

Systematic Innovation



e-zine

Issue 204, March 2019

In this month's issue:

Article – Kano & Intangibles II – Case Study

Article – The £5 Challenge

Definitely Not Funny – Sustainable Innovation 2019 Conference

Patent of the Month – Microbial Fuel Cell

Best of The Month – Lost Connections

Wow In Music – River

Investments – Low-Cost Cancer Probe

Generational Cycles – The Death Of Comedy?

Biology – Goldfinch

Short Thort

News

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

Our guarantee to the subscriber is that the material featured in the e-zine will not be published elsewhere for a period of at least 6 months after a new issue is released.

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

Kano & Intangibles II – Case Study

Back in December of last year we started to explore the connection between the Kano Diagram and TRIZ/SI, with particular attention to the integration possibilities of Kano's concept of 'exciter' and the Outcome Mapping tool. The promise at the end of that article was that we'd return to the model with a worked example. And so here we are. As usual we face the problem of not being able to talk about many of the case studies we've been involved in with clients. Which means we find ourselves looking at a public sector story, as it happens from the healthcare sector: what happens to a patient entering the hospital system through the Accident & Emergency (or 'Emergency Room') route. For the sake of argument (and familiarity), we'll focus on the National Health Service in the UK.

First up a small recap of the December article. Here's where lazy-Darrell ended up at the close of the first article:

	irrelevant	delight	irrelevant	delight
WE	basic	performance	basic	performance
	irrelevant	delight	irrelevant	delight
ME	basic	performance	basic	performance
	TANGIBLE		INTANGIBLE	

Figure 1: Integrated Kano 2x2 And Outcome Map – Best Bang-Per-Buck

The mauve-coloured boxes in the matrix represent the 'best bang-per-buck' places to go to look for potential delighters. Those are the two boxes we'll stick with in this example: we're looking at intangible outcome desires of the individual ('ME') and the people around them ('WE').

This immediately requires us to define who the individual might be. In a wide-reaching system like healthcare there are, of course, many individuals involved, and so if we were going to be thorough, we ought to construct the Map for each of them. What we'll actually do here is focus on one of those individuals, in many ways the main 'customer' of the system, the patient that has just been in an accident or has suffered an emergency.

As soon as we've defined the 'ME', that then automatically defines the 'WE' as the people around that individual. In this case, that means the friends and family that might have accompanied the patient to the hospital or are at home worrying about them.

Next, we can start focusing on the meaning of the 'intangibles' element of the Matrix. This is the part of the story where we're examining feelings and emotions and all the things that are typically difficult to survey people about, or indeed make any kind of measurement about. The fact that intangibles are difficult to measure is one of the reasons why we're likely to find 'delighters' on this side of the Matrix. 'What gets measured gets done' says the aphorism, and so, by corollary, what doesn't get measured doesn't get done. The intangibles are always present in any system because humans always feel before we think. And if service providers like the hospital aren't thinking about them, that means they're probably going to be negative rather than positive.

What we know clearly about the intangibles story is that, when we distil human emotions down to first principles, we end up with four basic outcome needs that need to be taken into account as shown in Figure 2:

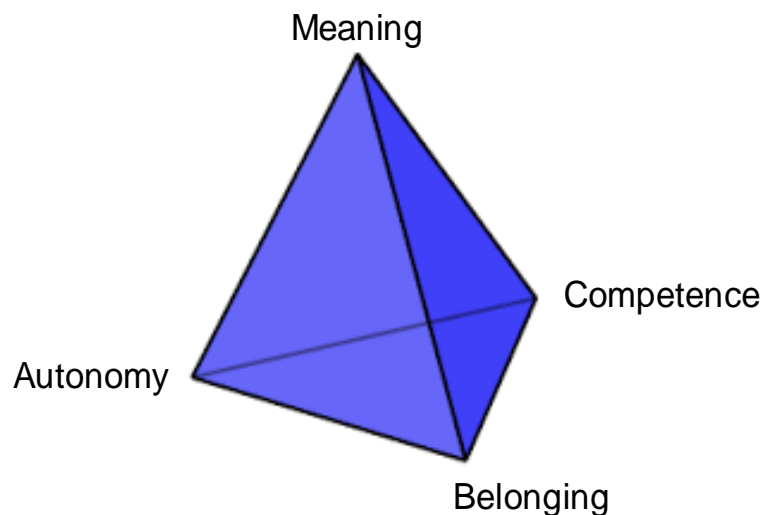


Figure 2: ABC-M Core Human Intangible Outcome Needs

One of the reasons for choosing healthcare for this case study is that, in my experience, the sector (the public part at least) is strongly focused on measurement and because none of A,B,C or M are easy to measure, they're not managed. Consequently, as soon as we're forced to think about these four outcome needs we quickly begin to see, per hypothesis, they are all negative:

Autonomy – the moment we cross the threshold of the A&E Department entrance it is made very clear to patients that we are handing over control to the hospital staff. Whatever is going to happen next is purely determined by those staff members and not the patient. Or the friends and family that might be accompanying them.

Belonging – from the moment of an injury or onset of their illness, the patient has in effect left their normal 'tribe' and is now an unwilling member of a new tribe, the tribe of 'sick people'. This is not normally perceived as a good thing to belong to, and so, as a consequence, the 'B' part of the intangibles equation is also in the negative.

Competence – again, the moment we cross the threshold of the A&E Department entrance it is made very clear to patients that everything that's is going on around them is stuff they don't understand. Especially given the fact that they're ill and not thinking straight. Patients entering hospitals feel incompetent, and, moreover, very often the clinical staff like it that way. A compliant patient is a good patient. Tell me about your symptoms, the clinical staff seem to say, then let me get on with the process of triaging you, and then, when we're ready, treating you. Probably doing a whole bunch of things

that you've got no idea about, other than they will hopefully make the pain go away. Patients, in other words, are also very definitely feeling negative competence.

Meaning – whatever else is meaningful in our lives, when we've just been struck by injury or illness, all we're thinking about is our symptoms. Our health is one aspect of what makes life meaningful, and we just lost that health. Our Meaning-meter is also, therefore, very likely to be in the negative when we enter A&E.

Overall, then, the patient is likely to have a full-house of negatives in relation to the ABC-M first principles. In this regard, for any hospital hoping to deliver some new 'delighters', the only way is up.

For the friends and family that might be accompanying the patient, things aren't much better: their Autonomy is in the negative, because the hospital staff make it clear that they, the staff, are in charge. Sense of 'Belonging', on the other hand is very likely heightened since friends and family have – willingly or otherwise – been forced into the position of being the people who've taken the responsibility for the well-being of their fellow tribe-member. While this part of the Belonging story is in the positive, that very likely means it is negative towards the hospital staff: they're not from the same tribe, they are 'them'. Competence-wise, the friends and family are perhaps even more in the dark than the patient. Especially when the patient gets whisked away from them periodically to places unknown. Friends and family are left waiting with no indication of what's happening, or when. Finally comes 'Meaning', where, like Belonging, as far as their relationship to the patient is concerned, the friends and family are in a place of high Meaning – they are literally responsible (in their minds) for the well-being of their sick loved one. They have emotional 'skin-in-the-game'. As far as their Meaning relationship with the hospital is concerned, however, things are not quite so clear. Do the hospital staff care? Do they have 'skin in the game?' I'm not quite so sure about this one. From my limited personal experience, I'd say a yes and a no respectively to the two questions.

