Doing'

…and, guess what, someone across the table just came up with what sounded like a pretty good idea. Then someone else did the same. Then someone built on that idea to make an even better one. Maybe things aren't quite as mad as I thought. Maybe I should just put aside all my common sense and go with the flow?

It won't always occur in 20 minutes of using the Inventive Principles or S-Fields (!) or Evolution Potential and Trends, but what invariably will happen is that a group will look at the pile of Post-It notes or butcher-paper scribbles when the facilitator tells everyone to get back together and start thinking, 'you know what, there are some pretty interesting directions here'.

As far as the facilitator is concerned, something important – and planned – has just happened. It's rarely possible to take any kind of real-world complex problem and hope to come up with implementable 'finished' solutions during the space of a 1-day workshop, but it is possible to show people that there is a way to get there. The world – and the problem at hand – is complex, and that's where we're now at – Figure 6.

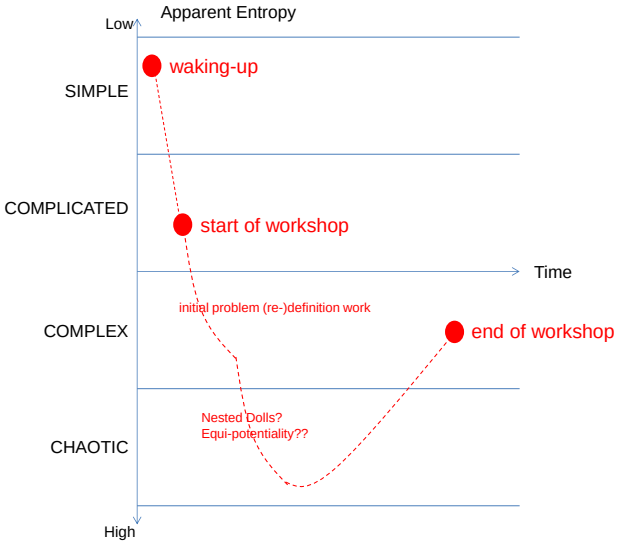


Figure 6: Back To Complexity & The End OF The Workshop

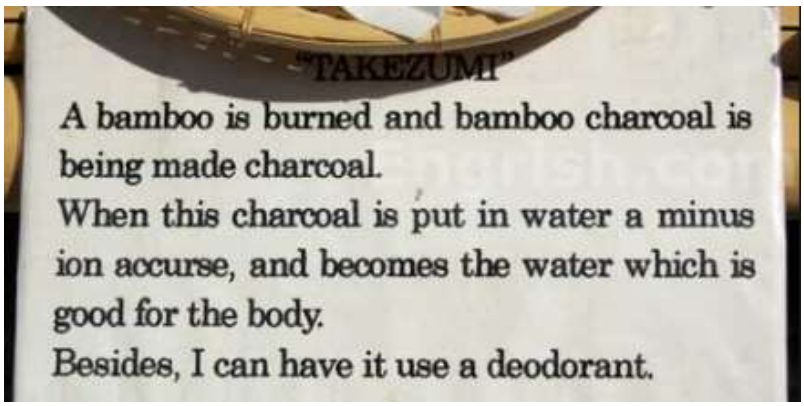
This trajectory is a deliberate design. It recognizes that progress on wicked problems only comes when we get people out of their comfort zones. And the best way to do that is to pull the common-sense rug out from under peoples' feet and take them into 'Chaos'. Albeit, thanks to the SI tools, a controlled kind of Chaos that is reliably and repeatably going to get people back into a more stable, Complex world armed with some really good solution clues.

Our experience in sharing this overall trajectory with people suggests that you can do it at the start of a session, but that generally speaking it's better to reveal what you did at the end after you've done what you've just done. Not that customer feedback forms are the best way to measure anything, but one thing we have noticed is that ratings have gone up by, on average, 20% in sessions where we've explained what the 'Chaos' was all about and why it was an important part of the day.

Finally – life is never as simple as you'd like! - the groups where we've found it helps to explain the trajectory earlier in the session are the ones with a strong contingent of MBAs and managers. Designers tend to implicitly understand the need for the chaos and are quite used to living in at least 'Complex' levels of entropy. MBAs, are really good, it seems, at giving managers rules, play-books and instructions for surviving in the 'Simple' and particularly 'Complicated' worlds. It's great that the B-Schools have done that for managers in general. Not so great that they've done it for managers in complex problem solving sessions where answers don't – and won't ever – drop out of running numbers through spreadsheets and other merely complicated things.

