Systematic Innovation

e-zine

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In this month's issue:

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Hearing What Is Really Being Said:
Part 1 – Thinking Styles

People, as any good marketer, employer or Doors fan will tell you, are strange. They'll tell you one thing when, quite often, they'll be thinking something completely different. People are reluctant to tell the truth, whole truth and nothing but the truth because doing so may cause them harm. Or embarrassment. Or, sometimes, because they simply don't know how to put the truth into words. All of this equates to something of a nightmare for the person tasked with listening to the 'voice of the customer'.

One of the longer term challenges in our roster of research programmes has been to get to the roots of the seeming discrepancies between what people say and what they do. The TrenDNA method and tools are one early outcome of this research. The overall premise of that piece of work is that the best way of capturing peoples' intentions is to not ask them in the first place; that we can do a far better job of capturing their future needs and desires by getting to the 'DNA' of what fundamentally drives all of our behaviours. Central to the successful creation of this capability is the ability to capture and understand the Gravesian thinking styles ('mental gears') that govern how people see and interpret their world.

In 2012, when we ran the first 'Graves Future' seminar, one of the key conclusions when we asked the question, 'what is hampering the spread of Graves' work?' was the fact that at present it is very difficult to measure thinking styles. For sure there are sophisticated instruments and questionnaires that can help to assess the in-the-moment thinking style of a person subjected to those instruments, but short of asking everyone on the planet to subject themselves to these things, it has not been possible to capture broad measures of, say, the people within an organization, or, to take a broader view, within a geographic region. Or the planet as a whole.

Even if such capabilities existed, they would merely represent the tip of a metaphoric iceberg when it comes to the bigger, far tougher, question of distinguishing between what is said and what is really meant. This series of articles is ultimately intended to get us closer to answering that bigger question. Along the way we will be examining a number of different ways and means of answering the question, all of which, we think, form

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necessary but individually insufficient pieces of a big jigsaw. The journey will take in things like Deep Metaphors, Archetypes, Generational characteristics, Cultural phenomena, Hero's Journey stages, Emotional states, Facial Coding and Voice Timbre Change measurement. These in turn will allow us to capture higher level say-versus-think metrics like Authenticity, Resonance and, ultimately, Truth.

Before we get there, however, we need to establish ways and means of measuring such phenomena. Specifically in a manner that allows us to capture statistically significant quantities of meaningful data. That's what this first article is about. Our focus will be on mass-capture of the aforementioned Gravesian Thinking Styles data. We start this particular journey with a short look forward to what such a capability might allow us to do, how it might allow us to see the world more meaningfully:

A Mini Case Study

We recently had occasion to work with an enterprise that was in the middle of a difficult re-organization, struggling to get engagement from the people tasked with working in the revised systems and structures. We were able to get many of these people to complete anonymous perception mapping statements about the new structure and what they felt could be done better (Example: 'management are more interested in protecting their old contract bonuses than they are in helping implement the required changes'). All of these statements – just over 500 in total – were transferred into electronic text form and then run through our new Thinking Styles scraping engine – more about which shortly. The results of the assessment are reproduced in Figure 1:

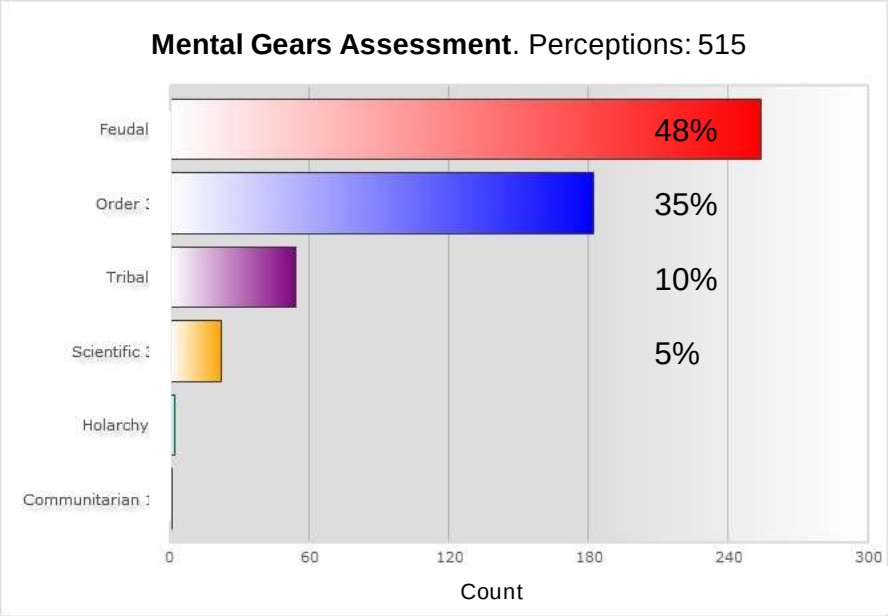

Figure 1: Thinking Styles Scraping Result 1 – Mid-Change

Anyone with any kind of familiarity with Graves' work will know that – assuming the graph is a fair representation of reality – what we have here is a bunch of very difficult people. For those that don't know Graves work, the top-scoring 'Feudal' Thinking Style is the sort of my-way-or-highway thinking observable in small children passing through their 'terrible-twos' phase.

Interestingly, we also had access to an equivalent (also anonymous), slightly smaller set of statements and stories gathered from the same group of people a few months prior to

the change programme implementation, during the time, in fact, when the changes were still being designed. The results of this assessment are reproduced in Figure 2:

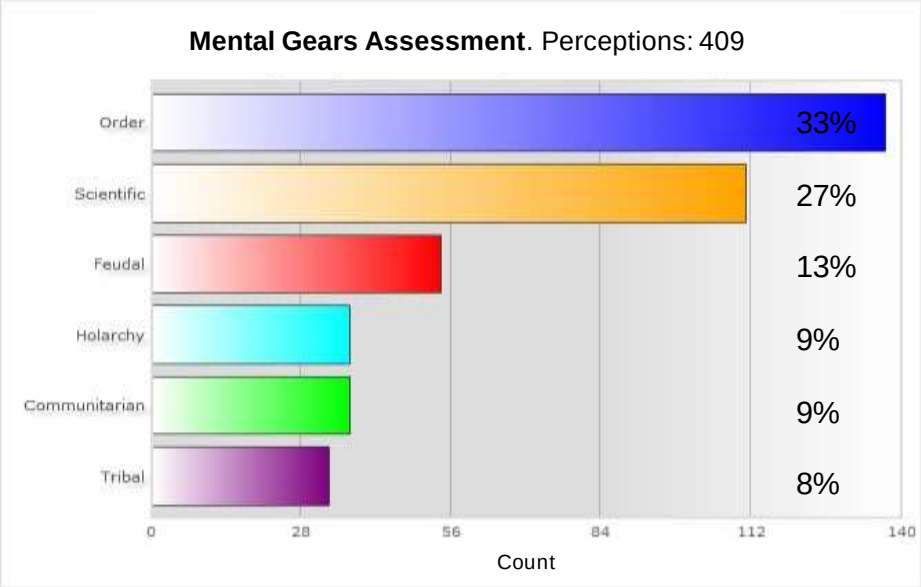

Figure 2: Thinking Styles Scraping Result 1 – Pre-Change

The difference between the two pictures is quite striking. Again for those unfamiliar with Graves' work, the dominant Thinking Style picked up in the Figure 2 analysis is the 'Order' mode. This is the Thinking Style most closely associated with people holding an rule-based, absolutist view of the world, people for whom there is always the right way to do something, and for whom change is generally viewed as a bad thing. The change from a group of change-averse Order people to one in which almost half of the people have reverted to terrible-two's, Feudal behavior is about the worst piece of news any change agent could hope to receive. But at least we now know what the state of play is.

