Systematic Innovation

e-zine

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In this month's issue:

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

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Case Studies: Patient Adherence Improvement

"Do the difficult things while they are easy and do the great things while they are small.
A journey of a thousand miles must begin with a single step."
Lao Tzu

One of the holy grails of the healthcare profession is solving the problem of patient compliance. Look around the world right now and the statistics reveal a depressing set of stories. No matter what healthcare professionals try and do, overall compliance rates stubbornly find themselves converging somewhere around the 50% level. Irrespective, it turns out, of the severity of the condition the patient is suffering from. Or, put in more dramatic terms, 50% of patients would rather succumb to a life-threatening condition than remember to take their medication. Clearly, there would appear to be something about the human psyche that causes to in effect self-destruct rather than comply with solid professional advice. All in all a great problem to work on. Albeit one that, thus far the whole world has failed to make any lasting impression on. Rather than tackle the whole issue, we recently had the opportunity to work on a smaller version of the compliance problem: patients turning up to appointments.

Here, too, is a scenario where that 50% number rears its ugly head again. Whether it's an appointment with their GP to renew a prescription, or to turn up at a hospital to have some tests done, healthcare administrators find that about half of the people that made an appointment to turn up, failed to do so.

In beginning to explore the roots of this type of compliance problem, one quickly becomes aware that the healthcare profession has devoted considerable time and energy to trying to understand the problem. Collate even a small proportion of all of the trials and experiments and we can quickly create a whole catalogue of rational and less-rational explanations for the failure to do what they ought. It's easy to understand why a patient might not turn up to an appointment because their symptoms disappear (although one might hope they might see fit to actually tell the hospital they're not going to arrive!), or because we all live busy lives and just plain forget. But, bringing in some thinking from the FMCG sector, and our oft-used J.P.Morgan quote, 'people do things for two reasons: the good reason and the real reason', looking through the catalogue of reasons people give for why they didn't turn up to their appointment, or didn't take their medication, and it's very clear it's a list of good reasons, and not a lot of real reasons.

Which, of course, gets to the fundamental heart of the human behavior story: we're often very reluctant to share the real reasons we do or don't do something. Smart organisations have learned that the only way to understand the 'real' reason stuff is to not ask patients directly at all, but rather to look at the universal drivers of behavior. As far as this mini-project was concerned, we decided to explore these universal drivers at two levels:

1) At a personal level
2) At the level of 'social influence'

As discussed in previous articles (Reference 1), when we look at the personal level, there are really just three things that drive our behavior: parallel desires for Autonomy (being 'in control'), Belonging (being part of something), and Competence (being able to demonstrate to ourselves and others that we're good at something) – Figure 1.

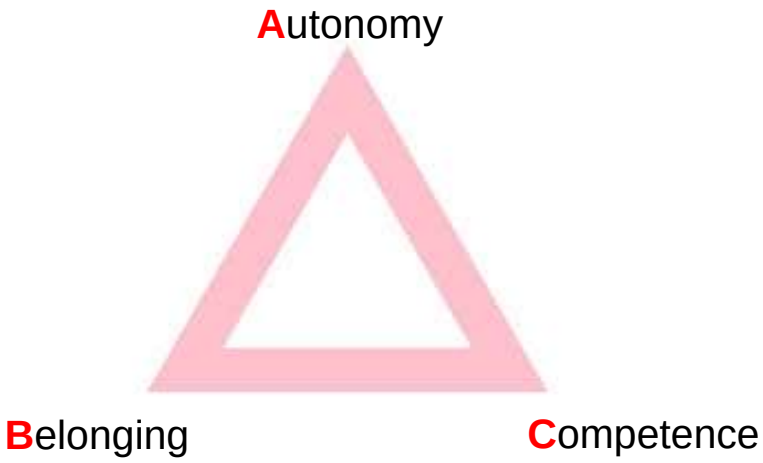


Figure 1: The ABC Of Human Behaviour Drivers

To build on this picture, we also know that, although all three drivers are ever-present in all of us, at any particular moment in time, the bias between each is likely to be different. The thing that then drives which is more important than another is about learning cycles: when we're trying to learn something new (like embark on a programme of medication), the emphasis is on building Competence. Once we've achieved some semblance of that competence, the emphasis tends to shift towards the Autonomy portion of the triangle. Learning new things can be uncomfortable, because we don't feel like we're 'in control', but when we have achieved a certain level of competence, we are able to work towards recovering our sense of Autonomy. Finally, once we feel like we're in control again, comes a desire to share the new found competence and control with others… and hence the bias shifts towards the Belonging part of the triangle. Every time we wish to (or have to) learn something new we essential go around the C-A-B cycle. And every time we go around the cycle, if we allow ourselves to add another dimension to the Figure 1 image, we head up a virtuous cycle towards Meaning – Figure 2.

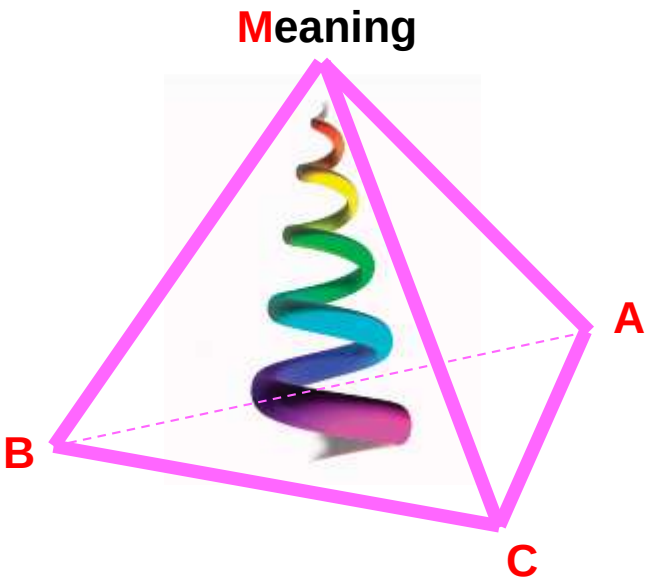


Figure 2: Virtuous Learning Cycles Leading To 'Meaning'

The converse of a learning cycle is what happens when we remove these opportunities from people. One of the things the healthcare profession finds itself talking about a lot

these days is ‘learned helplessness’. In other words, the profession has unwittingly educated patients to believe that they need more and more professional advice and input. The unfortunate side-effect of this kind of mis-direction is that we end up taking people in the exact wrong direction on the Learning Cycle – we, in other words, move people away from Meaning and towards what we might think of as ‘meaningless-ness’ – Figure 3.

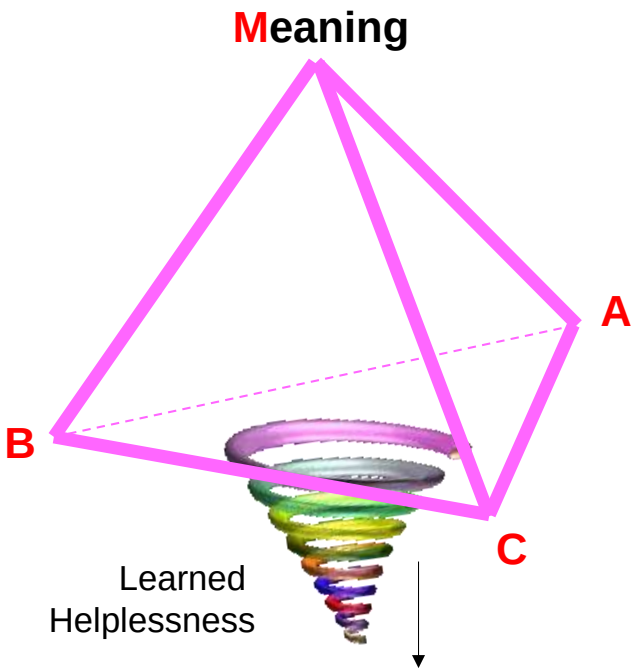


Figure 3: Destructive ‘Learned Helplessness’ Cycle

So much for getting the universal drivers wrong at the personal level, what about when we think about social influence? There are many ways to think about the manner in which ‘society’ influences our behavior. On one level, it very much connects to the ‘Belonging’ part of the ABC model. But at another, we might think of ‘social influence’ as a system in its own right. And the moment, we do that, we know from the TRIZ Law Of System Completeness (Reference 2) that there are a certain number and type of elements that have to be present. Six in all: Coordination, Engine, Transmission, Tool, Sensor and Interface. Figure 4 represents an attempt to express these six generic labels in terms relevant to what we know about universal social influence drivers (Reference 3)