So, now let's think about what we now need to do to find those 'delighters'. As detailed at the end of the December Part I article, we've got eight basic questions to think about, four relating to the individual patient and four to the 'WE' around them:

- What new feature or attribute would give an Autonomy delight for the individual?
- What new feature or attribute would give an Autonomy delight for the people around them?
- What new feature or attribute would give a Belonging delight for the individual?
- What new feature or attribute would give a Belonging delight for the people around them?
- What new feature or attribute would give a Competence delight for the individual?
- What new feature or attribute would give a Competence delight for the people around them?
- What new feature or attribute would give a Meaning delight for the individual?
- What new feature or attribute would give a Meaning delight for the people around them?

But what characterizes a 'delighter'? The best way to answer this question I think is to examine the dynamics of what evokes 'wow' reactions from people. By Kano's definition, a delighter is non-linear: a little bit goes a long way. If I can push that a little further, thinking about the dynamics of 'wow', a delighter involves some kind of a discontinuous step-change. In traditional TRIZ terms, this then means one of two things, either the addition of a new function or attribute, or the resolution of some kind of a contradiction. The former is

the thing that Kano traditionally focuses on – it being about adding something new that customers weren't expecting. The latter, however, in broader innovation terms, is the more frequent success strategy. When a contradiction gets resolved, it creates a wow reaction because when customers start to make the inevitable value calculation they obtain an unexpected result. We put on a sticking plaster to cover a wound knowing that it will hurt when we eventually come to rip it off. Our past history with the product sets our expectations: in order for the plaster to stay on, it needs to have a strong glue, ergo, when I remove it, it will hurt. But then, the day when you experience a plaster that stayed on, but *also* didn't hurt when you removed it, that's the day you experience a wow. Your expectation of pain was confounded, and the resulting wow delivers delight.

Those two strategies make up the overwhelming majority of 'wow's. When it comes to the intangibles side of the Outcome Map story, however, there is a third kind of non-linearity. Well, actually, it is often not strictly speaking a non-linearity at all, it merely feels like one. If an intangible outcome need is currently negative and it switches to a positive, even though the actual shift might be small, because the negative/positive boundary has been crossed, we experience it as a step change. Rather like what TRIZ Inventive Principle 35, Parameter Changes tells us – change a parameter to such an extent that a phase-transition occurs.

If we arrive at the Reception area of the A&E Department and the staff member gives us a re-assuring smile, we don't experience a wow if next time we get a bigger smile. On the other hand, if our previous experience of Reception staff is that they don't smile, the day we arrive and we receive a smile, we are likely to experience a mini wow moment.

There, perhaps, is a first example of how we might look to create the first new delighter for the A&E example: have the Reception staff smile.

Of course, nothing is quite that simple. If patients perceive a fake smile, that very definitely isn't going to be a delighter. The smile needs to be a genuine, empathetic one. Ditto for the friends and family. In fact, experience tells us, perhaps even more important to offer the smile to them. The experience here being several years of trawling through patient and 'friends and family' stories using our PanSensic software on the copious amounts of patient feedback the NHS routinely gathers. Patients are unwell and therefore are less aware of their surroundings than the people accompanying them. Friends and family are by far the ones most likely to complain afterwards. For the simple reason that they are acting as the eyes and ears of the patient, looking out for them and wanting to make sure they receive the best possible treatment by the 'them'. A genuine smile for the people accompanying the patient can, we know from the PanSensic experience, go a very long way.

So, let's expand on this start by examining each of the eight questions from the perspective of each of the three different delighter strategy options:

	Add A New Function	Solve A Contradiction	Shift -ve To +ve Intangible
Patient Autonomy	Printed information regarding pathway (information which exists once triage staff have made initial diagnosis)	Offer pain relief as soon as possible (even using placebo if diagnosis is still being processed)	Offer eye-masks if patient is becoming stressed about surroundings (especially for the inebriated!).
Patient Belonging	Eye-contact, smile when walking past patients in the waiting room	Connect 'frequent flyer' patients to other frequent flyers =	Smile! Readable name-tags for staff.

		ready-made self-help group.	Cultural sensitivity. Sometimes a hug or friendly hand on shoulder/arm works wonders. Put the wrist band information somewhere else so the patient isn't constantly seeing it.
Patient Competence	Allow patient to monitor their own vital signs (even if you're going to ignore what they're doing). (Assuming compos mentis) encourage patients to tell or write down what happened, 'while it is still vivid in their memory'	Ongoing patient vital sign feedback – encourage use of strategies to affect (eg deep breathing to lower blood pressure). Provide 'off' switch so patient decides if they don't want to see the information.	Find an exercise, or something that the patient can do while waiting... people want to feel like they're doing something that will help (again, it doesn't actually matter whether there's any great therapeutic value... placebos work)
Patient Meaning	Ask patients (assuming they wish to talk) to talk about situations where they felt the most relaxed / happy etc	Avoid use of digits on patient wristband and other visible identifiers... no-one wants to be a number.	Ask about life-circumstances. Treat the whole patient not just the symptoms.
Family/Friend Autonomy	Provide feedback on how much longer the wait will be thus enabling people to know when its safe to go and get a coffee, move the car, etc (possibly a display on TV screens that, eg blood tests are currently taking an hour, etc)	Different colour/shape chairs and tables. Different wall colours in different parts of the waiting room. Sky/cloud ceiling colours. Signs above the entrance, 'our promise: people who care'	Eliminate '4 hour' waiting-time targets – avoid 'clock-watching'. Allow people to move the tables and chairs in the waiting room (or at least don't bolt them to the floor)
Family/Friend Belonging	Give them something to do – fill in forms, take temperature, monitor patient, etc – to make them feel useful	Introduce non-hospital scents.	Check out who the 'talkers' are in the waiting room and make sure they have a 'good' story to tell others. Ditto the 'calmer' and even 'joker' – make use of them (they want to be helpful, including with other parties). Isolate drunk/aggressive people from others – give them a coffee voucher and send them to the coffee machine/café. Give them an eye-mask and encourage sleep.
Family/Friend Competence	Phone app that allows tracking of progress through the system (some hospitals electronically track blood	Eliminate (or make more subtle) colour-coding of different staff grades. Ask people what skills	Take down performance posters. Provide online resource if people want to access the data.

	sample progress – allow people to access the information so they can see what’s happening). Encourage use of online resources (webMD, etc)	they have (even if you’re not going to do anything with them, it gets people thinking about positives and into a ‘helpful’ mode)	
Family/Friend Meaning	Provide ‘post-treatment’ advice in written form that can be read while waiting. And give opportunity to collect thoughts and ask questions before leaving the hospital.	Connect to others that have been in similar situations and have volunteered to offer emotional support. (Indicate that they’d also be welcome to volunteer themselves in the future – people love to help!)	‘treat people as you’d like to be treated yourself’

Table 1: ABC-M Core Human Intangible Outcome Needs

This Table is not to say that all of these ideas could or should be implemented, and in precisely what form their implementation might take. These kinds of question can only be answered in the specific context of a given hospital situation. We do know from actual projects, by way of an example, that the ‘encourage the reception staff to authentically smile’ was implemented in one UK hospital (Medway, Kent) and they saw a 40% increase in their patient experience rating, and a 30% increase in ratings from their friends and family experience feedback scores.