Or rather we do provided the data is accurate…

We can't, of course, know all we wish to know about the unfolding context of the story in this situation. Simply because we were working with a client willing to try this coarse, previously untried experiment with us and there were too many things already in train that we had no ability to see or influence. Working for us, on the other hand, is the fact that we were able to compare two sets of data that we felt were largely consistent in their manner of capture, and so even if the absolute results can be questioned, we can have a higher level of confidence in the *changes* seen in the before-versus-during data.

Only time and a host of similar willing, open-minded clients will allow us to validate the model in absolute terms. In the meantime, we can share a few words about the underpinning methodology in the hope that it will encourage some of those potential candidates to say to themselves, 'hey, there is something that sounds valid, and is therefore worth exploring deeper' to come forward…

The media-scraping model, then, essentially works in two stages. The first stage is all about the language people use. Specifically the words and phrases that people use that are attributable to the different Thinking Styles and then the ability to 'scrape' electronic text to find places where these things are present. The second stage is about testing the contextual relevance of these words and phrases to establish whether they represent valid evidence that the speaker's intent is consistent with a given Thinking Style. Clearly,

because we are only using electronic text as the input data there are inevitable limitations to the amount of context that can be discerned. For this reason, the best way to view the overall two stage scraping/contextualizing process is as a means of capturing a 'gist' of the reality. No map is ever fully representative of the territory. We see the building of this scraping engine as an evolving journey, and that we are still somewhere close to the beginning. Maybe we can gist to a relatively low level of accuracy right now, but our thinking is that it is better to have some indication of Thinking Style's present in a situation rather than none.

The engine is also currently going through the patent application process and so the key inventive steps won't be described here. Here is what we think we need to reveal in order to give sufficient interest and confidence that we are heading in the right direction:

Keyword Scraping
Some words get used universally across all of the different Thinking Styles. These tend to be nouns and verbs. So the first thing a media scraping engine looking to establish what thinking style someone is currently in needs to do is look beyond these words to the pronouns, adjectives, adverbs, tenses and slang that tends to surround the core content of a sentence or block of text.

Some of the more extreme examples of the different Thinking Styles perhaps best help to illustrate what the sorts of words the scraping engine needs to find are:

The 'Order' Thinking Style was described by Clare Graves as *'Deny/sacrifice self now for reward later'* and is characterized by an absolutist view of the world that lives by a clear, unambiguous set of rules: there is a right way to do everything. The sacrifice element means that that a person thinking in this Style tends to talk in terms of 'us' and 'we'. The absolutist perspective means that words like 'must', 'always', 'never', 'illegal' and even 'the' tend to be the ones they will automatically chose when speaking.

The 'Scientific' Thinking Style (*'Express self for rationally self gain'*), conversely tends to be characterized by use of the personal pronoun rather than the collective. The archetype is referred to as 'Scientific' because this person is someone who deliberately and rationally looks at alternative options and solutions and makes an optimizing decision about which is the most appropriate. As such, this person will tend to use words ending in '–er' or '-est' – they want their products to be bigger, biggest, and the best. And they want the data to prove it.

Ultimately, then, the keyword scraping element of the overall Thinking Styles capture engine has been about the construction of a database of words and phrases attributable to each of the different modes of thinking. To date, this database contains around 4000 entries.

Contextualisation
Eagle-eyed Graves-familiar readers of the preceding paragraph will no doubt be saying to themselves, hold on a moment, Order are not the only types that will use collective pronouns and Scientific are not the only ones to talk about the world in terms of 'I'. Very true. Which means that the first thing a context engine has to be able to do is determine which Thinking Style category (if it can meaningfully say anything at all) it should place a person using either the personal or collective (or other) manner of speaking. This turns out to be one of the easier contextualization jobs since it uses some of the other keywords ('must', 'always', 'best', etc) to make initial assessments and then uses the consistency or otherwise of the pronouns to determine whether these words can be used to strengthen

the indications that one Thinking Style is present over another. In this regard, adjectives generally speaking give first order clues, while pronouns give ones that tend to offer second order reinforcement or cancellation clues.

The next easiest contextualizations to pick up involve capturing the emotional state of a person. Not so easy in absolute terms, but there are again a number of relatively clear clues:

- Use of slang is correlated to familiarity/exclusion – i.e. sometimes we use slang to make ourselves feel like 'part of the gang', whereas in other situations we might deliberately chose words that deliberately exclude a reader (e.g. Cockney rhyming slang in the UK)
- Use of slang is also correlated to the levels of anger or frustration that people might be feeling. This is an often important signal that a person is reverting to the Feudal or Tribal Thinking Styles
- Use of exclamation marks are a strong frustration clue (!!!)
- Switches from lower to UPPER-case writing (shouting) are another reliable frustration clue
- Strength and depth of metaphors used (an important one and therefore expect to hear more about this one in a future Part of this article series)

There are then, as one might expect, a whole series of context deriving clues that are much more difficult for an electronic text reader to pick up. Some of these only an ability to read facial and auditory tone clues can hope to pick up, and others that, while in theory are extractable from electronic text, turn out to be quite difficult to do with any level of repeatability. Most notably when people are using sarcasm: something that one human listening to another can generally speaking pick up quite readily, but which a computer still has enormous difficulty in distinguishing from the same words intended to be interpreted literally. We're not pretending that we can do an accurate job on any of these fronts right now – building such capabilities are steps along the research journey that we've already started making, so we are confident we'll get there one day in the not too distant future.

More importantly for the here and now is how we've been able to give ourselves a degree of confidence that what we're doing is getting us somewhere close. The answer to that question has involved us going back to some of the Clare Graves texts and specifically where he reproduces the written responses he received from individuals during his research. Running our automated scraping engine over transcripts Graves used to illustrate how one can discern whether someone is thinking in one Style or another has turned out to give us a pretty good first set of validation data.

Here's a short example taken from 'The Never Ending Quest' (pp262):

"Positively speaking, the mature individual must transcend his animal desires and give its geist free range in order that it might seek the fullest possible actualization of its ideas. The mature individual must not repress his animality (here used in a neutral context) because man is both geist and body, and in fact, they are one. An individual geist can only actualize itself through a body. The body ought therefore be appreciated, respected and cultivated to the fullest extent possible. The mature individual must seek harmony between the symbolic system, must realize its origins and limitations, while yet cultivating its powers. The mature individual must take stock of this emotive meaning structures and understand them. In this way the play of emotions and the subconscious will not produce existential anxiety in the individual and psychopathological stress will be avoided. The mature individual must take stock of his emotive meaning structures and understand them – as opposed to the vain attempts of others to comprehend, repress or ignore them."