Humour – Zengrish

We revisit our old friends at engrish.com this month for a more than usually cerebral look at some of those English mis-translations that somehow manage to take the reader to a higher zen-like understanding of the world. Think of it like a merging of Inventive Principles 16 and 17.



SYSTEM ·ATIC INNOVAT· ION

No idea what they're selling here, but I think I need some:

Or, if your tastes run to the more profound:

My favourite:

And one I know, deep down, is trying to tell me something really important. I just need to work out what it is. Which is probably the point:

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Patent of the Month – Resonance Enhanced Drilling

A nice easy choice for our patent of the month this month since this is an invention that we have had prior involvement with during one of our client projects. US8,453,761 was granted to Dr Marian Wiercigroch at the University of Aberdeen in Scotland on the 4th of this month. The title probably offers a pretty good clue as to the roots of the invention. Especially for anyone familiar with the Rhythm Coordination trend, and what it has to say about making use of resonances.

Here's what the invention disclosure has to say regarding the problem resonance becomes the solution to in this case:

The field of drilling into rock and other materials has driven a number developments in drilling technology. In this regard, the extremely harsh conditions involved in this type of drilling as well as its cost and the related environmental issues, all put severe demands on the effectiveness, reliability and safety of drilling methods.

As a consequence, industries which employ downhole drilling, such as the oil industry, are keen to develop drilling devices and methodologies that meet these demands and increase drilling rates and decrease tool wear.

In this connection, the oil industry is increasingly having to drill deviated or horizontal long-reach wells in pursuit of new oil reserves. However, such drilling further compounds several issues that challenge present drilling technology such as demands of low weight-on-bit, reduced power availability, variability of rock conditions over the length of the well, danger of bore collapses/fractures, increased costs of tripping, and increased tool wear and failure.

It is known that drilling rates in certain circumstances can be improved by applying reciprocal axial movements to a drill-bit as it passes through the material to be drilled, so-called percussive drilling. This is because the impact of these axial movements promotes fractures in the drilled material, thereby making subsequent drilling and material removal easier.

In conventional percussive drilling, the penetration mechanism is based on fracturing material at the borehole by large low-frequency uncontrolled impacts applied by the drill-bit. In this way, drilling rates for medium to hard rocks can be increased compared to standard rotary drilling. However, the downside to this is that these impacts compromise borehole stability, reduce borehole quality and cause accelerated, and often catastrophic, tool wear and/or failure.

Another important development to drilling techniques has been the application of ultrasonic axial vibrations to a rotating drill-bit. In this way, ultrasonic vibration, rather than isolated high load impacts, is used to promote fracture propagation. This can offer significant advantages over conventional percussive drilling in that lower loads can be applied, allowing for low weight-on-bit drilling. However, the improvements exhibited by ultrasonic drilling are not always consistent and are not as such directly applicable to downhole drilling.

It is therefore an object of the present invention to provide a drilling apparatus and method which seek to alleviate such problems.

From a downhole drilling perspective, the primary driver is drilling rate – drilling is an expensive business, and so the faster the drill can do its job the better. As described in the invention disclosure, the main hazards preventing the desired increase in drilling rate are the excessive forces on the drill bit, reliability of the system and the stability of the borehole. A fairly easy problem to map on to the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Speed (14)

WORSENING PARAMETERS YOU HAVE SELECTED:

Force/Torque (15) and Stability (21) and Reliability/Robustness (35)

SUGGESTED INVENTIVE PRINCIPLES:

28, 2, 3, 5, 18, 19, 35, 13, 15, 23, 24, 33, 29, 11, 17, 40

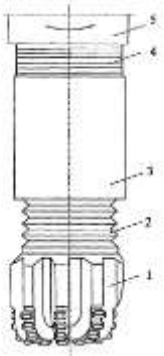
As expected, we find Principle 18, Mechanical Vibration, as one of the recommended solutions strategies for such problems. We say 'as expected' because, per the invention disclosure text, ultrasound has already been tried as a drilling aid and Principle 18B says 'increase the vibration frequency (possibly up to the ultrasonic)'. What's happened, in effect in the Aberdeen invention is that Principle 18C has now been exploited: 'make use of an object or system's resonant frequency'.