Teaching hospital staff to pay more attention to the emotions of friends and family is a bigger, longer-term exercise, and so we don’t as yet have any results in from any hospital trusts we’ve been recommending try it. This despite the fact that – as may be noticed from all of the suggested strategies, none of them requires any significant financial investment to conduct a trial. Or indeed, fully implement. As the saying goes, ‘a smile costs nothing’.

Important, finally, is to recognize that the taxonomy of the Table is not to ensure ideas go in the ‘right’ category. The taxonomy is merely there to encourage solution-finders to explore the problem from different perspectives. The aim is to get beyond the ‘insert miracle here’ instruction to generate some ideas, and to a place where problem solvers are given some clear solution search spaces and questions to explore.

The \$5 Challenge

Here's a little exercise to try next time you have ten minutes to spare:

What would you do to earn money if all you had was five pounds and two hours? Imagine being given an envelope with five pounds of seed-funding. You can spend as much time as you want planning. However, once you have cracked open the envelope, you have only two hours to generate as much money as possible. To make the exercise finite, let's say that everyone has two weeks after the publication of this edition of the ezine to submit a single slide describing what you have done, and, then a day later you will have three minutes to present your project to the rest of the SI world via a webinar.

Are you up for the challenge?

What are you going to do?

Would you look to use TRIZ/SI? Which tools would you use, and where would you start?

(To calibrate you in terms of what success might look like, when the experiment was run with a group of Stanford University students, the winner managed to multiply their initial seed-funding by a factor of 130.)

Let's start in the world of TRIZ and see what it might have to offer by way of a structured approach to achieving a better winning solution to the problem. Figure 1 offers up the first step of one of the more sane 1985 versions of ARIZ, the one found in Yuri Salamatov's book, 'TRIZ: The Right Solution At The Right Time' (Reference 1).

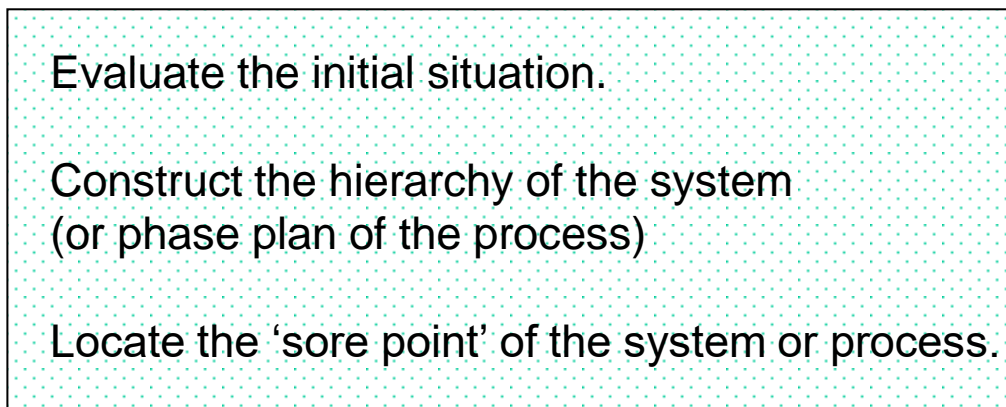


Figure 1: ARIZ Step 1

Straight away we seem to have a problem. We don't have a system and we don't have a process that we're trying to improve. We have a blank piece of paper and a desire to make money quickly. ARIZ doesn't look like it will help.

Okay, so now let's think about how we might begin to apply some Systematic Innovation structure to the problem. Our default 'process' for participants of a one-day introduction will close the day with the map shown in Figure 2.

This process begins with the question, 'what do I want to improve?' Given the three possible answers to the question, we know in the Challenge we've been given that the answer isn't 'nothing'. This means we either know or we don't. Which already seems somewhat unclear. On the one hand we know quite clearly that we have an objective to leverage our resources and make as much money as possible in two hours. On the other,

TRIZ will tell us that this definition is merely a description of an administrative contradiction: we know what we want, but we don't know how to get it. We could try going down the 'I don't know' route of the Figure 1 process, but the moment we start to think about the Ideal Final Result, we will hit a very quick stop: it's difficult to define any kind of Ideal when we don't know what the function we're trying to deliver is. Or who the customer might be. Likewise, we can't draw a Function Analysis model, because there is no system. Nor can we construct an Outcome Map, because again, we don't know who our potential customer might be, never mind what tangible and intangible outcomes they might want from us.