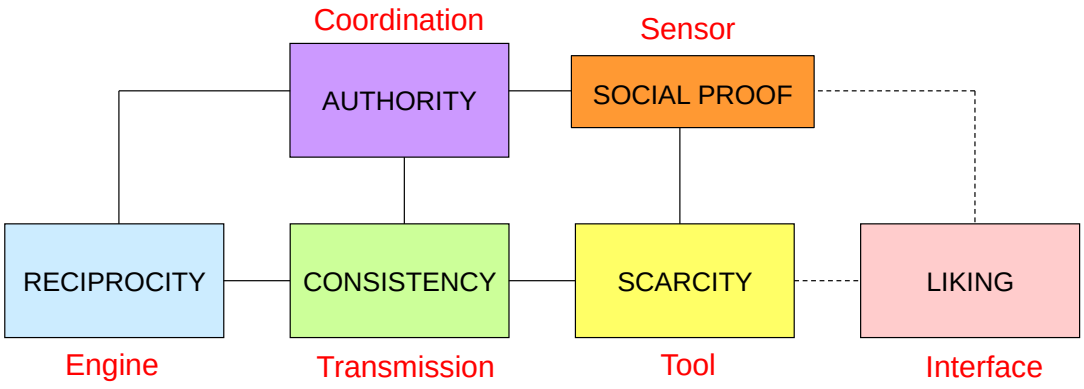


Figure 4: ‘Social Influence’ As A System

Table 1 describes what each of the six elements mean in practical terms:

Principle	Description
Scarcity	People typically overvalue things that are rare, dwindling in availability or difficult to acquire
Authority	People are more easily persuaded by individuals perceived to be legitimate authorities
Social Proof	People often look to the behaviour of similar others for direction about what choices to make
Liking	People prefer to say “yes” to those they like
Reciprocity	People feel obligated to repay, in kind, what has been given to them
Consistency	People feel strong pressure to be consistent within their own words and actions

Table 1: Six Key Social Influence Factors

Just looking at the personal and social influence ‘universals’ in relation to our appointment compliance problem already seemed to reveal a number of potential solution clues. If only because, the appointment system – like the vast majority of the healthcare system – simply hasn’t had the opportunity to think of any of these ‘universal intangibles’ as any kind of resource they might bring to bear on the problem.

Even the briefest scan over the two models, revealed several things that appointment systems (and, actually, we later saw, all compliance/adherence problems were the exact same) did wrong:

- They helped establish a downward cycle of learned helplessness
- They immediately removed people’s Autonomy needs – the handing over of an appointment card was in effect a clear sign that ‘the healthcare system’ has just taken control of your life
- There was no ‘reciprocity’ – everything happened in one direction: the ‘system’ told the patient where to be and when.
- There was no attempt to tap into the ‘consistency’ social influence factor. In other words, the patient had no opportunity to input their own ‘words and actions’ into the appointment making transaction.

Of these four factors, the loss of control appeared to sit at the root of the problem. Further analysis revealed a pernicious contradiction: the healthcare system needs to take control (in order to get the patient to do something), but the patient has little if any desire to cede control.

As ever in the Systematic Innovation world, we know that when we have found a good contradiction, we have found one of our best solution-finding opportunities. We are able to say this because the Contradiction Matrix tells us that, whatever our contradiction might be, someone amongst our 4 million case studies has already found ways to solve it (Reference 4). As far as the appointment control contradiction problem was concerned, we mapped it on to the Matrix as shown in Figure 5:

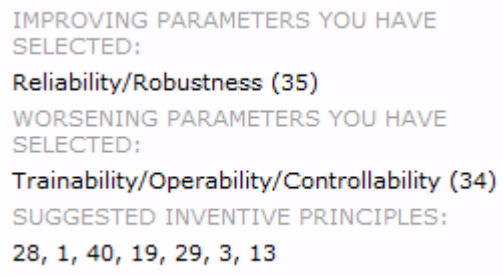


Figure 5: Mapping The Control-No-Control Problem Onto The Contradiction Matrix

In generic terms, what Figure 5 is saying is that what we're trying to improve is the reliability of patients turning up to their appointments, and what's preventing this from happening is their perceived loss of control. The numbers at the bottom of the Figure then describe a ranked list of the strategies that others have used to solve equivalent problems in other walks of life.

Essentially what we did at this point was work through this list of strategies, using them as a means to conduct a structured brainstorming session. The emphasis first of all was on generating as many ideas and solution clues as possible, then, after we had exhausted all the possibilities, we looked at combining ideas into possible implementable solutions. All the time we were doing this second job, we were highly cognizant of the fact that any solution needed to come with a minimal cost of implementation. The big idea here – per the Lao Tzu quote at the head of this article – was to find the simplest possible changes we could make, as close as possible to the route of the problem.

Going through our deliberations, to cut an afternoon-long story, plus overnight incubation down into one 'obvious' recommendation, the solution we recommended to the appointment administration team was very simply:

Instead of filling in an appointment card and handing it to the patient, take a blank appointment card out of a drawer that you make sure the patient sees you unlock, hand the card to the patient, give them a pen, and get them to fill the card in themselves.

In other words, a very simple illustration of an idea that came from Inventive Strategy 13, 'Turn Things The Other Way Around'.

Like a lot of solutions, it sounded too simple to be of any use. At the very least, however, it was extremely simple (and zero cost) to try out. The rationale, we explained to the team, was that by getting the patient to complete the card, it had sent a subtle message that they were in control of the process. The person with the pen, in other words, is implicitly the person in charge! It also played in to the previously untapped resources of consistency (having filled in the card themselves, the patient had sent themselves a clear message that they'd made a promise) and reciprocity.

A lot of simple solutions also 'don't work'. Not this one, though, it seems. Six months since its roll-out, and patient compliance has consistently been up from 50% to 80%. It's a small start, we think, but, now we know that the roots of the problem lay in the behaviour-driving intangibles, we know too that there's lot more to come in the not too distant future.

References

1) Systematic Innovation E-Zine, 'Universal Intangibles', Issue 140, November 2013.
2) Mann, D.L., 'Hands-On Systematic Innovation', 2nd Edition, IFR Press, 2009, Chapter 14.
3) Cialdini, R.B., 'Influence, Science and Practice', Allyn and Bacon, 2001.
4) Mann, D.L., 'Matrix 2010', IFR Press, 2010.

Case Studies: England @ World Cup 2014

"It could be a terrible long, frustrating summer if we don't get it right on Thursday," Gerrard told the players. He underlined the significance of these 90 minutes. "There is no hiding place for a player when you go out of a tournament. You go home earlier than you expect. It can be tough as a player and it can take an awful long time to get over it. A lot of people know that in the dressing room but a few young lads – it was important for them to realise what is at stake and how important this game is. We all need to leave everything on that pitch. If a defeat was to happen it is probably the most difficult place to be in as a footballer.
"I've been there. I've had that feeling. So I know what that feeling is about and that is the feeling that I don't want to come Friday morning. But it wasn't a message to scare any of the lads but a wake-up call to everyone in the room, staff, players. Me and Frank have been there and done it so I suppose our experience at times is very important in the dressing-room. It wasn't to scare anyone or intimidate anyone but that is the reality of where we are and we need everyone focused and right on it to perform individually and collectively on Thursday otherwise it will be a terrible long summer."

England Captain, Steven Gerrard, interview before the Uruguay game

World Cup fervor was somewhat short-lived in England this summer when England's campaign fizzled out after less than six days. Not since 1958 has the team done so badly. Not surprisingly, every footballing pundit in the country was asked by the media to express their views about what caused the trio of dismal performances by the team. Everyone, from the manager to the players to ex-players to the 'man on the street' had an opinion. Nearly all appeared to have it figured out quite clearly. The only problem was, everyone had a different opinion.

And – worse – everyone, as is so often the case in these post-trauma, soul-searching activities, was operating under the illusion that it was possible to isolate the failure of the team down to a single 'root cause' reason. Meaning that the poor old viewer or radio listener was subjected to hour after hour of meaningless, 'yes it was, no it wasn't' debate, that ultimately left no-one any clearer than they were at the beginning. To repeat something we find ourselves saying a lot, 'there is no such thing as a root cause in a complex problem'. Complex problems are the emergent outcome of a conspiracy of causes.

The best way to untangle what that conspiracy of causes might be is to take all of the different opinions and use the Perception Mapping process to map the relationships between each of them. So, in the interests of national well-being, that's what we set about doing. Here's what we found.