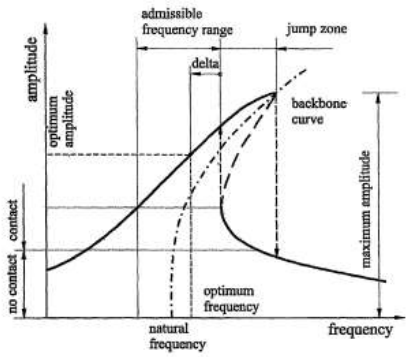
The only question now is what object or system's resonant frequency should be exploited? Here's what the invention disclosure tells us in the main independent claim:

A drilling module comprising: a rotary drill-bit; an oscillator configured to apply high frequency axial oscillatory loading to the rotary drill-bit, of up to 1 kHz; a vibro-transmission section connecting the rotary drill-bit and the oscillator, the vibro-transmission section configured to transmit the high frequency axial oscillatory loading from the oscillator to the rotary drill-bit; a vibrational isolation unit for connecting the drilling module to a drill-string, the vibrational isolation unit being configured to isolate the high frequency axial oscillatory loading from the drill-string; sensors for taking downhole measurements; and a controller configured to operate downhole under closed loop real-time control by utilizing the downhole measurements from the sensors to control the oscillator by varying the high frequency axial oscillatory loading responsive to conditions of material through which the rotary drill-bit is passing ***to establish and maintain oscillation system resonance between the oscillator, the rotary drill-bit and the material through which the rotary drill-bit is passing whereby the high frequency axial oscillatory loading is sufficient to initiate cracks in the material*** *through which the rotary drill-bit is passing.*

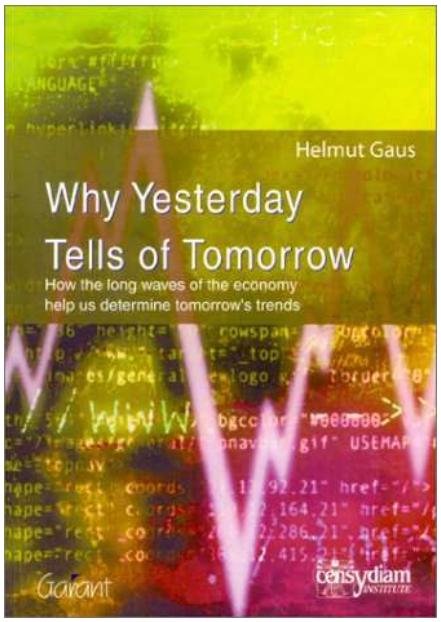
Which, in true legalese fashion is all a bit of a mouthful. In layman's terms what it means is that the drill 'finds' the resonant frequency of the material immediately adjacent to the drill tip in order to crack said material in order to then be able to drill through it more quickly.

Interesting to also note how the patented solution also uses the addition of Feedback (Principle 23) in order to control the frequency of the oscillator as the resonant frequency of the material being drilled through changes. Fantastic stuff. And, from the evidence of our visit to Aberdeen to speak with Dr Wiercigroch (we still can't pronounce his name!), a solution that offers order-of-magnitude improvement in performance over conventional systems.





Best of the Month – Why Yesterday Tells Of Tomorrow



A difficult call this month. Mainly because there's nothing we really unearthed this month that really stood out as worthy of the 'best' moniker. As it transpires, we've been forced back to this over-looked tome from 2001 to get to anything like a credible suggestion to e-zine readers.

Initially (as in 'several years ago'), we rejected this book without really getting beyond the fact that it talks a lot about Kondriateff and Kitchin and Juglar Cycles and seemed to be drawing lots of graphs showing interesting correlations (anxiety versus suicide rate in France for example), without really making a plausible case that there was any kind of causal link. It's only by accident that we recently re-examined the book and saw that our initial assessment was a little unfair. Hence, here we find ourselves today saying, 'this is a very intriguing piece of work worthy of the 2-3 hours it will take you to read it'.

That's not to say that we agree with all of the contents and concepts presented by the (University of Ghent professor in their Faculty of Social & Political Science) author, Helmut Gaus, but that at the very least, they make an interesting new lens through which to view the ebb and flow of economic cycles.

The big idea, if that's the right expression, is that those highs and lows emerge ultimately from the levels of *uncertainty* that are present in a society. The really nice part of this idea is that Gaus appears to have an implicit understanding of complex adaptive systems and therefore how societal patterns emerge, bottom-up, from the underlying motives of individuals within large groups and masses. Without understanding those – often subconscious – motives, Haus hypothesizes, it can never be possible to provide a genuinely meaningful understanding of society, and therefore, never be able to make any kind of meaningful projections about what the future holds.