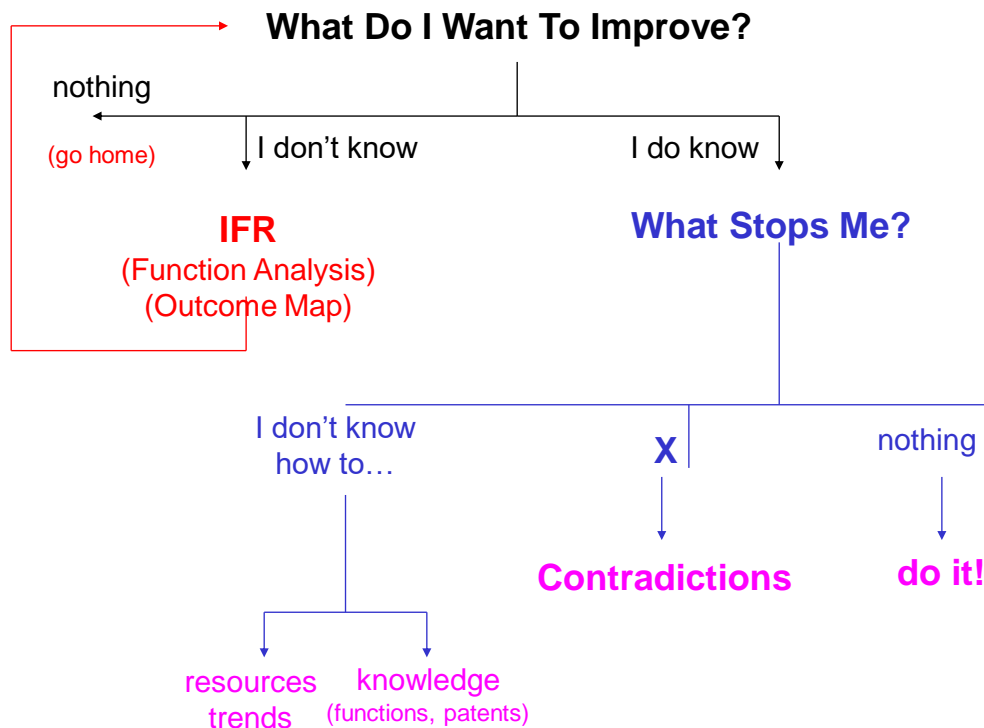


Figure 2: Basic SI Process Map For 'Minimum Viable' Toolkit

Aside from offering up the clues that we don't know function or customer yet, this route appears to be closed to us. In which case, all we are left with is the 'I know' route. All we know so far is that we're trying to make money quickly. If we take this as our start point, the next question we need to ask is, 'what stops me?' Looking at the available options, the only meaningful one seems to be, 'I don't know how to', and once we allow ourselves to travel down that route, we have the choice between going to look for some 'knowledge' or thinking about 'resources' and 'trends'.

Using the 'Trends' part of SI again works best when we already have a system in place, and quite clearly we don't have anything as yet. And it's difficult to know what 'knowledge' to go and find when we don't have a customer or function in mind... although a quick Internet search on 'how to make lots of money in 2 hours' reveals two seemingly relevant references: 'The Sixty Minute Millionaire' and, even more promising, 'The One-Minute Millionaire'. (References 2 and 3). In theory, I suppose it would be possible to purchase one of these books with the £5 inside our envelope, but that feels like it might be a bit of a long-shot. There doesn't seem to be anything in the description of either book to indicate we could become millionaires within two hours. As an alternative, I could see if my local library has a copy I could borrow. At least this way, I could read it before the 2-hour clock starts ticking. But then again, one suspects that whatever insight the books might have to offer, we're still talking about a bit of a long-shot. Let's, instead, make a quick exploration

of the 'resources' part of the story. Figure 3 shows a Nine-Windows analysis of the initial situation:

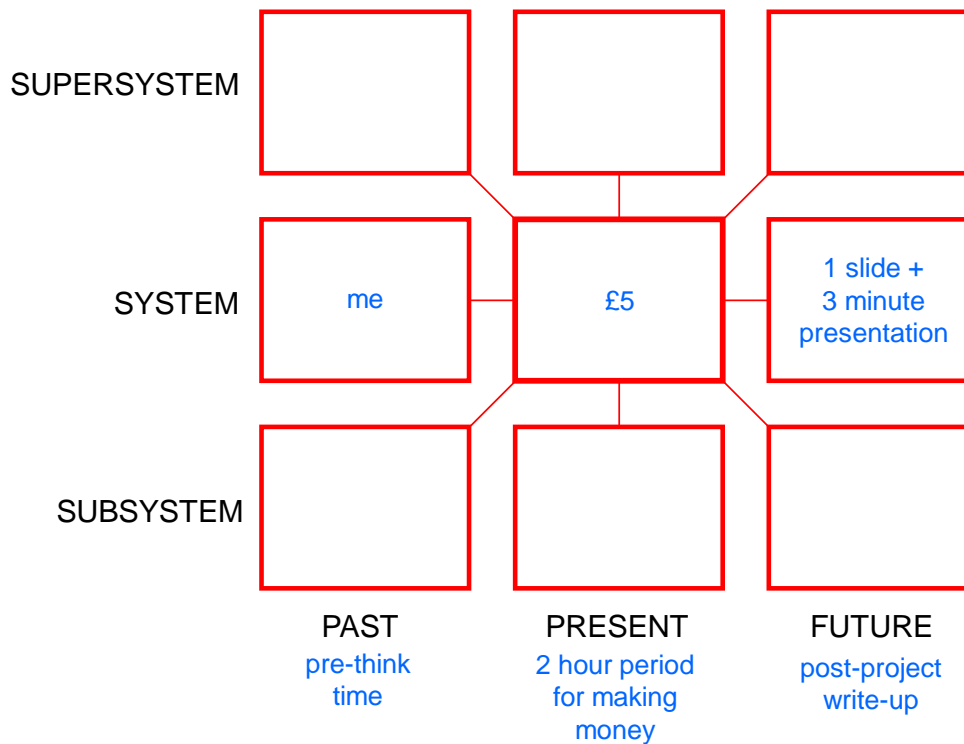


Figure 3: Nine-Windows Resource Analysis For The £5 Challenge Problem

On the face of things, the analysis, such as it is, doesn't appear to offer up much by way of any clues. Except...

Four things strike me:

- 1) The £5 begins to seem like a very small amount of seed-capital. All I can buy with five pounds is small stuff that will inherently be difficult to scale in a two-hour period. Perhaps it is a red-herring? Perhaps I am better off assuming it is zero? Maybe this 'resource' isn't actually a resource at all in the context of my two hours. Maybe it just encourages incremental thinking for a problem that appears to demand the opposite?
- 2) If the £5 is redundant, that also means the 2-hour time window is redundant. I actually have as much time as I like if I'm able to ignore the envelope.
- 3) Now that I have as much time as I want, however, I'm still limited by the fact that I have no money I can spend. Travelling, apart from walking, is out of bounds, and if I'm to communicate with others, I have to do it using 'free' resources...
- 4) ...which then suggests that my only real resource (apart from myself) is the 1-slide, three-minute presentation slot. Who might value this slot? And how might I access them? If it were a TV slot, to take an extreme perspective, three-minutes would cost an advertiser several hundred thousand pounds.

What my limited resources tell me I need is to find 'someone' (and ideally 'one') that I can speak to from where I am, that will value the opportunity to spend three minutes talking to the 'SI world'.

So now I have an end customer, nebulous as they may be, the 'SI world'. At least I have something that I can begin to focus the still-missing 'function' part of the story on. What functions might the 'SI world' want from a three-minute presentation? And, more to the

point, once I understand that, which paying customer might be willing to offer me money to access the 'SI world' participants and give those participants something useful?