First up, Figure 1 compiles all of the different reasons we were able to glean from the tera-bytes of media coverage that's emerged since the initial defeat against Italy in the first game of the campaign. In all we found 39 different perception statements:

1	everyone wants to play No.10
2	Young players too cosseted
3	Insufficient technical ability
4	Can't play under pressure
5	Too few players with big game experience
6	Insufficient good players to chose from
7	Don't play together as a real team
8	Overseas player in EPL learn how they play
9	Wanted it too much
10	Hodgson was un-inspiring
11	Don't know how to adapt strategy during game
12	Gerrard 'overwhelmed' with responsibilities
13	No-one wanted the ball
14	naive defence
15	no 'blood and guts' players anymore
16	No overriding philosophy
17	Academies too focused on individuals
18	EPL demands 'complete' players/no development opportunity
19	no central spine to the team
20	GenX seniors/GenY squad mis-match

21	Hodgson did nothing from the touchline to calm nerves
22	Defence made naive mistakes
23	Defence not looking out for each other
24	EPL/FA conflict of interest
25	Too many overseas managers in EPL playing teams in 'non-English' way
26	Four attacking players was too many
27	All wanted to play central
28	Too few English players playing abroad - lack of understanding how other countries play
29	Media wants instant results/don't allow 'time to develop'
30	EPL is 'entertainment', nothing to do with creating English talent
31	Rooney had poor season/was off-form
32	Negative Gerrard/Lampard 'motivational' talk pre-game
33	Too fragile
34	Players more concerned with media opinion of them personally rather than team
35	Other teams work out weak spots in advance/tactically superior
36	Tactics didn't work
37	Always on the back foot
38	Presence of Dr Steven Peters caused focus on 'wrong things'
39	Don't understand philosophy of other teams

Figure 1: Compiled List Of Reasons For England's Failure

The next part of the process involved mapping the relationships between each of these perceptions. The key to doing this in a meaningful way is answering the question, 'which of the other perceptions does this one *lead to*?' In situations where a perception potentially leads to several other perceptions, the process requires us to choose the perception that is lead to *first*.

Figure 2 over the page illustrates the overall result of completing this leads-to analysis for the 39 different cited reasons. The map helps to reveal the 'conspiracy of causes' by highlighting loops and collectors. The loops in particular represent the most important part of a conspiracy – being, in effect, the downward spirals or 'vicious circles' that inevitably emerge in systems of all kinds. The Figure 2 picture reveals one big loop. The good news this reveals is that the England failure has a single overall conspiracy of causes. The bad news is that when we zoom in and look at the details of what's happening in the loop, we see that it contains many elements that are 'non-trivial'.

Before getting in to some of the details of the loop, however, it is also worth noting another, less well known aspect of perception maps. The reason we are able to say that there is no such thing as a single root cause in any complex problem is that anything on the periphery of the map is in effect a root cause. All of these 'peripheral' perceptions have been placed at the top of the Figure 2 image. Thus perceptions 25, 24, 38, 15, 29, 3, 27 and 10 might all be legitimately described as 'root causes' of the England team failure.

The problem with multiple 'root causes' is simply that there are lots of them. There's no option to just work on one or two since it is the combination that is driving the behavior of the system. Far better, according to our last fifteen years' experience of constructing and using these maps to focus on the vicious circle and try and somehow try and break it. Possibly, for those new to the Perception Mapping process, taking account of the 'collectors' (perception statements that have multiple 'leads-to' arrows pointing to them) that are leading in to the main loop. In this case the main collector can be seen in Figure 2 as perception statement 7, 'not playing together as a real team'. We often describe these collectors as accelerators of the downward spiral. It is always useful to be cognizant of their presence, but ultimately, it's the downward spiral that we need to focus our attention towards. Figure 3 shows just the loop part of the overall Figure 2 picture.