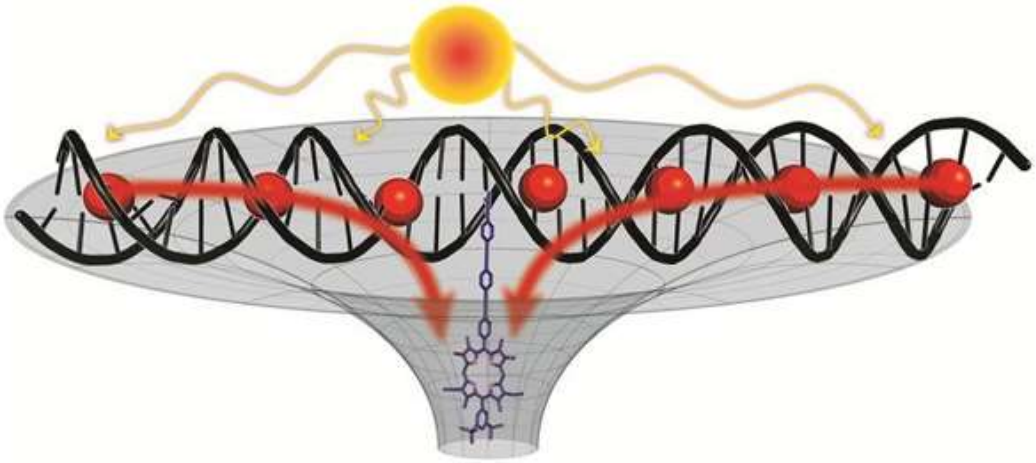
Gaus's research has focused on the expression and repercussions of individual feelings and emotions on state of mind, on the changes in values and tastes, on political, artistic, fashion, religious, economic, demographic and other behaviours. Honestly, to this writer, some of it still smacks a little bit of making some too-convenient connections between

different societal patterns, but at the end of the day, the job of a good book is very often to provoke constructive disagreement. And on that front, the book is at the very least ‘intriguing’ and at best deeply insightful.

The most likely scenario is that anyone fascinated by the Strauss & Howe work on generational cycles is going to be the group who will get the most insight, there being significant connection between some of Haus’s key cycle periods and the generational cycles that emerged from the Fourth Turning research. And, in that regard, if nothing else, you’ll get to answer the question which of the four generation archetypes are the ones that are more or less anxious about navigating their way through the uncertain periods than others... Nomads, you know it makes sense.

Ultimately, I don’t think I’d bet my house on any future predictions made as a result of using Haus’s findings, but I think it will add a useful new level of richness to the TrenDNA research that hopefully makes us more confident to see the future it predicts. And that’s not something we are able to say very often.

Investments – Solar Energy Antenna



Another longer term suggestion this month. This time from Chalmers University in Sweden, who have found an effective solution for collecting sunlight for artificial photosynthesis. By combining self-assembling DNA molecules with simple dye molecules, the researchers have created a system that resembles nature's own antenna system.

Artificial photosynthesis is an exciting area of energy research that has long been on our ‘things-to-keep-an-eye-on’ radar. A large number of the worlds' energy problems could be resolved if it were possible to recreate the ability plants have to transform solar energy into fuel. Earth receives enough solar energy every hour to satisfy our energy needs for an entire year.

The research team at Chalmers University of Technology has made a nanotechnological breakthrough in the first step required for artificial photosynthesis. The team has demonstrated that it is possible to use self-assembling DNA molecules as scaffolding to create artificial systems that collect light. The results were recently published in the scientific *Journal of the American Chemical Society*.

Scaffolding in plants and algae consists of a large number of proteins that organise chlorophyll molecules to ensure effective light collection. The system is complicated and would basically be impossible to construct artificially.

"It's all over if a bond breaks," says Jonas Hannestad, PhD of physical chemistry. "If DNA is used instead to organise the light-collecting molecules, the same precision is not achieved but a dynamic self-constructing system arises."

With a system that builds itself, the researchers have begun to approach nature's method. If any of the light-collecting molecules break, it will be replaced with another one a second later. In this sense, it is a self-repairing system as opposed to if molecules had been put there by researchers with synthetic organic chemistry.

The sun's light is moved to a reaction centre in plants and algae so they can synthesise sugars and other energy-rich molecules.

"We can move energy to a reaction centre, but we have not resolved how the reactions themselves are to take place there," says Bo Albinsson, professor of physical chemistry and head of the research team. "This is actually the most difficult part of artificial

photosynthesis. We have demonstrated that an antenna can easily be built. We have recreated that part of the miracle."