I can now return to the top of my Figure 2 process map and see if another iteration can help make the opportunity more tangible. Let's again start with the proposition that, while I've got a first 'clue' about how I'm going to make money, I still don't really know what I need to do. So again, I travel down the 'I don't know' route and can see that constructing an Outcome Map is one of the recommendations. Here's what I think the 'SI world' might be interested in from the perspective of the outcomes people might want:

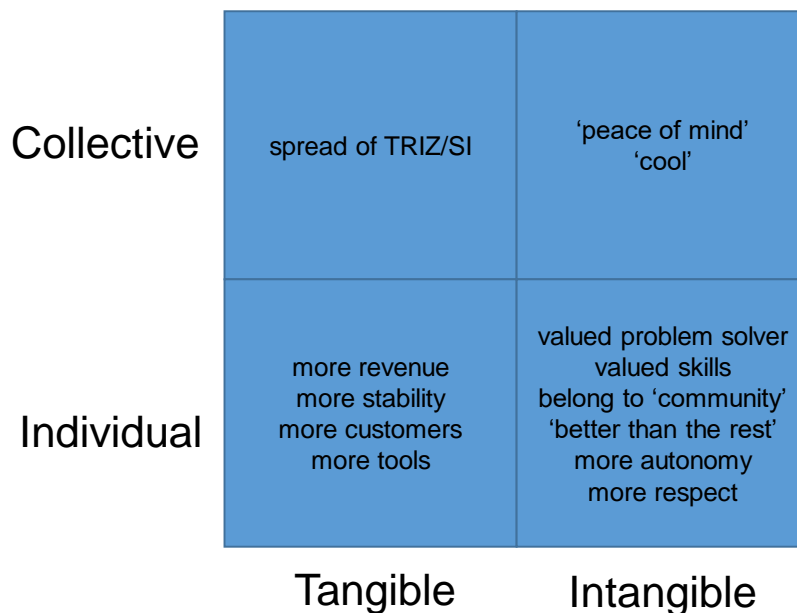


Figure 4: Outcome Map For The 'SI World'

If that's what the audience is looking for, the final question is who might be willing to pay to give the audience some or all of these outcome wishes? Someone selling tools? A big consulting company looking to recruit problem-solvers? A company looking to have people work on an important problem on their behalf? A Government agency? An intermediary Open Innovation organisation needing more solution providers?

Just for the sake of closure, we decided to make a couple of calls. Within ninety minutes we had an offer of £200. Another couple of hours later, we had an offer of £1500. Considerably beating the previous winner. And also, hopefully, making the point that when we're in this kind of heavily resource-limited problem situation, thinking carefully about what apparent resources are actually resources is a really important early step.

Over to you, then, to see if you can beat our total.

References

- 1) Salamatov, Y., 'TRIZ: The Right Solution At The Right Time', Insytec BV, New edition (24 Mar. 1999)
- 2) Kinder, H., 'Millionaire In Sixty Minutes: 7 Surprising Things The Rich Do Differently', CreateSpace Independent Publishing Platform (5 July 2016)
- 3) Hansen, M.V., 'The One-Minute Millionaire', Crown Business, 2002.

Definitely Not Funny – Sustainable Innovation 2019 Conference



I'm told that the reason women agree to have another child is because they're programmed to forget the pain associated with giving birth to the previous one. Not on anything like the same level, but I think I can be a little the same way when it comes to conferences. The last time I attended the Sustainable Innovation conference was fifteen years ago. The emotional scars are still there in the back of my mind, but, 2019, I decided maybe my memory was wrong and that it was the time to go back and see if the world of sustainability had changed. So I duly submitted my abstract, 'Never Make Predictions, Especially About The Future: What TRIZ Has To Say About The World in 2030', it got accepted, probably because there was something of a 2030 theme about the overall event, and hey-presto, I'm scheduled to speak. No going back now.

Given that only thirty papers got accepted, I felt quite privileged. That is, until I actually turned up and sat through the pitches we all had to give to try and attract other attendees to come and listen to our presentations. If I include the half-dozen keynotes, what was on offer appeared to sit in one of the following categories:

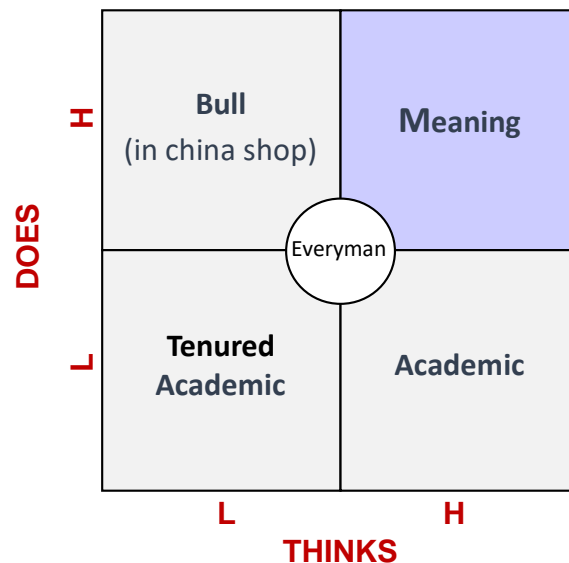
- 1) I have no idea what 2030 will be like, I have no methodology for working out what 2030 might be like, I work for a large organisation that also has no methodology for predicting what 2030 will be like, but I have some strong opinions about my area of expertise that I am going to extrapolate them into the future for you.
- 2) I have no idea what 2030 will be like, I have no methodology and I don't work for a large organisation either, I just happened to know the conference organizer and he thought I could entertain people with an upbeat message for half an hour.
- 3) Company bosses, politicians, anyone in a position of power never listen to what we 'sustainability experts' have to say, it's not fair and I'm quite angry.
- 4) 2030 is going to be brilliant because Greta Thunberg and the rest of Generation Z are going to sort the whole environment thing out for all of us.
- 5) The fashion industry is evil but we have invented this thing called 'mass-customization' so everything is going to be okay from now on.
- 6) I've written a book on the 'circular economy', and I hope everyone in this room is going to buy a copy, because I worked quite hard on it. Including doing a survey that wasn't really scientific, but I think I've done a pretty good job of disguising the fact.
- 7) I have a great idea for a project. I have no idea how to get from where we are today to where we need to be, but apart from that, I think I've invented Sustainability Utopia.
- 8) I have some really strong opinions about sustainability, but I don't understand science or mathematics or anything involving numbers and anyone that tries to challenge me with any of them is a liar and wants the planet to be destroyed.

9) I run a recycling business. There is money in waste.

Before the conference, I could very easily find myself getting angry with Trump and other climate-change denying politicians. After the conference, I can see that if the people attending the conference are the people badgering these politicians, I'd have exactly the same attitude the skeptical politicians do. The Sustainability Community's biggest problem is the Sustainability Community.

There need to be some new rules. Starting with who is allowed to come and attend Sustainable Innovation conferences: 1) they needed to have passed Systems Thinking 101 and Complex Adaptive Systems 101 courses, 2) they have to have some genuine skin-in-the-sustainability-game, 3) they don't call themselves 'creative' (especially if they work in one of the so-called 'creative industries' – where, to make any progress you need to be precisely the opposite of creative).

And, for the authors and presenters: 1) they understand the concept of boundary conditions and 'externalisation' and that you have a duty to present data in an objective manner, not one that ignores inconvenient facts that don't fit your hypothesis, 2) they do not read their presentation from a script. Especially if they are claiming to be 'a creative', 3) they are able to demonstrate a combination of academic-AND-do-er...