And here's what the scraping engine will make of the words – each colour text highlighting the Thinking Style colours associated with that particular Style: Order = blue; Scientific = orange; Communitarian = green)

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So, while we might argue over the validity and relevance of all of the coloured 'hits' made by the scraping engine, the overwhelming conclusion from the gist analysis is that this paragraph was written by a (blue) Order person… which indeed then coincides with Graves diagnosis.

Imperfect as it might be, we already saw the methodology and findings were good enough at least to convince our earlier change-programme client to let us do an experiment with them. And now, hopefully, providing us another step towards convincing some of our readers to try the next experiments. One of the nicest parts about automating anything is that at the very least it's easy to analyse even the biggest set of input data. We invite people to give the emerging capability a shot.

Organisational Evolution:
From Start-Up To Efficiency Engine

Last month we took a look at typical models for the various different levels of Innovation Capability's found within organizations. In the article we looked at ICMM Levels 1 through 5. This month we examine the main paths taken by start-up organizations *before* they reach the Level 1 state. Part of the reason for doing this is to explore how some of the problems found in a Level 1 organization get inherently 'baked-in' as a result of the earliest seeds of the innovation capability building journey. The other part (full disclosure) is that it will help us to assemble another piece into our Hero's (Start-Up) Journey book project.

Figure 1 illustrates the most likely structure of any type of start-up company:

Figure 1: The Typical Start-Up At The Beginning Of Its Life

What this figure is intended to show is that, essentially, a start-up company begins its evolution fully in learning and innovation mode. This could be because – often – the organization begins its life as a spin-out from a piece of academic research or an R&D person that decides to leave their employer to pursue their own new-product dream. But even if the roots of the new business are more mundane, the fundamental fact remains that the business is new, has no track record, limited resources, and no customers and the only way to find a critical mass of all three is to work out how to solve the myriad puzzles and barriers that will inevitably appear. Learning and innovation thinking is what's needed and that's typically what attracts the entrepreneur and co-workers to come on board: the thrill of the chase.

The only likely exception to this start position is the person that takes on a franchise operation. Aside from a few minor allowances to tailor the franchise offer to suit a local environment, generally speaking 'all' of the learning and innovation has already been done by the franchise owner and what they're looking for is someone to 'merely' follow the established (efficiency-engine-ish) rules. The franchise, in other words, tends to start from a position that looks more like the picture shown in Figure 2. We won't say any more about this start-up option since, in effect, it offers few if any opportunities for the franchise operator to scale and grow their business other than by taking responsibility for a greater number of franchise operations. There is nothing at all wrong with such an approach to life. We're not interested in it in our context here because, very simply, it has nothing to do with innovation or innovation capability.

The successful franchise, however, can give the start-ups we are interested in some useful insights. The main one being that the only reliable way to scale a business is to create a scalable business model that can be quickly and successfully taught and implemented to people new to the business. Management-guru owned consulting

companies represent an interesting class of start-ups that almost always fall foul of this problem: the brainpower of the guru being very difficult indeed to reproduce in other people well enough to convince potential customers (who, almost inevitably, will still want to deal with the guru personally rather than their 'apprentices').

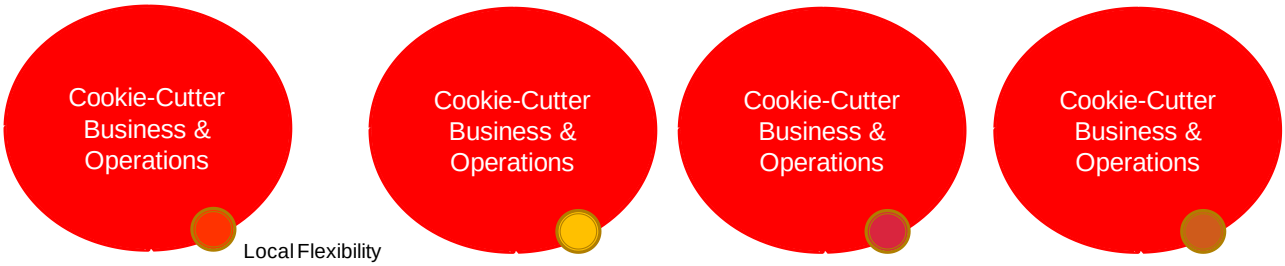


Figure 2: Typical Franchise Operation Business Model

Examine the business model of most venture-capital and other funding organizations and it quickly becomes clear that, the moment they see scalability potential in any start-up company, they will want to bring in people with the skills to create the scalable business model that will allow the underpinning idea behind the start-up to be capitalized. Essentially what they are doing, and indeed what any start-up with the intention to scale their business needs to do, is to modify the initial Figure 1 business model so that it looks like the one illustrated in Figure 3:

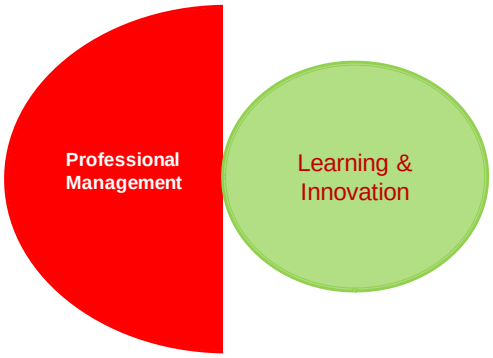


Figure 3: Second Evolution Stage In Scaling A Start-Up

As the figure tries to hint, the fit between the newly introduced 'professional management' structure and the initial learning and innovation operation tends to be an awkward one. Often so much so that the organization never successfully manages the transition to the next stage, it being too easy for each of the two parts to fail to appreciate the value of the other. Or, on the part of the 'learning and innovation' people that the required transition is the one to the model illustrated in Figure 4:

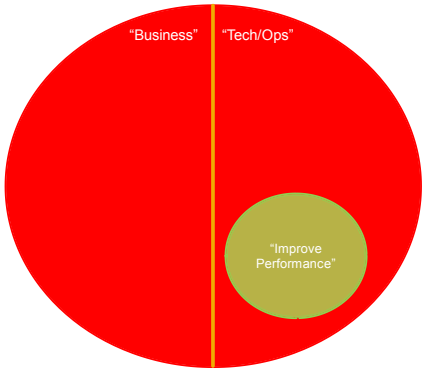


Figure 4: Third Evolution Stage In Scaling A Start-Up

As might be imagined, the 'learning and innovation' people are the ones that seem to lose out in this transition. This is because – essentially – their role at this stage becomes one of focus on the near term and serving the newly arrived, usually unhappy customers, which in turn means improving what already exists, rather than creating more step-change solutions.