The Chalmers researchers are combining artificial photosynthesis with DNA nanotechnology. When constructing nano-objects that are billionths of a metre, DNA molecules have proven to function very well as building material. This is because DNA strands have the ability to attach to each other in a predictable manner. As long as the correct assembly instructions are given from the start, DNA strands in a test tube can bend around each other and basically form any structure.

"It's like a puzzle where the pieces only fit together in one specific way," says Bo Albinsson. "That is why it is possible to draw a fairly complex structure on paper and then know basically what it will look like. We subsequently use those traits to control how light collection will take place.

'nano', 'self', and 'fields' – add in a bit of pulsing and resonance and this would be just about a full-house in terms of winning directions predicted by TRIZ. Pulsing? Hmm. Maybe a phone call to Chalmers might be on the cards.

More details at:

Jakob G. Woller, Jonas K. Hannestad, Bo Albinsson. **Self-Assembled Nanoscale DNA–Porphyrin Complex for Artificial Light Harvesting**. *Journal of the American Chemical Society*, 2013; 135 (7): 2759 DOI: 10.1021/ja311828v

Generational Cycles – Class A Drug Use In UK Under 18s

An article from a recent edition of the Daily Telegraph in the UK revealed, the number of under-18s receiving treatment for Class A drugs including heroin, cocaine and ecstasy has fallen by two thirds over the past five years but cases involving cannabis are on the rise.

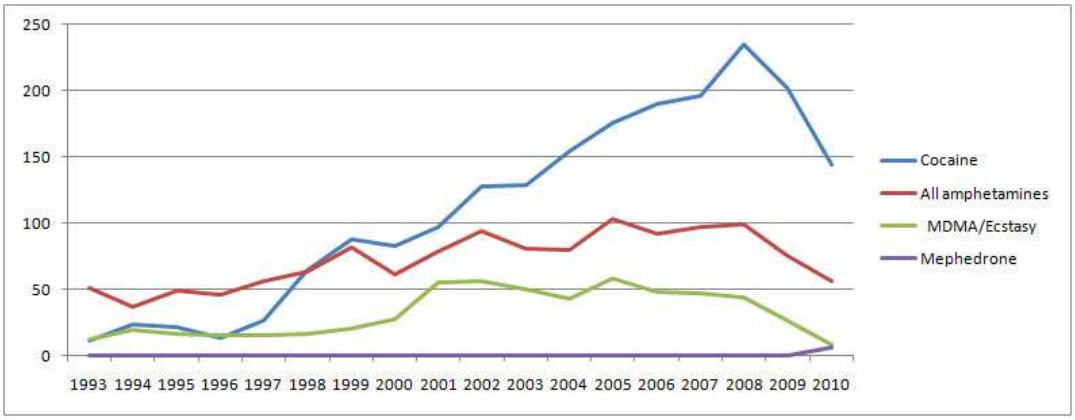
New figures released by the National Treatment Agency for Substance Misuse (NTA) showed that just 631 young people were treated for Class A drugs last year, compared with 1,979 five years earlier.

In contrast, those seeking help for cannabis rose three per cent to 13,200 last year, adding up to an increase of 18 per cent since 2006/07 when there were 10,824 cases.

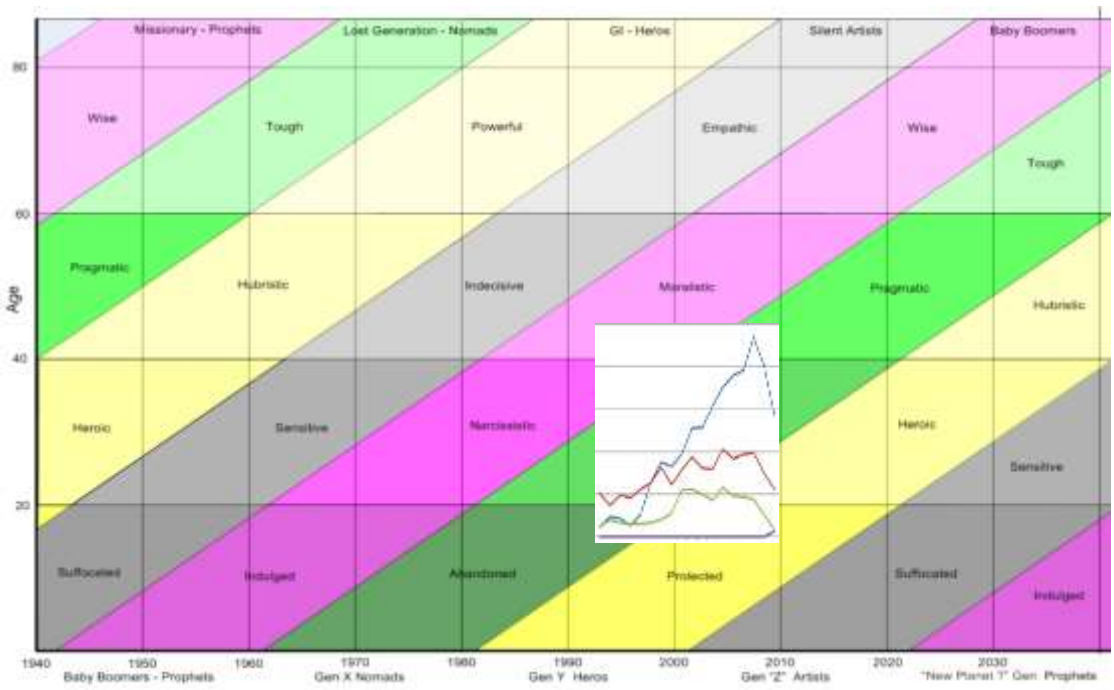
Overall use of cannabis among young people is thought to be declining, but leading experts suggested more potent and harmful strains of the drug could partially explain why more are seeking help.