The planet doesn't need humans. It will survive in some form or other no matter how much the average global temperature might increase or decrease in the coming decades. If humanity wishes to preserve its ongoing upward trajectory of civilization, however, we need to do something to fall ourselves dropping off the end of a very non-linear cliff edge. If the Sustainability Community is the self-appointed guardian of this mission, I fear, based on the evidence of Sustainable Innovation 2019 that, as a species, we're very likely doomed. If humanity does finally resolve to tackle the climate problems we're creating, I'm willing to make three bets. The first is that we will succeed. The second is that, when we do succeed it will have absolutely nothing to do with the Sustainability Community. And third, a bit more radical, if we're still talking about poor old suffocated Greta Thunberg in three years' time, the discussion we'll be having will have nothing to do with sustainability or the environment.

There is a genuine environmental crisis looming. We're still looking in all the wrong places to solve it. And, to quote a certain skeptic, that's 'Sad'.

Patent of the Month – Microbial Fuel Cell

Microbial fuel-cells (MFC) have been around for over a century now, but they've never quite made the grade in terms of practical, commercially viable applications. Which is perhaps odd given the fact that they offer the potential to deliver useful electrical energy from little more than waste. Perhaps the story is on the verge of a serious step-change thanks to our patent of the month this month. Not the first time we've given the award to inventors *from* India, but very definitely a first in terms of Indian inventors *based* in India. At the SRM University in Tamil Nadu state as it happens. Another sign of the times, maybe. The patent was granted as US10,230,122 on 12 March.

The disclosure is beautifully concise. Here's what the inventors have to say about the problems associated with the prior-art MFCs:

It is an object of the present disclosure to provide an easy, user friendly and cost effective process for fabrication and scaling up of microbial fuel cells (MFCs) from wastes.

Another object of the present disclosure is to provide a real time power utility based on MFCs.

A further object of the present disclosure is to provide higher power density and current density through MFCs.

One more object of the present disclosure is to provide an efficient device and/or apparatus for recycling and reuse of sewage water.

And here's what happens when we re-structure those conflicting requirements into a contradiction:

IMPROVING PARAMETERS YOU HAVE
SELECTED:

Power (18)

WORSENING PARAMETERS YOU HAVE
SELECTED:

**Amount of Substance (10) and Speed
(14)**

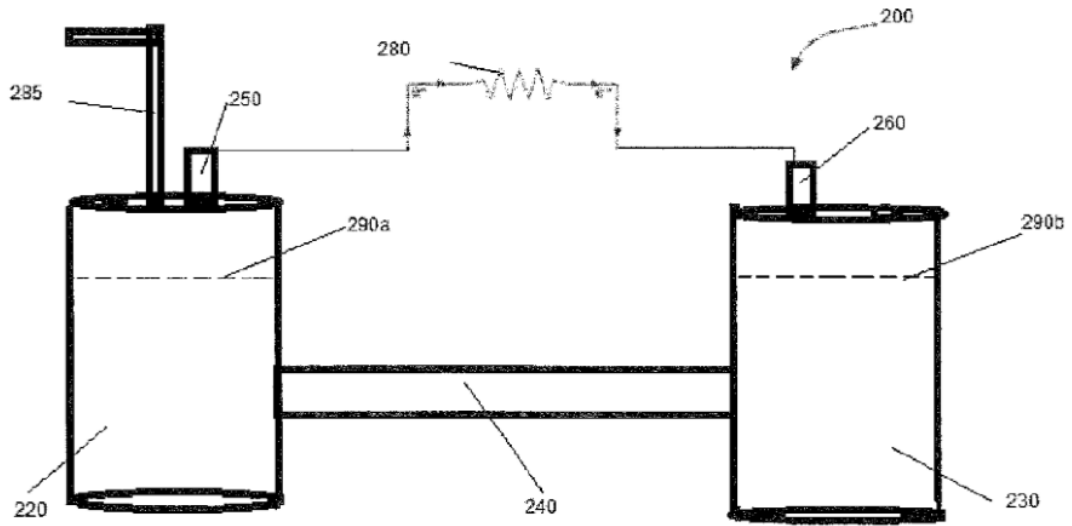
SUGGESTED INVENTIVE PRINCIPLES:

19, 35, 3, 24, 15, 38, 2, 4, 40, 18, 30, 14,
1, 13

Not only is the disclosure write-up simple and elegant, but so is the solution proposed by the inventors. A classic illustration of elegant solutions possessing all the hallmarks of simplicity. To the point where we might begin to wonder why the world hadn't thought of the solution before. Here it is:

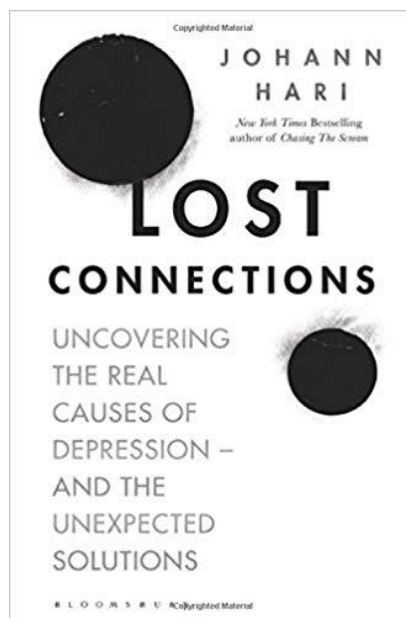
A microbial fuel cell is described comprising an anode chamber having an anode, the anode chamber filled with a first mixture of a buffer solution, nutrients, and at least one microbial inoculum, a cathode chamber having a cathode, the cathode chamber filled with a second mixture of a catholyte mediator and an electron mediator, the cathode chamber connected to the anode chamber via a salt bridge and the cathode and the anode connected through an external electrical circuit, wherein the anode is sealed to maintain anaerobic condition inside the anode chamber while the cathode chamber is maintained in aerobic condition.

Say hello to Principle 3, Local Quality – two chambers, one anaerobic and one aerobic.



I'm predicting a bright future for this one.

Best of the Month – Lost Connections



This month's book choice fits into the psychology end of the innovation story. It's also about the Big Pharma industry and how their urge to sell drugs rather than cure patients ends up creating far bigger problems than the ones being solved. As is so often the case when we're looking for big ideas, the book does its job by looking at extreme situations. In this case, 'Lost Connections' by Johann Hari, is all about the true causes of depression. And more to the point – skin-in-the-game – his depression.

Hari was 18 when he took his first antidepressant. That morning he had visited a doctor and explained how, ever since he was small, he had battled with feelings of overwhelming sadness. When he wasn't taking himself off to cry quietly, an anxious monologue would be running in his head. "Get over it," it would say, "stop being so weak." The doctor was reassuring, explaining that these feelings were to be expected since Hari was one of many people whose brain had depleted levels of serotonin. And so he prescribed some pills that would restore the balance. As Hari swallowed his first tablet, he says, "it felt like a chemical kiss".

It wasn't until he was in his 30s that he thought of all the questions the doctor didn't ask, such as: what was his life like? What was making him sad? What changes could be made to make life more tolerable? The push and pull between "reactive" depression (the kind that relates to our environment and life experience) and "endogenous" depression (where something goes wrong in the brain) forms the basis of Lost Connections, an eye-opening, highly detailed though sometimes frustrating investigation into the causes and cures of depression.