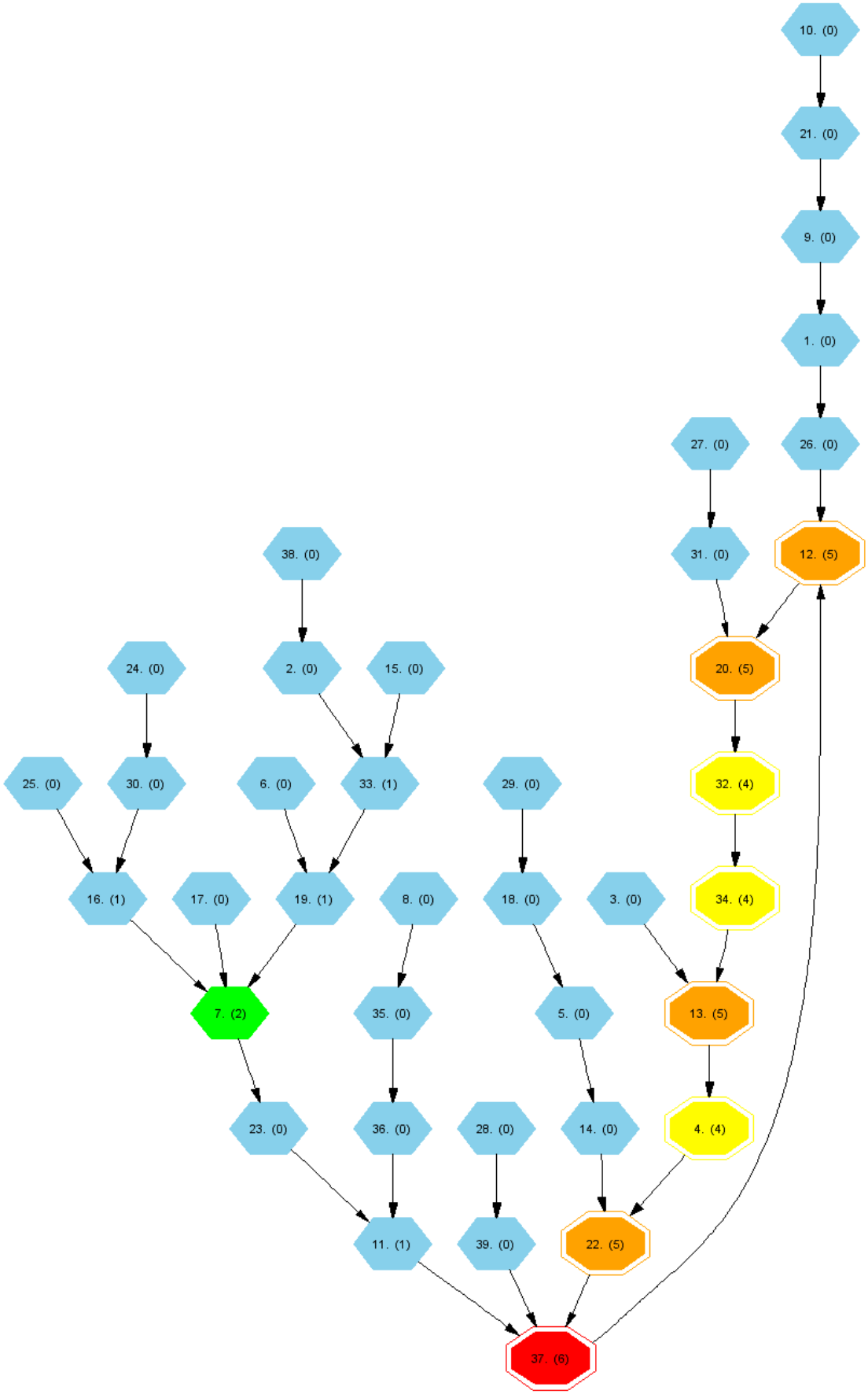


Figure 2: Overall Perception Map Of England World Cup Failure Reasons

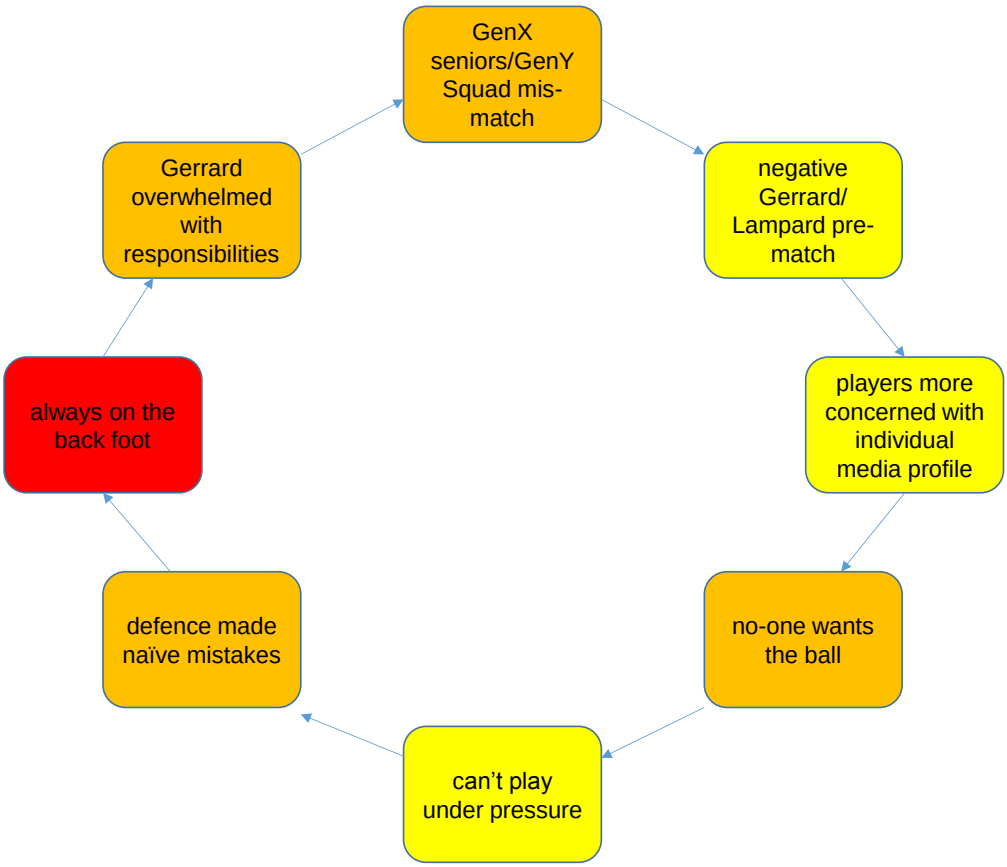
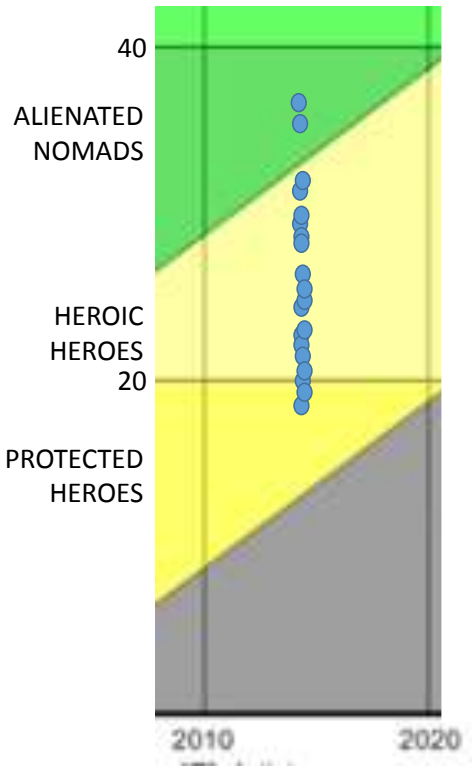


Figure 3: England's Downward Spiral

When looking at these loops for possible solution strategies, it is often the case that some of the perception statements are more actionable than others. Some of them require long term strategies to resolve. Others, on the other hand, are amenable to a much more rapid solution. Looking at the Figure 3 picture suggests to us that the heart of this problem has its foundations in a generational problem. Namely the fact that the two most senior players – Steven Gerrard and Frank Lampard – are of a different generation to the rest of the squad (see Figure 4). While this might not have been a problem in its own right, the Alienated Nomad version of a pre-match motivational talk to the other players and what the Heroic Hero and Protected Hero players would actually be motivated by were a considerable distance apart. While there can be no doubt neither Gerrard or Lampard had any intent to cause a problem, much of what they said, when listened to through Hero ears, would most likely be interpreted as 'this is not going to go well, look after yourself'.

The good news for forward-thinking England supporters is that in two years' time, when the next big competition comes along, this generational mis-match problem will have solved itself. Gerrard and Lampard's retirement from the squad, in other words, will be a good thing… irrespective of the prodigious playing talents of both players.

The bad news is, when we remove them from the overall perception map gives us a much more insidious downward spiral that will involve the Hero generation players having to tackle some difficult personal questions. But that's another story. In the meantime, we can at least say we understand what's gone wrong this time, that it will be a different set of problems next time and that – most important of all – we have a process for reliably working out what they are and for really getting to grips with them.



		AGE
1	Joe Hart (G)	27
13	Ben Foster (G)	31
22	Fraser Forster (G)	26
2	Glen Johnson (D)	29
3	Leighton Baines (D)	29
5	Gary Cahill (D)	28
6	Phil Jagielka (D)	31
12	Chris Smalling (D)	24
16	Phil Jones (D)	22
23	Luke Shaw (D)	18
4	Steven Gerrard (M)	34
7	Jack Wilshere (M)	22
8	Frank Lampard (M)	36
14	Jordan Henderson (M)	24
15	Alex Oxlade-Chamberlain (M)	20
17	James Milner (M)	28
20	Adam Lallana (M)	26
21	Ross Barkley (M)	20
9	Daniel Sturridge (F)	24
10	Wayne Rooney (F)	28
11	Danny Welbeck (F)	23
18	Rickie Lambert (F)	32
19	Raheem Sterling (F)	19

Figure 4: England World Cup 2014 Generational Profile

Funny? – It Was This Big

The primary role of advertising is to make us buy crap we don't need. One of the most effective ways of convincing potential customers they need your particular brand of crap is to exaggerate the benefits they are going to receive. Exaggeration is, in theory at least, a variant of Inventive Principle 35, Parameter Changes – change a parameter to such an extent that a non-linear change in behavior results. Sometimes that can be done in a really clever way. Take Miele's recent demonstration of the suction power of their vacuum cleaners:

Sometimes, the non-linearity gets pushed a step or two too far:

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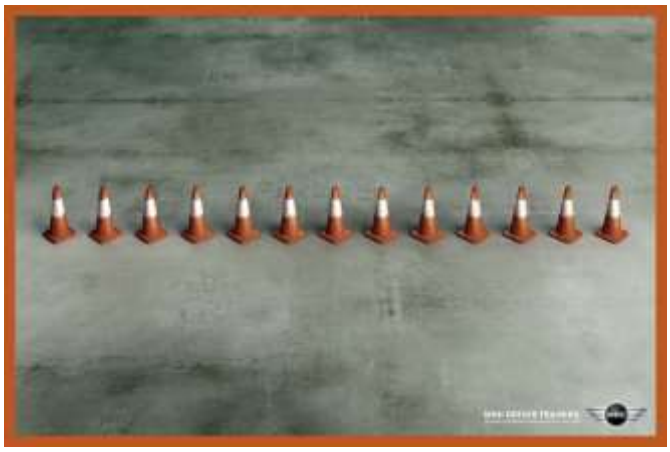
Other times, it can get a little too close to call. Really clever or Advertising Standards Agency complaint? You decide:



Of course, exaggeration travels both ways. Understatement can be another really effective Principle 35 advertising strategy. Here's the one that lead me to one of my less expected purchases.

Kind of.

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Patent of the Month - Biostimulation

Patent of the month this month takes us to the University of Southern California in LA, and a team of inventors working in the domain of consumption behavior in humans. US8,755,896 was granted on June 17.

Here's the problem the team has been working on:

As people become increasingly sedentary, obesity grows as a public health problem. Many people have difficulty preventing their caloric intake from exceeding their energy needs, and as a consequence grow progressively more obese over time. In addition to the psychic impact, obesity shortens lifespan by increasing the incidence of heart disease, diabetes, and possibly cancer. Consequently, individuals spend enormous sums on diets, exercise regimens, and prescription drugs in an attempt to lose weight and/or to maintain a lower weight.

Despite this effort, however, long-term success eludes most would-be dieters. All too many, even if they succeed temporarily in losing weight, return to their previous eating habits and regain the weight they lost. Such people need to modify their eating behavior so that once they succeed in losing weight they do not later regain it.

A similar challenge faces those attempting to quit smoking, drinking, or illicit drug use. In each case, the individual needs assistance in modifying his behavior so that, after an initial effort to quit, he does not slide back into the habits of many years and defeat the progress he has achieved. Attempts at such assistance have included hypnosis and the use of drugs such as disulfiram (commercially sold as Antabuse), which makes alcohol noxious to the user. Hypnosis is clearly impractical on an ongoing, daily basis, while use of drugs raises concerns about side effects and long-term toxicity.