There is no absolute rule demanding that the 'improve performance' part of the organization, as drawn in the figure, is fundamentally within the technical domain – it being conceivable that the underpinning spark behind the business is a business innovation – its just that this tends to be the norm. And as such, the reason that the second major shift that occurs during this evolution stage is that a clear silo wall tends to get built between the 'business' side of the enterprise and the technical/operations side. Again, this division is largely inherent if the business is to be scaled successfully: investors want to see a strong, in-control management team and an operations team designed to ship finished product or service to paying customers.

Next up, assuming the enterprise successfully weathers the traumas of this transition, comes a usually easier one to the model shown in Figure 5:

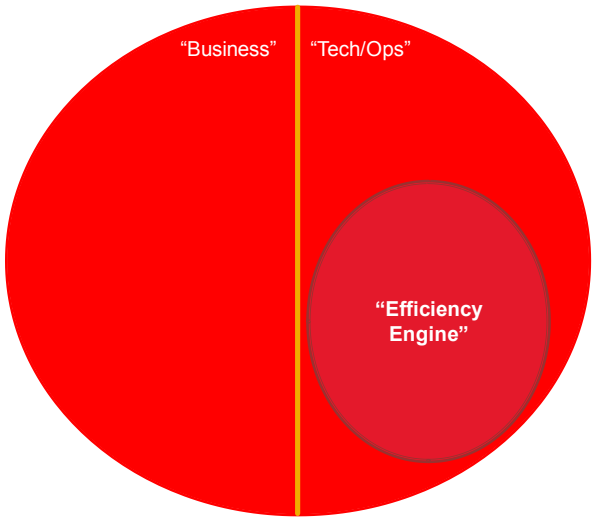


Figure 5: Fourth Evolution Stage In Scaling A Start-Up

All that has happened during this jump is that, having successfully improved the customer offering to the point that the business is stable, the need for the first versions of a 'continuous improvement' efficiency engine kicks in. Again, there is no rule that says this has to be about the technical side of a business, but the overwhelming evidence thus far is that this is where it is going to be. The trigger to switch from 'improve performance' to create the efficiency engine is usually the first signs of decreasing margins spotted over in the 'business' side of the silo wall. Given this signal, the 'cut cost' message is most frequently the one shouted over the wall in the general direction of those responsible for day-to-day operations.

We've re-coloured this 'efficiency engine' from green to red at this stage to indicate a subtle but nevertheless profound transition away from the learning and innovation needed during the third evolution stage to simply get the offering good enough to satisfy customer needs, to the incremental, data driven (Lean and/or SixSigma) initiatives that drive the behaviours at the Fourth stage. This shift is important since, per many of our previous

discussions in this e-zine, the optimization task of the efficiency engine is now the polar opposite of the learning and innovation mindset. In effect, those learning and innovation people have little or no role in the Fourth evolution stage. Oftentimes they will leave the organization or be encouraged to leave in the case of the reluctant inventor/founder. If they don't leave, they will become the 'viruses' found in the final evolution stage shown in Figure 6:

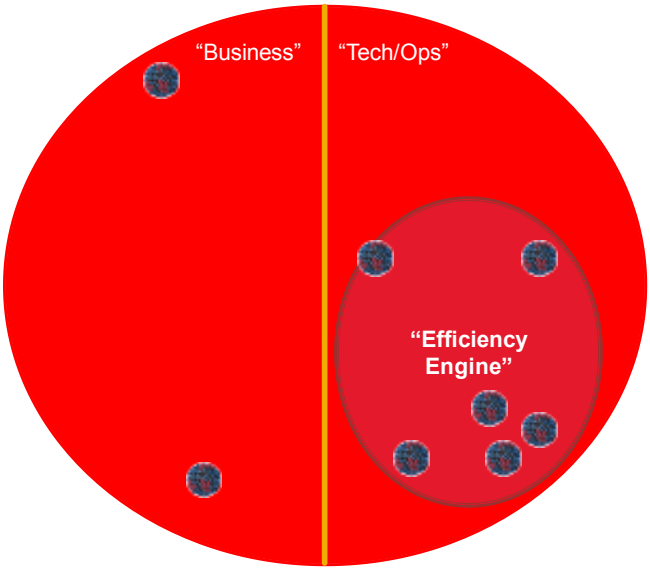


Figure 6: Final Evolution Stage In Transition From Start-Up To ICMM Level 1 Organization

This is now the mature ICMM Level 1 organization, complete with the viruses – those awkward individuals that have had the 'misfortune' to look outside and ahead and seen better – step-change – ways of doing business. They might (often!) decide that the antibodies present in the rest of the organization are too powerful or make life too unpleasant. Which in turn means they either:

1) Stop looking like viruses, shut-up do just what they're told, or
2) Help the organization to transition to ICMM Level 2, or
3) Leave the organization to set up the next (Figure 1) start-up

And thus, in this third case, the cycle begins again. Usually without understanding that they're setting off another spin of what will inherently be the same wheel. Plus ça change, plus c'est la même chose.

Not So Funny – Texas Breakfasts

This month found me doing a short job in San Antonio, Texas. As is my usual way of doing things, the hotel selection process essentially involved finding the hotel meeting minimum standards (these days: comfortable bed, free-internet and bath) that is geographically closest to the place I will be working. I thus found myself here:

A brand-spanking new Holiday Inn on the very pleasant north-west of the city. I can still in fact recall the smell of new carpets that greeted me upon arrival. (Note to every hotel: forget your high falutin' 'corporate scents' and get yourself back to basics – the scent of new carpet works in exactly the same heady was as the smell of new leather upholstery does in a new car. Simultaneously intoxicating and a great 'opulent luxury' cue.)

All went swimmingly until the moment I entered the restaurant for breakfast the morning after my arrival. I'd been given a clutch of 'free Best-4-Breakfast' coupons for the duration of my stay. A very nice gesture I thought, especially since I hadn't built breakfast in to my plans when I made the booking.

Unusually, the breakfast was menu ordered rather than buffet. I ordered coffee (in my experience, Texans don't understand 'tea'), fruit-juice, cereal and a very exotic sounding egg and bacon filled croissant.

Everything arrived in good order, in the right sequence, with precisely the right gap between each course.

I'd done what my free coupon told me ('present this coupon to your server when ordering to receive your breakfast credit') and so was a little surprised when, just as I was putting down my knife and fork at the end of my croissant adventure, a bill was put down in front of me.

A bill? I looked quizzically at the waitress, 'I thought I'd given you my coupon?'

She smiled pityingly back at me, 'the orange juice wasn't included.'

Now I've been to Texas a few times, but not so many to know whether this was a standard feature of a Texan breakfast so, not wishing to make a scene, I signed for the 4 dollars my free orange juice was now going to cost me. I made a mental note to check with my work hosts whether I was missing something. They turned out to be as confused as I was: fruit

juice is as central to the concept of ‘breakfast’ in Texas as it is everywhere else on the planet.

The next morning, again not wishing to make a scene, I decide that, not liking the idea that my free breakfast coupon was going to make me pay 4 dollars for my orange juice, I just ordered the coffee, cereal and (being at least slightly adventurous) another variant on the croissant – this time sausage replacing the bacon.