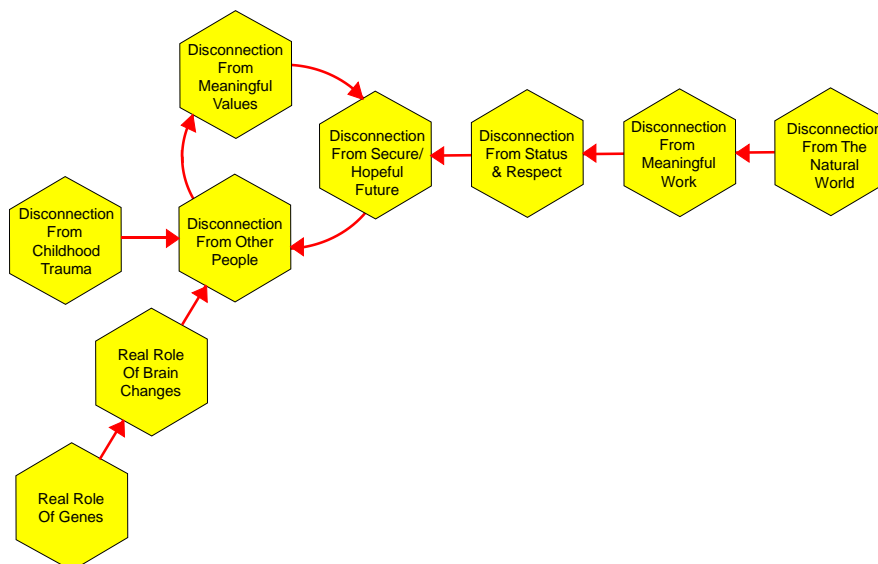
The book is part personal odyssey, in which Hari gets to grips with the flaws in his own treatment, and part scholarly reflection, where he sifts through the varying perspectives of scientists, psychologists and people with depression. In the first half, he examines the social and psychological factors that can cause reactive depression, which include hardship, trauma, loneliness, lack of fulfilment, absence of status and disconnection from nature. He casts a damning eye on the research practices of the Big Pharma industry, which has a clear investment in the endogenous argument, and deftly debunks the popular notion that depression stems from faulty genes.

It's no surprise that Hari is meticulous in revealing his methods, given his past misdemeanours while working at the Independent newspaper. In 2011 it emerged that he had been using quotes from his interviewees' books, and from previous press interviews, as if they had been given to him. Thus, to (over-)compensate there are copious notes at the back of *Lost Connections* containing websites, journals and books consulted, while his interview recordings have been made available online.

As well as sifting through hundreds of academic papers, Hari has talked directly to people who have made great strides in understanding depression. He meets a junkie-turned-neuroscientist in Sydney, climbs a mountain with a primatologist outside Banff in Canada, visits a rehabilitation centre for gaming addicts in Washington state and observes an Amish community in Indiana. So, it's somewhat baffling, given the legwork put in, how little his interviewees actually get to say. In London he meets George Brown and Tirril Harris, authors of a groundbreaking study of the social causes of depression that saw them going into the community and interviewing women about their lives. He makes clear the importance of their work and spends 10 pages telling their story, but quotes just a few sentences from each. It's a recurring theme: Hari crisscrosses the globe to meet prominent thinkers only to tell their stories on their behalf, throwing in a couple of quotes if they are lucky. (He does, at least, give his case studies a louder voice; his conversations with those dealing with depression are extremely moving.)

The research is thorough, however, and his ability to locate a narrative in what one might fairly assume to be bone-dry source material is undeniable. The lazy, oversimplified and unimaginative attitudes of the medical establishment to anxiety and depression laid out here beggar belief. You could argue that finding fault in the current system isn't that hard – it's the solutions that present the real challenge. But Hari is clear about the difficulties of the task ahead and, in offering new ways of thinking, presents not surefire solutions, but, he says, "an alternative direction of travel ... points on a compass". Put in the broadest terms, his argument is that if our current malaise lies in disconnection from vital human requirements such as neighbourliness, professional fulfilment, acknowledgment of trauma and so on, then we need to find ways to reconnect.

Hari discusses nine causes of depression and anxiety in all. He doesn't think to try and (irony alert) connect them all, but that's probably because he didn't have the tools. Or an understanding of the importance of mapping the 'betweens' when dealing with complex situations like depression. Here's what happened when I made my own attempt at doing the 'between' mapping job with his nine causes:



Which suggests to me that the vicious cycle is the place to start if there's a desire to genuinely address the depression epidemic currently engulfing many parts of the West. One thing's for certain: there's little or no place for drugs in the remedy story. If you take away nothing else from this book, it's a vivid re-affirmation of the power of the body (or should that be mind) to self-repair. In that context, the Big Pharma industry – and their sinister role in the growing distrust of 'experts' – has a lot to be ashamed of.

Hari is by no means the first writer to call for a compassionate, common-sense approach to depression and anxiety, or to point out how medical and societal attitudes have fallen short. But his book brings with it an urgency and rigour that will, with luck, encourage the authorities to sit up and take note. Plus, where else are you going to find a book endorsed by Hillary Clinton, Naomi Klein, Brian Eno and Russell Brand?

Wow In Music – River

River
Joni Mitchell
Blue (1971)

Music & Lyrics by Joni Mitchell (1971)

$\text{♩} = 103$

A Intro
C Am

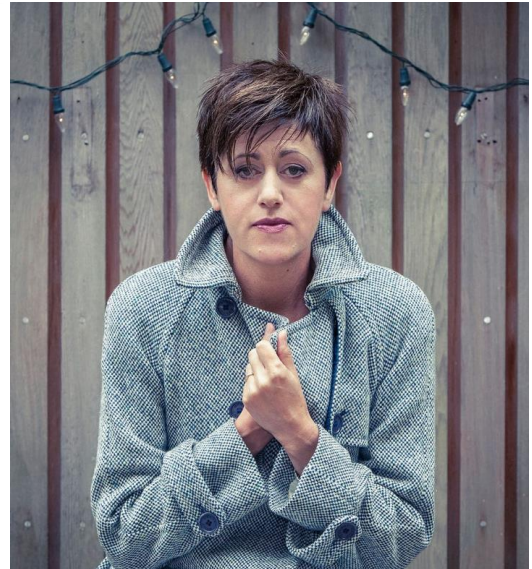
let ring throughout

Piano
mf

B Verse 1

Dm/c C Dm/c C Dm/c C Dm/c C

It's coming on Christmas That's cutting down trees That's cutting on a window and closing come of love and peace



Released in 1971 and produced by Reprise records, River is a contemporary folk song found on Joni Mitchell's classic album, 'Blue'. For some reason, even though it really isn't really a Christmas song, it has somehow become one. I guess for two reasons. Firstly, from the opening line of the lyric it's clearly set during Christmas, and secondly, it has largely been adopted by the Generation X Nomads, who tend to love the juxtaposition of Christmas with songs that are sad and depressing (see The Pogues, Fairytale Of New York). In many ways, it is this juxtaposition between the season and the heartbreak Mitchell expresses that makes the song so powerful. The (Principle 37) juxtaposition story extend, too, within the song, both lyrically (half the verses are about the preparations for Christmas that are underway while she nurses her heartbreak and longs for a river so she can "skate away" and "teach her feet to fly") and musically (the song begins with a piano riff on the very upbeat chorus of "Jingle Bells," and this motif re-appears throughout the song).