Consequently, there is a continuing need for a way to facilitate modification of behavior so as to maximize the chances of long-term success in overcoming disorders involving consumption of food, drink, tobacco, or illicit drugs (hereafter, "consumption disorders"). Ideally such an approach would be as non-invasive as possible, and could be practiced by the patient herself when and for as long as necessary.

This is, of course, one of those perennial 'human nature' problems. Patient compliance with prescribed treatments is the bane of the clinician's life. Global average compliance is around 50%. Even for life threatening illnesses. Put simply, people would appear to prefer death to complying with their medication regime. No wonder, then, that something as 'trivial' is over-eating is so difficult for dieticians to meaningfully effect. There's no reason to believe that this patent is the silver bullet the profession has been looking for, but at least it's a step in the right direction.

In contradiction terms, the thing we're trying to improve is over-eating, and the thing that prevents us is – crudely – lack of patient will-power. Here's how we might best map that conflict pair onto the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Amount of Substance (10)

WORSENING PARAMETERS YOU HAVE SELECTED:

Control Complexity (46) and Negative Intangibles (48)

SUGGESTED INVENTIVE PRINCIPLES:

23, 25, 28, 10, 37, 7, 36, 1, 32, 3, 4

And here's how the inventors have tackled the problem:

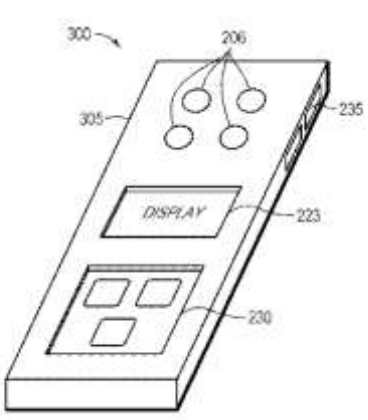
An apparatus for diminishing a user's desire for oral gratification, the apparatus comprising: (a) at least two spaced-apart electrodes for establishing an electric circuit across a portion of a user's body, at least one of the electrodes being configured to contact a surface in the user's oral cavity; and (b) circuitry configured to generate, across the electrodes, an electrical signal comprising a train of pulses having a width that is varied over time during a single application of the signal to the surface in the user's oral cavity, the signal eliciting a neural response that diminishes the user's desire for oral gratification, wherein the train comprises some pulses having a first width and other pulses having a second width different from the first, and the pulse-widths vary from the first width to the second width and back to the first width during a single application of the signal.

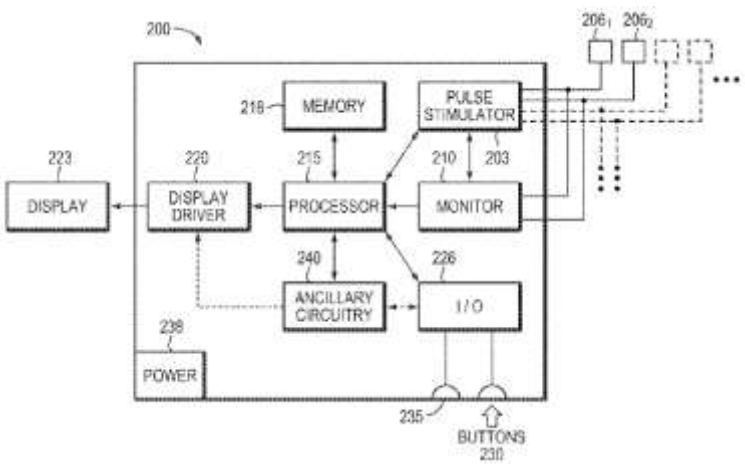
The main inventive step – and the reason we suggest this really is a step forward – comes from the shift to an (electrical) field (Principle 28). Beyond that, the solution clearly involves a feedback mechanism (Principle 23), and asymmetric (Principle 4), time-variant (Principle 3) pulses (ideally Principle 19, but Principle 1 is probably close enough).

That the Matrix has captured the spirit of the invention is encouraging. The main reason for making this Patent of the Month is a) that it represents a rarity in the healthcare world, a solution that doesn't involve a chemical (and therefore an ongoing revenue stream for the pharma industry), and b) that it makes use of a number of resources that were already present in the system (hey, Principle 25B), that might well have a bunch of uses in other applications:

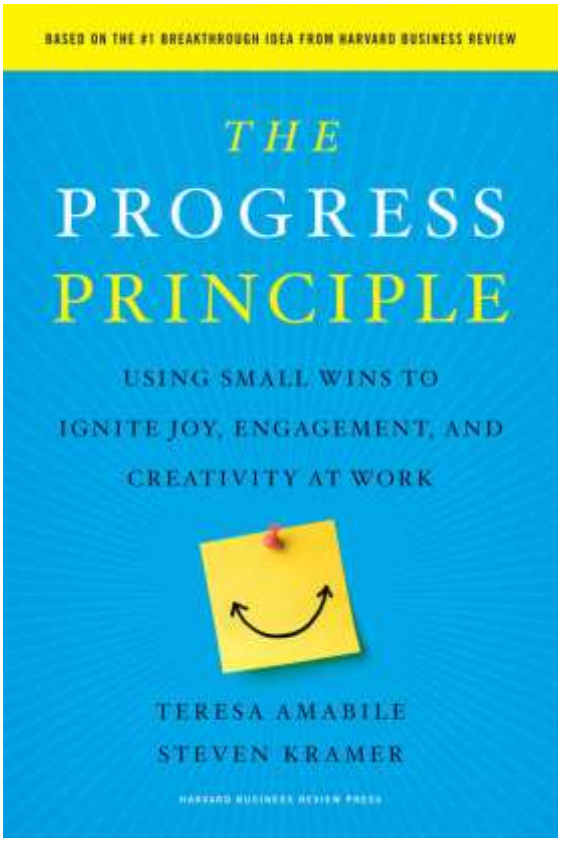
… the invention applies an electrical stimulus to the nerves of the oral cavity, which include the fifth (trigeminal), seventh, ninth, tenth, and twelfth cranial nerves. The stimulus may be applied, e.g., to the hard palate, soft palate and/or tongue. Stimulation of the trigeminal nerve, or facial nerves such as fibers from the Chorda Tympani, may cause the user to perceive any of three sensations: (1) a moderately unpleasant taste that persists for some time after the stimulation ceases, and thereby diminishes the user's desire for oral gratification through eating, drinking, or smoking; (2) a centralized feeling of euphoria; or (3) a feeling of satiety. The sensation experienced by the user depends strongly on the pulsing frequencies, pulse durations, and timing, especially when the frequency and/or duration of the pulse is varied.

For purposes of the present invention, responses (1) and/or (3) are desired. The euphoria response tends to come at higher frequencies between 100 Hz and 300 Hz. It does not have direct relevance to the consumption-related objectives of the present invention, and unlike responses (1) and (3), the euphoria response tends not to linger (it is only experienced during and immediately following stimulation, while satiety tends to last for hours) and is not always consistent--i.e., the experience tends to vary among stimulation sessions.



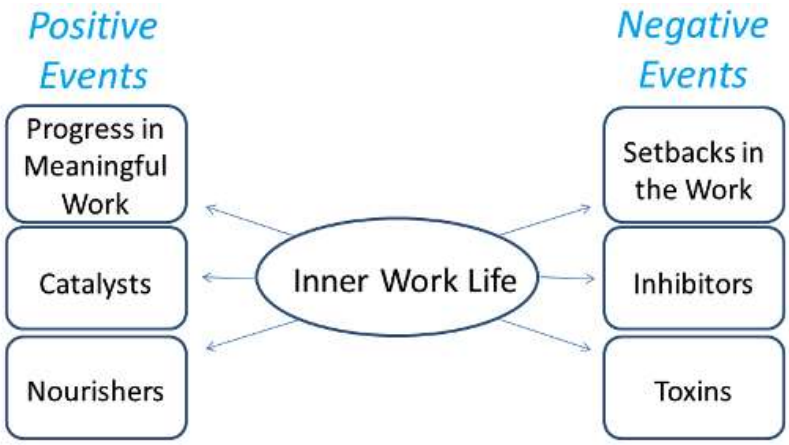


Best of the Month – The Progress Principle



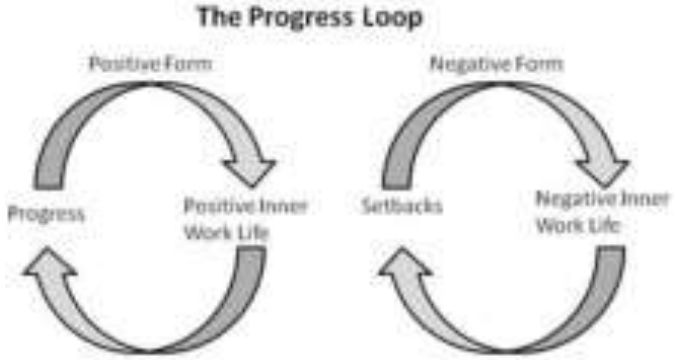
Anyone that has heard us banging on about 'sense of progress' as one of the key requirements of any innovation capability building project and wondered about the why's and how's, this month's book recommendation is the one for you. The Progress Principle was published in 2011 on the back of a substantial programme of research conducted by Harvard Business School professor, Teresa Amabile and development psychologist, Steven Kramer. The research centred around 12,000 diary entries made by 238 willing volunteers from 26 project teams in 7 difference companies and three different industries. The simple basic – very PanSensic-compatible! – instruction given to the diarists was, 'describe one event from today that stands out in your mind'. The event had to be relevant to the work in some way, but no-one was given any prompt regarding whether the comments should be positive, negative or neutral, and everyone was given a clear assurance of anonymity. (One day it would be great to run all the 12,000 resulting verbatims through the PanSensic engine!)