Again everything arrived right on cue and tasted just the way it should, the heady mixed scent of melted cheese, sausage and new carpet a minor miracle of Holiday Inn luxury. Something I got to bask in for a few seconds before – bam – another bill gets slapped down on the table in front of me.

Again my quizzical look up at the waitress. A different waitress this time. She didn’t seem to understand what my look was about, ‘is something wrong?’ she drawled.

‘I thought I gave you my free coupon?’ I said, trying to sound simultaneously confused and English.

‘You have to pay for the cereal,’ she replied.

I looked at the bill. Then I looked at the menu. Then I looked back at the bill. Then at the waitress, ‘it says here that the cereal is $3.50.’

She nodded.

‘So why does my bill say $6?’

She stood looking at me, not saying anything. I looked closer at the bill. The cereal had indeed been charged at $3.50. But then, below it was another entry: ‘milk $2.50’.

Now I’ve been to Texas a few times, but not so many to know whether this was a new standard feature of a Texan breakfast so, not wishing to make a scene, I signed for the six dollars. I made a mental note to check with my work hosts whether I was missing something. As had happened the previous day, they turned out to be as confused as I was: milk is as central to the concept of ‘cereal’ in Texas as it is everywhere else on the planet.

The following morning, I took my remaining free breakfast coupons up to the reception desk at the front of the hotel, ‘excuse me,’ I said, handing the coupons over the counter, ‘you have nice carpets.’ The receptionist smiled. I smiled back, ‘is there a Taco Bell nearby?’

Patent of the Month – Optical Image Shutter

Patent of the month this month takes us on a rare visit to our friends at Samsung. Rare because, although the company is still generating enormous quantities of new patents (average still over 150 a week this year), many of them are still relatively incremental in nature. Not so with US 8,289,606, granted on 16 October, which looks to have opened up an interesting step-change in capability in the camera and image-capture arena. Here's what the invention disclosure has to say about the problem the invention addresses:

Optical image shutters transmit or block an optical image containing information according to a control signal. Optical shutters are essential optical modules widely used in image pickup devices, such as cameras, and display devices, such as liquid crystal displays (LCDs).

Optical shutters may be technically classified into a mechanical shutter used in a camera or the like, a liquid crystal shutter used in an LCD, a digital micromirror device used in a projection display device, a micro-electro-mechanical system (MEMS)-based spatial light modulator such as a grating light-valve, an image intensifier used in a laser radar (LADAR) or a three-dimensional (3D) camera, and a semiconductor-based optical shutter.

In terms of working principles and shutter speeds, a mechanical shutter drives an aperture by using an electro-magnetic motor and has a shutter time on the order of 1 millisecond (ms). A liquid crystal shutter is driven by the rotation of liquid crystal molecules and has a shutter time of several milliseconds. A MEMS-based spatial light modulator drives a fine structure with an electrostatic force and has an operation time of tens of microseconds (.mu.s). An intensifier used in a 3D camera and a semiconductor-based optical shutter are driven by photoelectric conversion occurring in a semiconductor and have a shutter time of several nanoseconds (ns).

Much research into obtaining distance information of a subject by using a LADAR or a 3D camera has been recently conducted. To obtain the distance information, light having a specific wavelength (for example, a near infrared ray having a wavelength of 860 nm) is projected onto the subject by using an LED or a laser diode (LD), a light image reflected from the subject is (shuttered), an image is obtained via an imaging device, and a series of processing is performed on the image. In this regard, a fast shutter opening and closing time of about tens of ns is used to exactly identify a light traveling time to determine a distance. An image shutter, such as the image intensifier or the semiconductor-based optical shutter stated above, provides a fast shutter opening and closing time.

The image intensifier is an expensive piece of equipment requiring a high operating voltage and vacuum packaging. The semiconductor-based optical shutter includes a light absorber using a multi-quantum well structure based on a III-V group semiconductor, such as GaAs, a combination of an opto-electric converter (for example, a photodiode), and an electro-optical converter (for example, an LED), etc. The semiconductor-based optical shutter is manufactured using a GaAs substrate during a semiconductor manufacturing process.

In addition to the light shutters described above, another kind of light shutter relies on an electro-optical effect in which a refractive index varies according to an electric field applied thereon. Since the light shutter relying on the electro-optical effect described above has a response speed corresponding to several tens of GHz, it may be used as a waveguide in ultra-speed optical communication. Examples of the light shutter relying on the electro-optical effect described above include a Kerr cell using the Kerr effect and a Pockel cell using the Pockel effect. Kerr cells and Pockel cells relying on the electro-optical effect described above often use a bulk electro-optical crystal that requires a driving voltage of thousands of volts in order to obtain a desired effect. It has recently been proposed that a light shutter that operates at a low voltage can be created by forming a thin film using an electric-optic material. In this regard, a technology for crystallizing the electro-optical material as a thin film on an amorphous substrate such as glass is at issue.

The last paragraph gives us a pretty good hint at the basic contradiction present in the state of the art. Namely that we're trying to increase the speed of the image shutter, and the thing that prevents us from achieving that aim – in the Kerr Cell type design – is high voltage required to drive the shutter. A nice simple one to map on to the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Speed (14)

WORSENING PARAMETERS YOU HAVE SELECTED:

Force/Torque (15)

SUGGESTED INVENTIVE PRINCIPLES:

19, 13, 15, 28, 3, 29, 18, 5, 17

And the inventors' solution?

Again from the disclosure, this time the summary section:

One or more exemplary embodiments include an optical image shutter having a transparent electro-optical crystal formed on a transparent amorphous substrate.

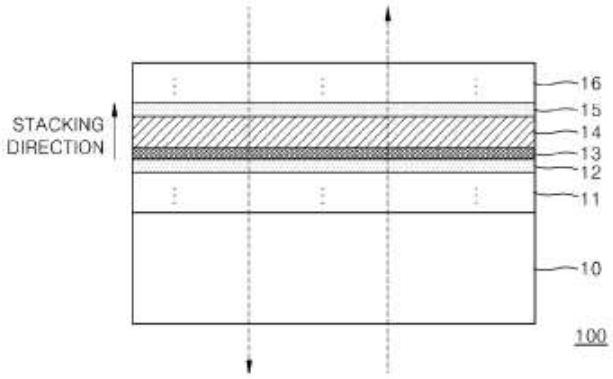
One or more exemplary embodiments include a method of manufacturing an optical image shutter by forming a transparent electro-optical crystal on a transparent amorphous substrate.

Additional exemplary embodiments will be set forth in part in the description which follows, and will be apparent, in part, from the description, or may be learned by practice of the presented exemplary embodiments.

According to one or more exemplary embodiments, a light image shutter including: a transparent amorphous substrate; a first reflective layer disposed on the transparent amorphous substrate; a crystalline transparent buffer layer disposed on the first reflective layer; a crystalline electro-optical thin film layer disposed on the crystalline transparent buffer layer and having a refractive index which varies with respect to an electric field; a transparent electrode disposed on the crystalline electro-optical thin film layer; and a second reflective layer disposed on the transparent electrode.

Can you spot the Inventive Principles?