The NTA said in a related report, "as evidence suggests that overall young people's cannabis use is declining, the rise in numbers seeing specialist services could be down to a combination of stronger strains of the drug causing more harm, greater awareness of the issues surrounding cannabis, and specialist services being more alert and responsive to the problems the drug can cause for under-18s."

Here's what the drug use shift looks like in graphical terms for the period leading up these past five years:



And here it is again, plotted this time on the Generations map:



What's striking about this picture is how the sharp rise in teen drug use coincides with the first of the 'protected' Generation Y Heroes. Also striking is how the precipitous drop in figures is coinciding with the second half of the generational cohort hitting their teenage years.

Why this rise and fall?

A difficult question to answer, and certainly one that inevitably carries with it a multitude of driving factors, but we think the generation archetype profiles give us a few clues:

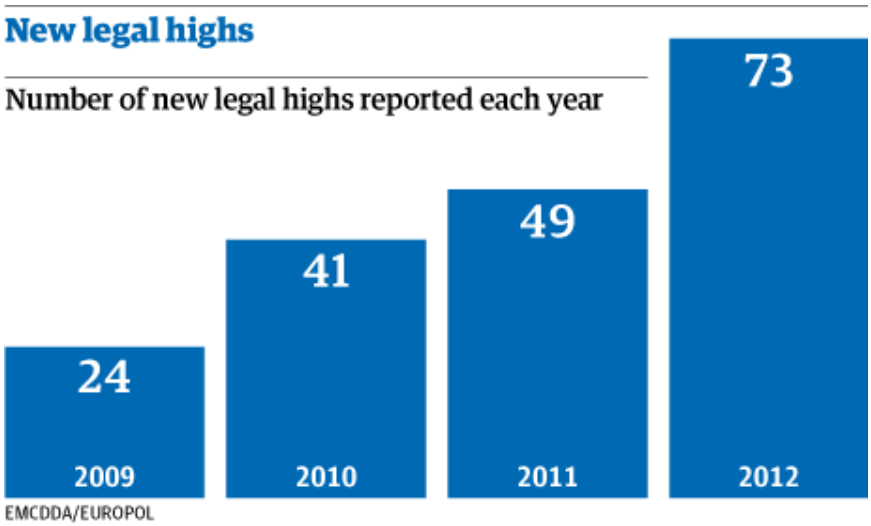
First up, the rise in drug use coincides with the emergence of a 'protected' group of youngsters who get to taste the thrill of Heroic freedom when they're able to escape their parents' attentions. How do Heroes experiment with drugs? Heroically!

And how do their, mostly 'Alienated' Nomad parents react? Not Quite with a shrug of the shoulders, but very definitely with a request that the experimentation doesn't leave any permanent damage. Or a criminal record. Protective, 'helicopter' parenting, in other words, with a view that it's going to happen anyway, so let's stay friends about it.

This is the same mentality that gives us GenY youngsters carrying around water bottles wherever they go ('good hydration is important') and more vividly, wearing ear-plugs at gigs ('don't let 90minutes of fun ruin your hearing for life').