The results of analyzing all the diary entries was that there were a very small number of positive and negative events that could occur during a work day that would affect a person's 'inner work life'. Inner work life here being pretty much identical to the 'real' reason part of the 'people do things for two reasons: the good reason and the real reason' that again forms the heart of PanSensics and for that matter TrenDNA. In all, the book describes three positive and three negative factors:



Of which 'progress in meaningful work' was number one in the positive lists. Interestingly, too, the book reveals how this factor was rarely even on the radar screens of the management teams overseeing the 238 diarists. Put more starkly, what was most important to the workers was perceived as least important by the managers.

The heart of the book – and certainly the main take away for the reader – is then the Progress Principle itself. Something of a recipe or playbook for managers and teams alike to understand and implement practices and strategies that make 'a sense of progress' happen. Here's the basic idea:



Which is really a way of saying the story distills down to establishing virtuous loops and breaking destructive ones.

Beyond that, there's not much more that needs to be said other than mentioning that the back of the book contains a testimonial from Craig Wynett our good friend from P&G in the US. Craig is quite possibly the smartest bloke on the planet when it comes to innovation in big organisations, and quite likely the smartest bloke on the planet when it comes to everything else too. If Craig likes it, you can be pretty certain it contains something of value.

Getting hold of a copy of The Progress Principle is very likely the most useful thing you can do this month. For yourself or for the teams that you work with.

Wow In Music - Habituation and Surprise

It is fascinating to explore "surprise" in the light of a phenomenon known as habituation. In Psychology, this means that our ability to respond to a repetitive stimulus does not remain constant or, from a physiological point of view, the output of our neurons, when repeatedly excited with the same stimuli, decreases over time (Snyder, 2000). This experience can be easily exemplified with the fact that, after some time hearing sounds of the environment, such as the noises from the air conditioning or the traffic, we tend to push them to the background, away from our focus of attention.

In fact, our attention is normally drawn to those elements that are not stable, constant or predictable. In music, for instance, we are often attracted to unexpected changes in patterns that involve harmony, melodic contour, timbre, etc. The same happens with emotions. Studies indicate that listeners like music that expresses contrasting emotions, as a “stimulus is perceived differently depending on whether it is presented in isolation or in context” due to the fact that habituation to one type of emotion usually decreases the listener’s level of arousal (Schellenberg et al, 2012).

Surprise is, evidently, an element that defines a musical piece in several dimensions, including creativity, a much-cherished human attribute. The question that naturally arises is how much surprise would be necessary and/or sufficient in a piece considering that too much of it normally leads to an adverse effect - including the lack of structure - and affects the listener's attention in an opposite way. In other words, there should be a level of surprise in any piece that would be just enough. The amount of information plays an important role in this definition as too much of it (e.g., a random process) can lead to disinterest. Expectation, another side of the same coin, works in parallel and shapes the way we appreciate music (Huron, 2006).

All these facts are old companions of composers who carefully manipulate the several parameters of the sound material in ways that seek to provoke our amazement. It is important to understand that the continuous sequence of choices that are made by composers in specific cultural conditions define the evolution of musical styles. Therefore,

it is important to distinguish between innovation and choice as "composers usually have at their disposal many more alternatives than can be included in a particular work" (Meyer, 1983).

As mentioned in last month's Systematic Innovation eZine (Issue 146, May 2014), in the orchestral piece Bolero, Ravel used several techniques to gradually create an atmosphere that, all of a sudden, was broken by leading the listener to something that was previously unexpected. After listening to the same repetitive rhythmic pattern, over and over again, one becomes accustomed (or habituated) to it - and a violation of this state "awakens" (wows) the listener.

Many other musical pieces - not only from the classical realm but also from other genres and styles - have been composed deliberately with this concern in mind. Philip Glass, who describes himself as a composer of "music with repetitive structures" has a classical example of this type of manipulation in Koyaanisqatsi. Readers might care to take a listen to it before next month, when we'll help reveal the mechanics behind the 'surprise'.

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Schellenberg, E.G., Corrigall, K.A, Ladinig, O., Huron, D. (2012). Changing the Tune: Listeners Like Music that Expresses a Contrasting Emotion. Frontiers in Psychology 3: 574.
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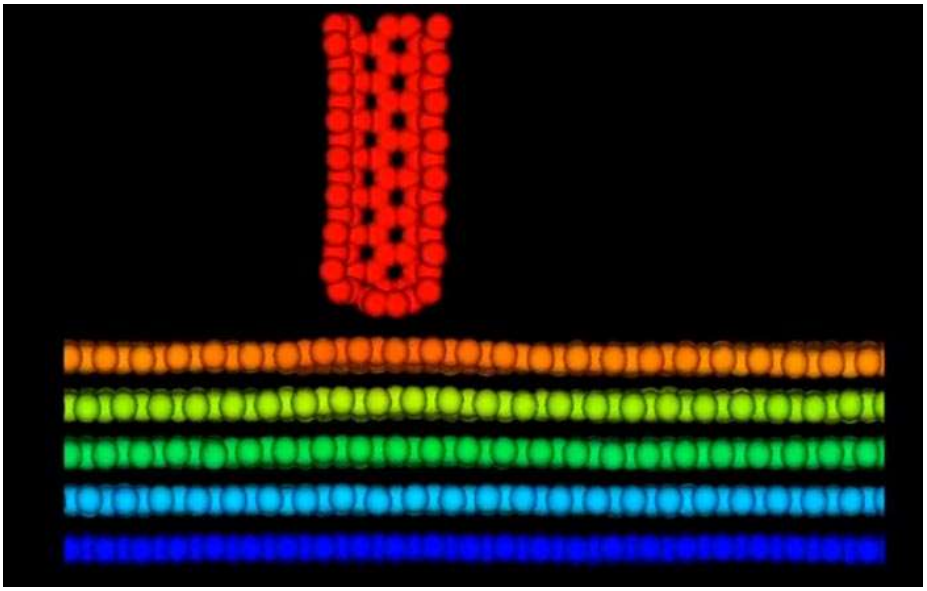
Investments – Negative Friction Coefficient Materials



We love ‘negative materials’. Negative Poisson Ratio, negative stiffness, negative viscosity, negative thermal expansion coefficient. And now, wonder of wonders, here comes negative friction coefficient. Okay, admittedly not quite ready for sale in your local high street. Or at a size scale that will give us all to go out and place that order for the flying car we always wanted, but definitely something to get minds whirring.