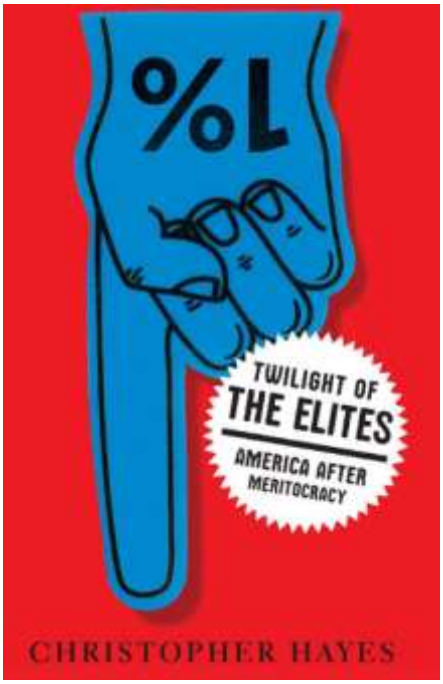
How about when you can also see the picture…



Our thoughts: mainly the design offers a very nice illustration of Inventive Principle 3, Local Quality – in that a previously homogenous structure has been divided into a number of different layers, each with a different function. Then, a bit more of a stretch, but we can't find a better Principle connection, the incorporation of a mirror, 'reflective layer' maps well to Principle 13, The Other Way Around.
Easy when you know how.

SYSTEM ·ATIC INNOVAT· ION

Best of the Month – Twilight Of The Elites



As every good author or publisher knows, one of the best ways to present a new book is to feature some kind of paradox. Preferably one that counters the prevailing common-sense logic of the day. Chris Hayes manages that feat in spades in this, his debut book, Twilight Of The Elites. The basic premise being that the US is in the mess it is currently in *because of* the meritocracy and advancement of the elite thinkers that came with it. Surely, common-sense tells us, those that rise to the top of a meritocracy are the best placed to look after our future?

A lot of books, of course, fail to deliver on their basic start point. That's one of the features of a world in which the sizzle too often triumphs over the steak. Hayes' case isn't then exactly helped by the fact that he is only 33 years old. Surely he can't have paid sufficient dues or understood a big enough picture to be able to talk coherently about why the current system is delivering such dysfunctional outcomes?

Wrong. Turns out that Mr Hayes is a very coherent thinker indeed. Definitely falling on the downbeat Nomad side of the generational divide with the Generation Y 'Heroes', this is not a book that's going to make for particularly happy, fluffy-bunnies type reading. This from the book's frontispiece:

Over the past decade, Americans watched in bafflement and rage as one institution after another – from Wall Street to Congress, the Catholic Church to corporate America, even Major League Baseball – imploded under the weight of corruption and incompetence. In the wake of the Fail Decade, Americans have historically low levels of trust in their institutions; the social contract between ordinary citizens and elites lies in tatters.

How did we get here? With Twilight of the Elites, Christopher Hayes offers a radically novel answer. Since the 1960s, as the meritocracy elevated a more diverse group of men and women into power, they learned to embrace the accelerating inequality that had placed them near the very top. Their ascension heightened social distance and spawned a new American elite--one more prone to failure and corruption than any that came before it.

Mixing deft political analysis, timely social commentary, and deep historical understanding, Twilight

of the Elites describes how the society we have come to inhabit – utterly forgiving at the top and relentlessly punitive at the bottom – produces leaders who are out of touch with the people they have been trusted to govern. Hayes argues that the public's failure to trust the federal government, corporate America, and the media has led to a crisis of authority that threatens to engulf not just our politics but our day-to-day lives.

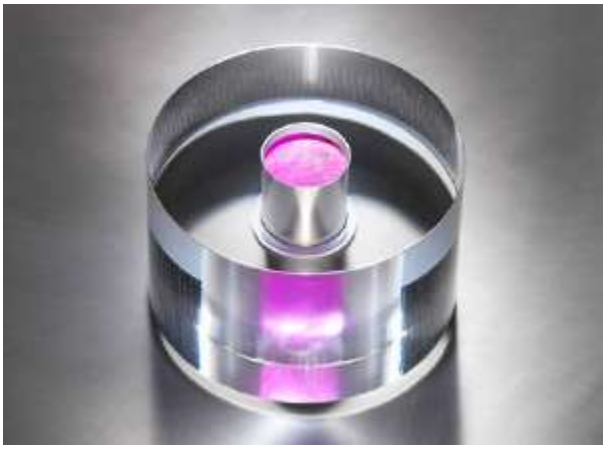
Upending well-worn ideological and partisan categories, Hayes entirely reorients our perspective on our times. Twilight of the Elites is the defining work of social criticism for the post-bailout age.

More spin perhaps, but amply justified by Hayes' compelling and well argued case. And also his (get the Gen Y's on board positivism) call to action in the closing chapters of the book.

I bought this book on impulse while waiting for a plane in Dallas. It seemed to be the best of a two shelf-units worth of what looked to me like same-old, same-old business books. Does nobody have anything to say any more I found myself thinking. Turns out they do. His name is Chris Hayes and buying his book was one of the best decisions I made all year.

If you're open minded enough to at least contemplate the heretical thought that meritocracy doesn't work (even better if you're interested in the convoluted workings of complex systems), I think you'll enjoy this as much as I did.

Investments – Room-Temperature Maser



Quite a substantial technology step-change on offer in our Investment feature this month: Scientists from the National Physical Laboratory (NPL) and Imperial College London demonstrate, for the first time, a solid-state 'MASER' capable of operating at room temperature, paving the way for its widespread adoption - as reported in the journal *Nature*.

MASER stands for Microwave Amplification by Stimulated Emission of Radiation. Devices based on this process and known by the same acronym were developed by scientists more than 50 years ago, before the first LASERs were invented. Instead of creating intense beams of light, as in the case of LASERs, MASERs deliver a concentrated beam of microwaves.

Conventional MASER technology works by amplifying microwaves using crystals such as ruby - this process is known as 'masing'. However, the MASER has had little technological impact compared to the LASER because getting it to work has always required extreme conditions that are difficult to produce; either extremely low pressures, supplied by special vacuum chambers and pumps, or freezing conditions at temperatures close to absolute zero (-273.15 °C), supplied by special refrigerators. To make matters worse, the application of strong magnetic fields has often also been necessary, requiring large magnets.

Now, the team from NPL and Imperial have demonstrated masing in a solid-state device working in air at room temperature with no applied magnetic field. This breakthrough means that the cost to manufacture and operate MASERs could be dramatically reduced, which could lead to them becoming as widely used as LASER technology.
The researchers suggest that room-temperature MASERs could be used to make more sensitive medical instruments for scanning patients, improved chemical sensors for remotely detecting explosives; lower-noise read-out mechanisms for quantum computers and better radio telescopes for potentially detecting life on other planets.
Dr Mark Oxborrow, co-author of the study at NPL, says: "For half a century the MASER has been the forgotten, inconvenient cousin of the LASER. Our design breakthrough will enable MASERs to be used by industry and consumers."