The next problem, then, is that eventually every excessive behavior hits some kind of a limit. Generation Y icons, Amy Winehouse and Pete Doherty – both famous for their heroic consumption of drugs and alcohol – switch from being cool to being rather tragic. Amy's 2006 single 'Rehab' may well turn out to be an iconic moment in the turnaround in drug consuming. What was funny suddenly becomes quite serious, and anything but short term experimentation.

Class A drugs have long term consequences. Ergo, it becomes an increasingly smart idea to go and look for Heroic experimentation drugs that are much less likely to have any long term adverse effects. Like the so-called 'legal highs' that have seen a not so surprising corresponding rise in the same last five year period:



Biology – Pilobolus

To be crowned as "the fastest thing alive" has been a title long sought after by competitors across our planet. No, not the fastest man alive nor the fastest mammal alive - the fastest *thing* alive. But how fast is fast?

It turns out that if you can see it with your eyes, it's not nearly quick enough. Indeed, it has only been with the recent development of high speed imaging technologies that scientists have been able to peek into this invisible world and discover what is now believed to be some of the fastest known flights in nature.

Fungi - a kingdom within the domain Eukaryota - is comprised of an enormous population of micro-organisms such as yeast, mold and mushrooms. Pilobolus, our fastest-spore championship winner, flourishes on cow-pats. In order to create more piloboli, it creates a spore that it would like to be able to disperse as far away from its current location as possible… mainly because cows eat grass rather than cow-pats.

Species like Pilobolus, commonly known as hat throwers, employ a unique catapulting technique (as their name may suggest) for dispersing their spores. Spores are reproductive structures disseminated from and by the parent fungus. Adapted almost solely for the purposes of dispersal, these spore structures are capable of surviving extended periods of time in unfavorable conditions.

From a contradiction-solving perspective, this is a classic fight between the desire to dispatch something a long distance when you've got to fight the effects of your small size (pilobolus is typically less than 1cm in length) and, without wishing to get too technical generate sufficient force to overcome the Reynolds Number effect that tells small things that they shouldn't be able to move very quickly through whatever medium – air in this case – that they find themselves trying to fly through. Here's how we might best map that conflict onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Length/Angle of Stationary Object (4)

WORSENING PARAMETERS YOU HAVE SELECTED:

Force/Torque (15)

SUGGESTED INVENTIVE PRINCIPLES:

10, 17, 35, 3, 28, 4, 12

Pilobolus solves the problem – in that it is the world-record holder for highest acceleration, and as a consequence manages to dispatch its spore over 150 times its stalk length – using a cunning ‘hat throwing’ technique:

The act of ‘hat throwing' runs on a simple mechanism: it includes (1) a spore, or projectile, which is placed atop (2) a supporting fluid-filled stalk pressurized by osmosis (Principle 12). As the turgor pressure within the stalk reaches a certain threshold (Principle 10), it triggers the discharge of the spore. The liberation of pressure from the stalk is so rapid and converged (only at the tip – Principles 3, 17) that it allows for an almost instantaneous release of energy. The spore then flies away from the stalk taking up an intriguing aerodynamic profile (Principle 17 again) in order to bet counter the Reynolds Number effect.

High-speed cameras running at maximum frame rates of 250,000 frames/sec were used to capture the entire launch sequence. Launch speeds of the spores ranged from 2 to 25 m s-1 with corresponding accelerations of 20,000 to 180,000 G. To put that into perspective consider the following: space shuttles upon liftoff generates ~3 G and supersonic fighter jets may reach a maximum of 9G. For humans, any sustained G-force above 10 G may be fatal.

Check out the whole impressive story here:
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0003237