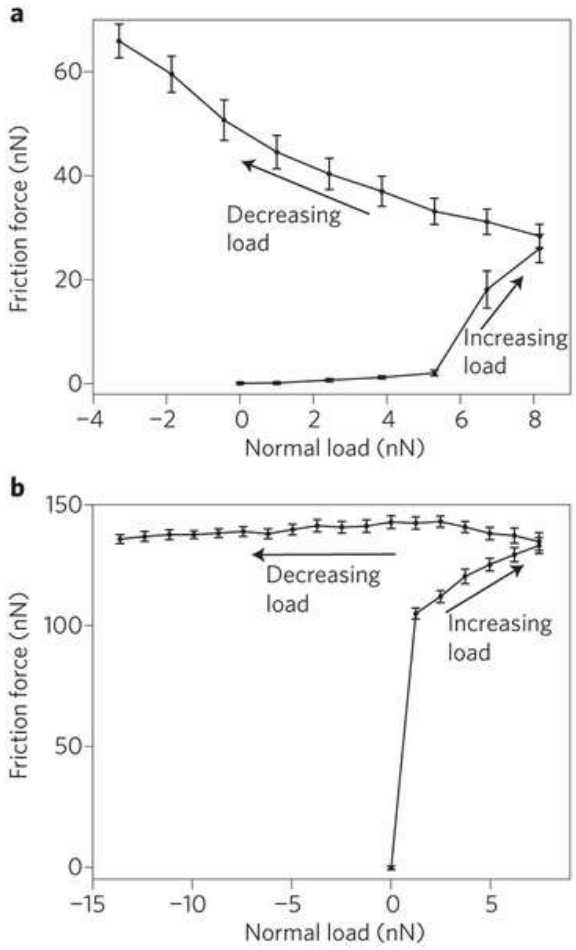
Here’s the basic idea: If you ease up on a pencil, does it slide more easily? Sure. But maybe not if the tip is sharpened down to nanoscale dimensions. A team of researchers at the National Institute of Standards and Technology (NIST) has discovered that if graphite (the material in pencil "lead") is sticky enough, as measured by a nanoscale probe, it actually becomes harder to slide a tip across the material's surface as you decrease pressure—the exact opposite of our everyday experience.

Technically, this leads to an effectively "negative coefficient of friction," something that has not been previously seen, according to team leader Rachel Cannara. Graphite, Cannara explains, is one of a special class of solids called "lamellar" materials, which are formed from stacks of two-dimensional sheets of atoms. The sheets are graphene, a single-atom-thick plane of carbon atoms that are arranged in a hexagonal pattern. Graphene has a number of exotic electrical and material properties that make it attractive for micro- and nanoelectromechanical systems with applications ranging from gas sensors and accelerometers to resonators and optical switches.

Zhao Deng, a University of Maryland postdoctoral researcher at NIST's Center for Nanoscale Science and Technology, noted some odd data while experimenting on graphite with an atomic force microscope (AFM). Deng was measuring the friction forces on the nanoscale tip of an AFM tracking across the graphite as he modified the "stickiness" of the surface by allowing tiny amounts of oxygen to adsorb to the topmost graphene layer. Deng found that when the adhesive force between the graphene and the stylus became greater than the graphene layer's attraction to the graphite below, reducing the pressure on the stylus made it *harder* to drag the tip across the surface—a negative differential friction.

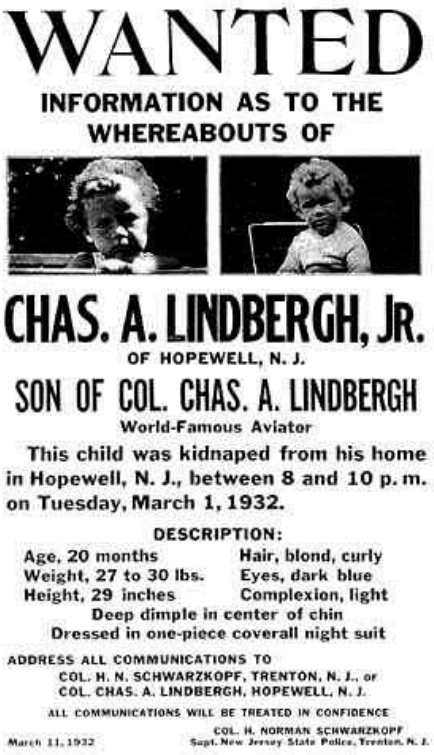
Backed by theoretical simulations performed by collaborators from NIST and Tsinghua University in Beijing, Cannara's team found that, after the AFM tip has been pressed into the graphite surface, if the attractive force is high enough, the tip can pull a small localized region of the surface layer of graphene away from the bulk material, like raising a nanoscale bubble from the surface. Pushing that deformation around takes more work than sliding over a flat surface. Therefore, whenever the researchers pressed the AFM tip against the sticky graphite surface and then tried to pull the two apart, they measured an increase in friction force with a sensitivity in the tens of piconewtons.

"Once we have a complete model describing how these graphene sheets deform under repeated loading and sliding at the nanoscale—which we're working on now—friction force microscopy may be the most direct way to measure the energy that binds these layered materials together. And, since it's nondestructive, the measurement can be performed on working devices," Cannara says. Understanding how the sheets interact with each other and with other parts of a device would help quantify the energy required to produce individual sheets from bulk material, assess device operation, and assist in formulating new structures based on layered materials, she says.



More information here: Z. Deng, A. Smolyanitsky, Q. Li, X.-Q. Feng and R. J. Cannara. Adhesion-dependent negative friction coefficient on chemically modified graphite at the nanoscale. Nature Materials. Published online: 14 October 2012 | doi:10.1038/nmat3452.

Generational Cycles – The Lindbergh Kidnapping



WANTED

INFORMATION AS TO THE WHEREABOUTS OF

CHAS. A. LINDBERGH, JR.

OF HOPEWELL, N. J.

SON OF COL. CHAS. A. LINDBERGH

World-Famous Aviator

This child was kidnaped from his home in Hopewell, N. J., between 8 and 10 p. m. on Tuesday, March 1, 1932.

DESCRIPTION:

Age, 20 months	Hair, blond, curly
Weight, 27 to 30 lbs.	Eyes, dark blue
Height, 29 inches	Complexion, light

Deep dimple in center of chin

Dressed in one-piece coverall night suit

ADDRESS ALL COMMUNICATIONS TO
COL. H. N. SCHWARZKOPF, TRENTON, N. J., or
COL. CHAS. A. LINDBERGH, HOPEWELL, N. J.

ALL COMMUNICATIONS WILL BE TREATED IN CONFIDENCE

March 11, 1932

COL. H. NORMAN SCHWARZKOPF
Supt. New Jersey State Police, Trenton, N. J.

Young, good looking, and shy, Charles Lindbergh made Americans proud when he was the first to fly solo across the Atlantic Ocean in May 1927. His accomplishment, as well as his demeanor, endeared him to the public and he soon became one of the most popular people in the world.

The dashing and popular young aviator didn't stay single long. On a tour of Latin America in December 1927, Lindbergh met heiress Anne Morrow in Mexico, where her father was the U.S. ambassador. During their courtship, Lindbergh taught Morrow to fly and she eventually became Lindbergh's co-pilot, helping him survey transatlantic air routes. The young couple married on May 27, 1929; Morrow was 23 and Lindbergh was 27.

Their first child, Charles ("Charlie") Augustus Lindbergh Jr., was born on June 22, 1930. His birth was publicized around the globe; the press called him "the Eaglet," a nickname stemming from Lindbergh's own moniker, "the Lone Eagle."

The famous couple, now with a famous son, tried to escape the limelight by building a 20-room house in a secluded spot in the Sourland Mountains of central New Jersey, near the town of Hopewell. While the estate was being built, the Lindbergh's stayed with Morrow's family in Englewood, New Jersey, but when the house was nearing completion, they'd often stay the weekends at their new home.

Thus, it was an anomaly that the Lindbergh's were still at their new home on Tuesday, March 1, 1932. Little Charlie had come down with a cold and so the Lindberghs had decided to stay rather than travel back to Englewood.

Little Charlie still had a cold when he went to bed that night on March 1, 1932 in his nursery on the second floor. Around 8 pm, his nurse went to check on him and all seemed well. Then around 10 pm, she checked in on him again and he was gone. She rushed to