Professor Neil Alford, co-author and Head of the Department of Materials at Imperial College London, adds: "When LASERs were invented no one quite knew exactly how they

would be used and yet, the technology flourished to the point that LASERs have now become ubiquitous in our everyday lives. We've still got a long way to go before the MASER reaches that level, but our breakthrough does mean that this technology can literally come out of the cold and start becoming more useful."

Conventional MASER technology works by amplifying microwaves using hard inorganic crystals such as ruby. However, masing only works when the ruby is kept at a very low temperature. The team in this new study have discovered that a completely different type of crystal, namely *p*-terphenyl doped with pentacene, can replace ruby and replicate the same masing process at room temperature. As a curious twist, the pentacene dopant turns the otherwise colourless *p*-terphenyl crystal an intense reddish pink - making it look just like ruby!

The twin challenges the team currently face are getting the MASER to work continuously, as their first device only works in pulsed mode for fractions of a second at a time. They also aim to get it to operate over a range of microwave frequencies, instead of its current narrow bandwidth, which would make the technology more useful.

In the long term, the team have a range of other goals including the identification of different materials that can mase at room temperature while consuming less power than pentacene-doped *p*-terphenyl. They will also focus on creating new designs that could make the MASER smaller and more portable.

Not only is the breakthrough an important one from the perspective of the life-changing possibilities it opens up, but how the researchers made the breakthrough is also insightful. Oxborrow again: “we stitched things together. We took one magic parameter from one paper, and another from a different paper, and by looking at all the different possibilities were able to work out the properties of p-terphenyl doped with pentacene… it wasn’t a shot in the dark: we didn’t just try every chemical on the shelf.” Amen to that, very TRIZ-like (someone, somewhere…) view of life.

The full paper, 'Room-temperature solid-state maser', was published in Nature on 16 August 2012.

Dr Mark Oxborrow introduces the paper and discusses the maser in a nice video that can be found here:
http://www.npl.co.uk/news/maser-power-comes-out-of-the-cold

Generational Cycles – UK Coalition Governments

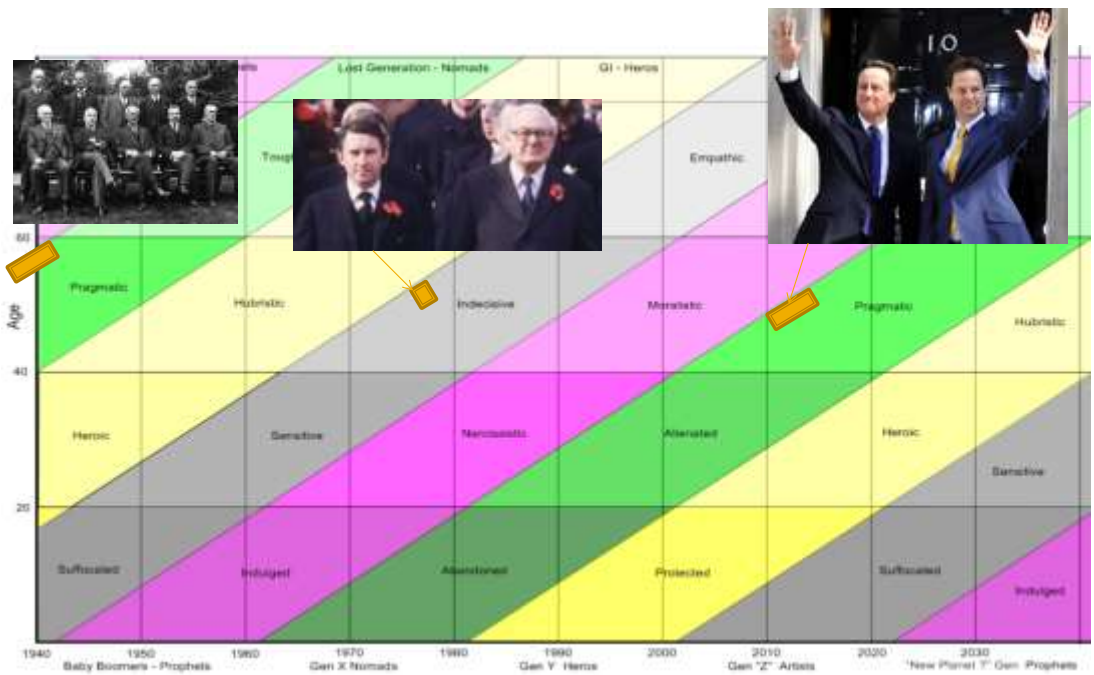
Many people in the UK have been surprised by the durability of the current coalition between the Conservative and Liberal Democrats. Few expected the uneasy alliance to survive to the end of 2010, but here we are in the last quarter of 2012 and most in the country would now have no doubts that the government will serve its full term.

The doubters have typically been the people alive during the UK's previous attempt at a coalition government. This occurred between the Labour party and, again, the Liberals in 1977:

In March 1977 the Labour Government, left with no overall majority following a by-election defeat, faced a motion of no confidence. In order to remain in office, Prime Minister James Callaghan approached the Liberal Party under the leadership of David Steel. Callaghan had been prime minister for just one year, having succeeded Harold Wilson who had led Labour to a three-seat majority in October 1974. An agreement was negotiated, under the terms of which the Labour Party accepted a limited number of Liberal Party policy proposals and in exchange, the Liberal Party agreed to vote with the government in any subsequent motion of no confidence. The Lib–Lab Pact's end was confirmed on 7 September 1978, by which time Callaghan was expected to call a general election, but instead he decided to continue as leader of a minority government until May 1979, when after a vote of no confidence it was forced to hold a general election, in which Margaret Thatcher led the Conservatives back into power.

By all accounts this 10 month coalition was an unmitigated disaster in what is now looked back on as a definite 'discontented-doldrums' period in modern British history. Prior to 1977, the previous coalition had been rather more durable. It was the 9 year 'National Government' that steered the country through the depression in the 1930s.

Here's what these the three periods in history look like when mapped on to the Generation Cycles map of the world:



The 1931-40 and current governments, of course, share the same place in the four-turning Generational history in that they both existed in 'Crisis' periods. Also important is the fact that both the governments and the majority of the people that voted for them were in the

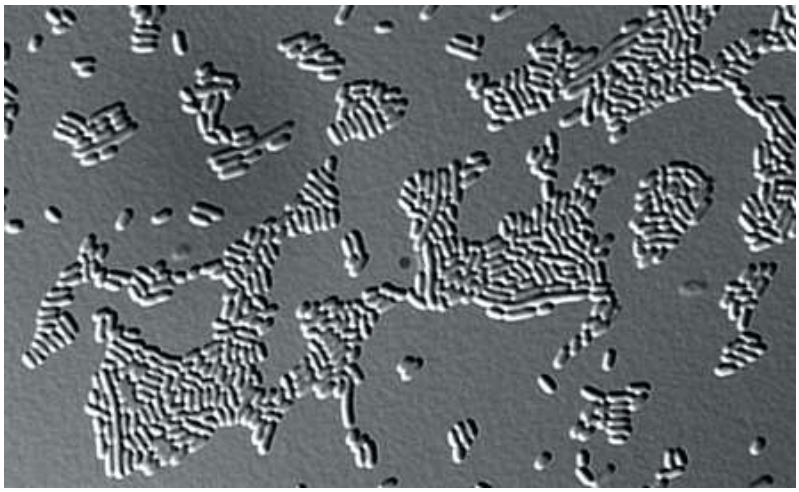
‘Pragmatic’ periods of their life. Much as a pragmatist might find it objectionable to work with people with quite different political ideologies, their pragmatism tells them it is better to cooperate and be in power than to sit on the sidelines and argue.