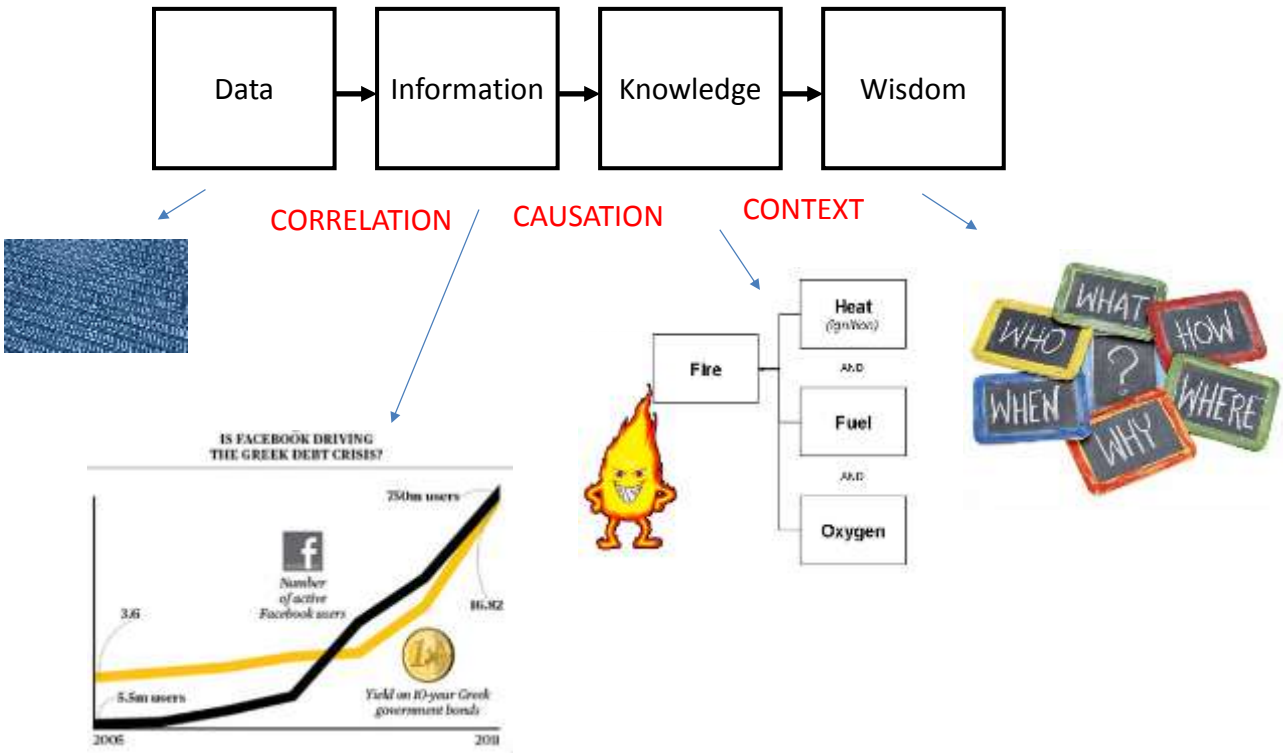
Or watch a pretty cool video of the discharge process here:
http://www.youtube.com/watch?v=TrKJAojmB1Y

Short Thort

INFORMATION is CORRELATED DATA

KNOWLEDGE is CAUSALLY RELATED INFORMATION

WISDOM is CONTEXTUALLY RELEVANT KNOWLEDGE



News

Engineers Ireland

We're pleased to announce a collaboration with Engineers Ireland to bring a series of Systematic Innovation workshops to the engineering community in Ireland. The first of the public events is scheduled to take place in Dublin on November 20.

DTU '100 Day Growth' Programme

We're also very happy to have been invited to contribute to another new MBA initiative at the Danish Technical University in Copenhagen. The '100 day growth' programme is a bootcamp for entrepreneurs and executives between posts or just entering new posts. We'll be exposing the participants to an intensive day of TrenDNA and HOSI tools. Running four times a year, the next module will see our contribution happening on 5 September.

New Round Of UK Public Workshops

A recent resurgence of interest in workshops in the UK has prompted us to schedule a round of repeat and new courses. Thus far findable on the SI-shop web-page are SI

Certification, TrenDNA, ICMM, DeBono Six-Thinking Hats and brand new GenerationDNA and PanSensic one-dayers. We're pleased to announce that the Six-Thinking Hats workshops will be facilitated by certified DeBono trainer Prith Biant. For the PanSensic workshop, we'll be bringing in Paul Howarth, the powerhouse behind the suite of PanSensic measurement tools.

Change Of Address

UK clients are likely to notice a change of address on any invoices they are unfortunate enough to receive from us. This is because the registered office of IFR Consultants has moved this month to a new office. 'The Old Vicarage', halfway between Bideford in North Devon and Bude in Cornwall, is in the process of being refitted so that we can run workshops, record music (!) and generally offer clients a full immersion SI experience. We will, of course, continue to run normal workshops in our Clevedon Hub. Judging by the working speed of Devon builders, we're predicting the Old Vicarage will be open for operations by the end of 2013. Meanwhile, we're all moved in and surrounded by a million unopened boxes.

New Projects

This month's new projects from around the Network:

- Machine Tools – Eyes on the World study
- IT – Eyes on the World study
- FMCG – patent portfolio building project
- FMCG – Sweat the Assets programme
- Utilities – Eyes on the World study
- Construction – Workshop series
- Automotive – turnkey development project
- Academia – PanSensic survey project
- Healthcare – PanSensic analysis project