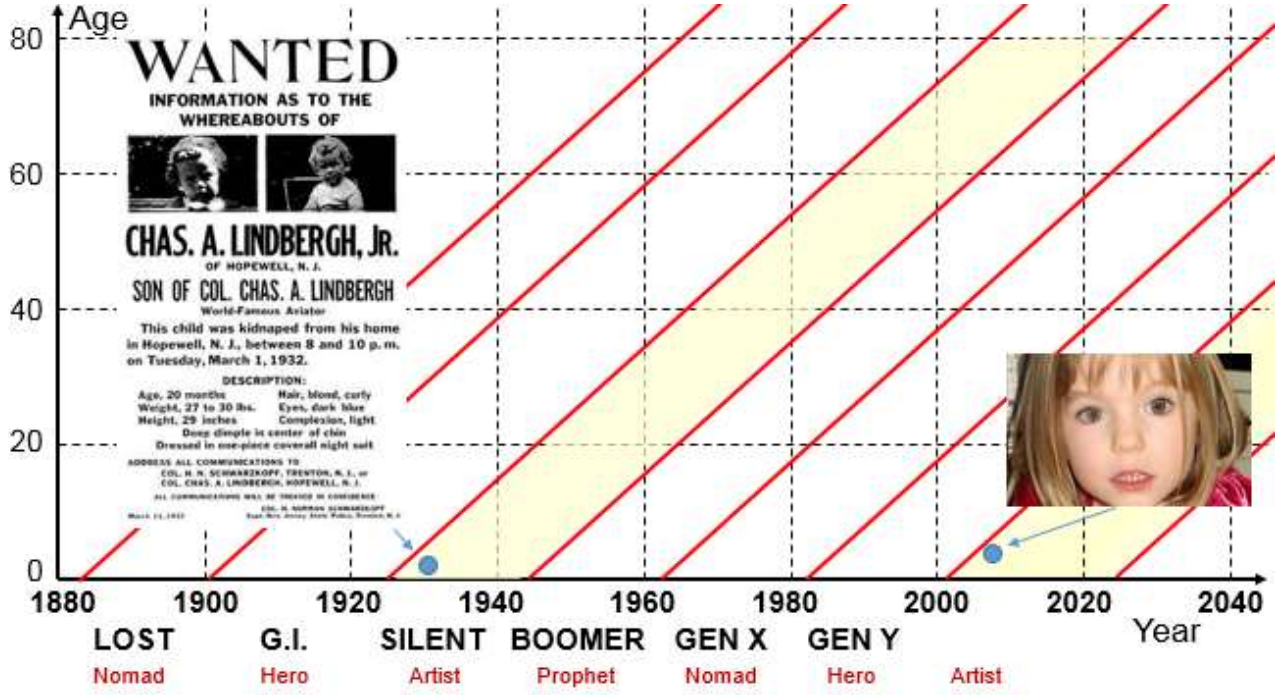
tell the Lindberghs. After making a quick search of the house and not finding little Charlie, Lindbergh called the police. There were muddy footprints on the floor and the window to the nursery was wide open. Fearing the worst, Lindbergh grabbed his rifle and went out into the woods to look for his son.

The police arrived and thoroughly searched the grounds. They found a homemade ladder believed to have been used to kidnap Charlie due to scrape marks on the outside of the house near the second-floor window.

Also found was a ransom note on the nursery's windowsill demanding $50,000 in return for the baby. The note warned Lindbergh there would be trouble if he involved the police. The note had misspellings and the dollar sign was placed after the ransom amount. Some of the misspellings, such as "the child is in gute care," led the police to suspect a recent immigrant was involved in the kidnapping.

The kidnapping turned into one of the most widely reported media stories of the 20th Century.

The point of talking about it in this section of the ezine?
Here's what the story looks like when mapped on to the Generations Landscape:



They say history never repeats, and, of course, it never does. Events happen at random. Kidnappings included. But, somehow, Society's reactions to such tragedies have a strong generational connection. What's significant about both the Lindbergh kidnapping and the 2008 – but still going – case of Madeleine McCann is that both events happened early in Artist-generating periods in history. Periods when parents are 'suffocating' their children. So that, when the media sends them a clear reminder that the world is a dangerous place for children, they unwittingly re-enforce the suffocation message: The Lindbergh's took their eyes of their son for a couple of hours and look what happened. The McCann's did the same. Therefore, the subliminal message to parents goes, make sure you don't fall in to the same trap.

Biology – Cuckoo

The cuckoo is best known for laying its eggs in other bird's nests. Which in itself is a pretty good solution to a tricky contradiction – I want to produce healthy offspring, but I don't want to have to expend any effort doing it; answer: find an Intermediary (Principle 24) and lay your eggs in their nest while they're away (Principle 10):

IMPROVING PARAMETERS YOU HAVE SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE SELECTED:

Loss of Time (26) and Loss of Energy (27)

SUGGESTED INVENTIVE PRINCIPLES:

24, 10, 28, 3, 35, 6, 15, 14, 34, 9, 1, 5, 7, 19

The main reason for featuring them in this section of the e-zine, however, is for another, less well known, trick they manage to pull off when the interloping birds have grown to become self-sufficient adults. That trick involves eating large black hairy caterpillars of the garden tiger moth. The caterpillars are poisonous to all British birds apart from the Cuckoo, so in that regard, solving the contradiction allows the Cuckoos access to a food source that they don't have to compete with anyone else for.

Here's what the basic survival-versus-poisonous-food-source problem looks like when mapped on to the Contradiction Matrix:

IMPROVING PARAMETERS YOU HAVE SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE SELECTED:

Harmful Emissions (30)

SUGGESTED INVENTIVE PRINCIPLES:

35, 25, 13, 2, 34, 21, 10

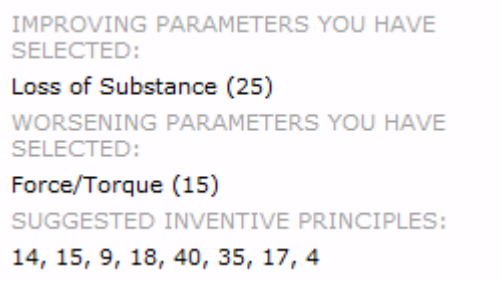
The cuckoo's solution – featured live during the recent BBC Wildlife 'Springwatch' TV series for those that would like to see actual video evidence – starts with the discovery

that the poisonous part of the caterpillar is its gut: get rid of the gut and the caterpillar becomes highly nutritious without any side-effects. So, now, how to get rid of the gut?

Answer:
Step 1) bite the head of the caterpillar off
Step 2) grab the tail of the caterpillar and, making sharp twisting motions of the head, spin the caterpillar around until the guts are centrifuged out of the body.
Step 3) eat remaining part of caterpillar

Looking at the recommendations from the Matrix, it's good to see that Principle 2, 'Take Out' is featured as a solution strategy used by others to solve similar problems. But what about the centrifugal force part of the solution?

To work that one out, those of us less creative than the Cuckoo might work out that the more detailed-level contradiction is the need to remove the gut, which is prevented because of the various forces causing it to be retained in the caterpillar's body. Here's what that problem looks like:



Et voila, recommendation number 1 is, Principle 14, Spheroidality/Curvature. Which, if we read all the way through to part 14D tells us to make use of centrifugal forces.

Cuckoo!

Short Thort

"It is said that once upon a time St. Kevin was kneeling with his arms stretched out in the form of a cross in Glendalough. . . As Kevin knelt and prayed, a blackbird mistook his outstretched hand for some kind of roost and swooped down upon it, laid a clutch of eggs in it and proceeded to nest in it as if it were the branch of a tree. Then, overcome with pity and constrained by his faith to love all creatures great and small, Kevin stayed immobile for hours and days and nights and weeks, holding out his hand until the eggs hatched and the fledging grew wings, true to life if subversive of common sense, at the intersection of natural process and the glimpsed ideal, at one and the same time a signpost and a reminder. Manifesting that order of poetry where we can at last grow up to that which we stored up as we grew."

Seamus Heaney

News

Design Thinking Conference

We are happy to announce that we will be working with IRDG in Ireland to facilitate a one-day conference on Design Thinking featuring several high profile organisations who will be presenting their design thinking experiences. The day will be followed by a hands-on workshop day at which delegates will be able to work on some real design thinking challenges. 14 October is the first date to start locking in to your diary. More news on the irdg.ie website in due course.

Generation Z Book

14 years of generational research comes to a head on 9 July when, together with our friends at Happen in London, we publish the world's first book in the new 'Generation Z' ('Orkids') Artist generation. The oldest of this generation hit their teens this summer, a highly significant moment for government agencies, marketers and product and service designers. We set ourselves the challenge of collating all the research, doing the graphics and laying out all the words in a 48-hour 'blitz' starting at 8am on July 7 and finishing no later than midnight on the 8th…

SYSTEM·ATIC INNOVAT·ION

GenerationDNA

…the launch of the Generation Z book has also prompted us to get our act together and finally finish tinkering with the GenerationDNA book. While we can't promise it will be available on the 9th of July, we are hoping it will be out in time for anyone looking for some light beach reading for their summer holidays. No doubt we'll be letting you know how and when to get hold of your copy as soon as our printer has revealed how we fit into their production schedule.

New Projects

This month's new projects from around the Network:

- FMCG – PanSensic study
- Pharma – TrenDNA workshop series
- Oil & Gas – business innovation strategy and workshops
- Financial Services – Innovation workshop
- Healthcare – PanSensic study and solution generation study
- SME – new organisation business strategy building study
- Construction – Invent-to-order project
- Construction – Innovation White-Space finding project
- Process – Business Innovation workshops
- Transport – Innovation Capability Maturity building study
- Transport – Innovation project support programme