Conversely, the 1977 Callaghan/Steel coalition was a disaster because it came at a moment in the cycle when the politicians (and, again, the majority of voters) were at an ‘indecisive’ period in their Generational cohort lives. This indecision resulted, first of all, in a populace that wasn’t able to vote a clear majority to any party, and then secondly in a pair of (in retrospect) bumbling party leaders that allowed themselves to sign up to something that neither believed in their hearts would work.

Long live pragmatism!

(Well, at least for about the next ten years or so.)

Biology – E. Coli



Here's a great story recently reported in consistently wonderful resource, Nature:

When it comes to fighting antibiotics, *E. coli* bacteria have each other's backs. Just a few drug-resistant bacteria can release a protective substance that makes a whole population resilient to drugs. The findings may lead to new ways of combating drug-resistant germs in humans.

"Antibiotic resistance is a global health issue and we want to understand how and why bacteria become resistant to a particular antibiotic," says biophysicist Hyun Youk of MIT. It turns out that when *E. coli*, a common gut microbe that occasionally causes illness, becomes resistant to an antibiotic, it releases a molecule called indole to share with its more vulnerable neighbors. Indole is a molecule known to help *E. coli* tolerate stress. By sharing the compound, just a few members of the population can make the whole group of bacteria tolerant of an antibiotic.

"These *E. coli* cells have developed a very cunning strategy," Youk says. The finding "highlights how difficult it will actually be to fight off antibiotic resistance."

A team of scientists from Boston University made the discovery by accident. They were studying *E. coli* to see which genetic mutations made the bacteria resistant to drugs. By singling out individual bacteria within a large antibiotic-resistant population, the team found that most individuals were less resistant than the group as a whole. But a few rare individuals were more resistant than the population average. "We were surprised," says bioengineer James Collins, a coauthor of the study. "We immediately thought that the resistant guys must be producing something to help out the less resistant guys."

It turns out that the more resistant bacteria were producing indole. After further analysis, the team found that indole was turning on cellular pumps that push drugs out and was protecting against damage produced by chemically reactive free radicals.
When the researchers looked for genetic changes that might explain the indole production, they found numerous mutations that protected the bacteria against the antibiotic. There weren't any for increased indole production. It seemed that resistant bacteria, untroubled by the antibiotic, were able to keep right on producing their normal levels of indole, sharing it with neighbors. In contrast, bacteria that aren't drug resistant stop making indole in response to antibiotics.

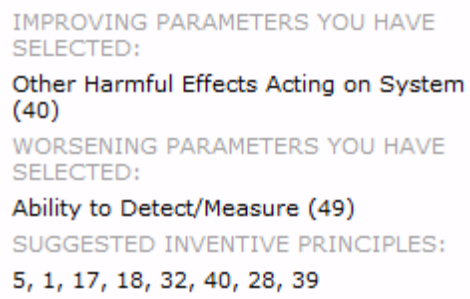
But the indole production came at a cost to the resistant bacteria. Since they spent energy making the indole, they had fewer resources to use for their own growth and reproduction and grew more slowly than mutants that didn't produce indole. Somewhat similar to the evolutionary idea of kin selection, the process may ensure survival of the mutants' relatives.

"This is the first observed example of altruism in antibiotic resistance," Youk says. The finding adds to the growing notion that groups of bacteria might behave more like a multicellular organism than traditionally thought, he says.

Collins isn't quite sure why this type of bacterial altruism would exist. If more vulnerable bacteria died, it would be to the advantage of the resistant ones, which would have more room to multiply and take over.

"It may be that the bacterial populations evolved this as a strategy to help survive transient stresses as a population," he says. His paper explains that preservation of the bacterial colony as a whole would keep other beneficial mutations in the gene pool. Youk thinks doctors may one day want to revise their strategy for avoiding antibiotic resistance in people, perhaps by varying the number of pills taken every day to make it harder for resistance to develop in bacteria.

From a conflict resolution perspective, the 'altruism' discussed by the Nature article authors represents a very nice illustration of the 'Merging' Principle (5): one resistant bacteria protects the others that aren't resistant. Here's how we might best map the basic conflict being overcome – i.e. the bacteria colony wants to protect itself, but the ability to work out what the anti-biotic 'enemy' is and what to do about it is limited – onto the Contradiction Matrix:



Now all we need to do is work out how to design antibiotics that are able to counter the E.Coli solution. Hmm.

Read the full article here:
H. Lee et al. Bacterial charity work leads to population-wide resistance. Nature. Vol. 467, September 2, 2010, p. 82. Doi: 10.1038/nature09354

Short Thort

ELEMENTS are easy to identify
RELATIONS between elements are less easy to identify
FUNCTIONS delivered by relations and elements the least easy to identify

FUNCTIONS are the sole purpose systems exist; they are the most important thing
RELATIONS are necessary but subservient to functions
ELEMENTS are necessary but subservient to relations

News

SI Certification Workshops – UK
The next series of public SI workshops will begin with a 2-day 'Basic' event, to be held on 30 and 31 January. Dates for the next Part 2 and 3 follow-ons will be fixed in due course.

ICMM Introduction workshop: Hong Kong
Launch of the Innovation Capability Maturity Model moves into Hong Kong in early 2013 when we run our first public Introduction workshop in the region. Organised through CIO Connect, the workshops will take place between the 9th and 11th of January….

Taiwan
…right after our first road-trip of 2013, which takes us to Taiwan from the 3rd to the 8th. So far, we know we will be running a 2-day public 'Strategic IP' workshop, keynoting at the Taiwan SI Conference on the 5th, running a one-day introduction to Edward Matchett's 'Road To True Professionalism' and doing a Business TRIZ session based wholly on real-world case studies.

Graves Future Conference
The dates for what we think is a very exciting development in the Clare Graves/Spiral Dynamics world – namely a 2-day event in which we will bring together some of the leading developers of the next generation of Gravesian thinking – have been fixed as 26 and 27 February. Presenters have largely already been determined (but don't hesitate to contact Darrell if you'd like to suggest your own new topic), and so full programme and joining instructions should be up on the SI website shortly.

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

FMCG – anthropology study
Medical Devices – Clinician-Generations Study
Automotive – Asset SWEAT project/workshops
FMCG – Eyes on the World technology study
Construction – Problem solving project
IT – SI workshop series
Academia – IP licensing strategy project
Automotive – SI workshop series
Agriculture – IP licensing project
Healthcare – Change culture strategy design/implementation study
Medical Devices – disruptive innovation project
Medical Devices – TrenDNA project