Beyond this brilliant juxtaposition, which adds the weight of melancholic holiday sadness to the song, we also get the trademark Mitchell confessionism. Somehow, Mitchell is able to make hyper-personal lyrics like, "I'm so hard to handle / I'm selfish and I'm sad / Now I've gone and lost the best baby / that I've ever had" seem universal.

What also makes the song unusual is that instead of using a typical verse/chorus style this song is written using different sections – A/B/C etc. The refrain 'I wish I had a river' is the overlying focus point throughout the song and is used throughout. Employing an easily recognizable common time, the song although played at a slow to medium tempo sounds as though it is moving faster due to the ornate piano part. Using the key of C major allows a free-flowing melody.

Throughout section A there is a consistent IV-I chord progression. These are aligned with each phrase and through the use of plagal cadence it makes each phrase seem resolved before moving onto the next.

Section B follows (Principle 3) a more erratic chord structure when the vocal melody is peaking on the vi-ii progression. This use of the minor second creates tension over two bars before eventually (Principle 12) resolving to the C major.

The plagal cadence (IV-I) followed by the vi chord is a neat device, and one that becomes a consistent theme used by Mitchell in several of her later songs.

Its probably not a great surprise to learn that the song has been covered over 500 times by other artists since the original 1971 release. The version we opt for here is the cover by Tracey Thorn on her 2012 album, Tinsel & Lights. Melancholy songs often benefit from melancholy voices, and Nomad, Thorn very likely possesses the archetypal downbeat GenX voice. That certainly helps the song. Its not often that a cover supersedes the original, but I think that's the trick Thorn pulls off here. River sounds like it was written for her voice. If that were the only change to Mitchell's original, it would probably be enough, but the final clincher, I believe, is Thorn's addition of a (Principle 17) brass band in the background. If the combination of muted cornet and Thorn's voice doesn't bring a tear to your Nomad eye, nothing will.

Investments – Low-Cost Cancer Probe



Melanoma, the deadliest form of skin cancer, is diagnosed in more than 130,000 people globally every year. Now, work is being done on a tool to help in its early detection: a simple, compact laser probe that can distinguish between harmless moles and cancerous ones. In a matter of seconds.

"With skin cancer, there's a saying that if you can spot it you can stop it - and that's exactly what this probe is designed to do," said researcher Daniel Louie, a PhD student who constructed the device as part of his studies in biomedical engineering at the University of British Columbia. "We set out to develop this technology using inexpensive materials, so the final device would be easy to manufacture and widely used as a preliminary screening tool for skin cancer."

The probe works on the principle that light waves change as they pass through objects. The researchers aimed a laser into skin tissue from volunteer patients and studied the changes that occurred to this light beam.

"Because cancer cells are denser, larger and more irregularly shaped than normal cells, they cause distinctive scattering in the light waves as they pass through," said Louie. "We were able to invent a novel way to interpret these patterns instantaneously."

Imaging devices to assist cancer detection are not new, but this optical probe can extract measurements without needing expensive lenses or cameras, and it can provide a more easily interpreted numerical result like those of a thermometer. Although the probe's components cost only a few hundred dollars total, it is not currently being envisioned as a consumer product.

"A cancer screening tool should be administered by a trained health care professional who would know where the patient needs to go afterwards," said Tim Lee, an associate professor of skin science and dermatology at UBC and a senior scientist at both BC

Cancer and the Vancouver Coastal Health Research Institute, who supervised the work. He believes the device would be a good future addition to standard cancer screening methods, but not a replacement.

Noting that about 7,200 new cases of melanoma are reported every year in Canada, Lee believes the probe can promote early detection of this cancer.

"We have so few dermatologists relative to the growing number of skin cancers that are occurring," said Lee. "If we can develop a device that can be integrated easily into other parts of the health care system, we can simplify the screening process and potentially save hundreds if not thousands of lives."

Read more:

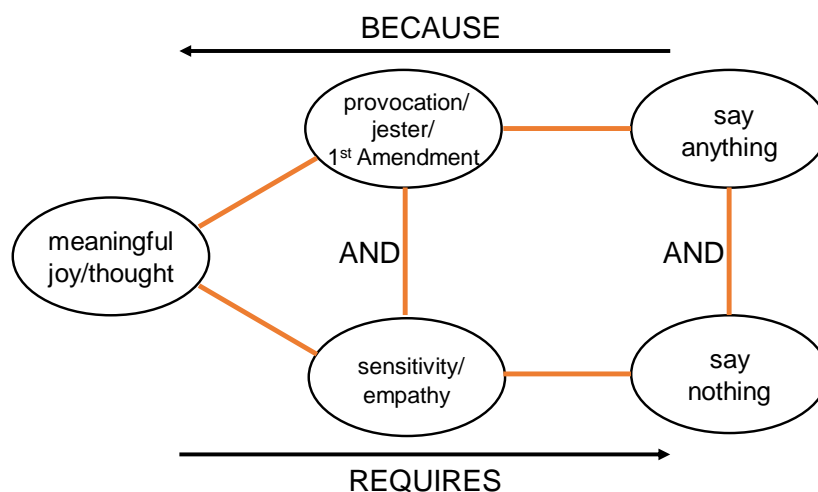
Daniel C. Louie, Jamie Phillips, Lioudmila Tchvialeva, Sunil Kalia, Harvey Lui, Wei Wang, Tim K. Lee. Degree of optical polarization as a tool for detecting melanoma: proof of principle. *Journal of Biomedical Optics*, 2018; 23 (12): 1 DOI: 10.1117/1.JBO.23.12.125004

Generational Cycles – The Death Of Comedy?



Comedy is in a period of extraordinary flux. It wasn't so long ago that it seemed like comedians were filling stadiums and everyone was saying comedy was the new rock-n-roll. The past two years, however, have witnessed the reputations of revered comics, such as Louis CK and Aziz Ansari, implode in the wake of #MeToo allegations. Then there is the culture of unearthing old tweets, with standups being held to account for problematic "jokes" they've made online (for Kevin Hart, it even cost him his most high-profile gig to date, hosting the Oscars). There are also increasing fears around political comedy and censorship. This month, Hasan Minhaj's Netflix special was pulled because he criticised the Saudi regime over the killing of Jamal Khashoggi, while Michelle Wolf's searing political set at the White House Correspondents Association dinner in 2018 led to the board announcing that 2019 will be the first time in 15 years that a comic would not be presenting the event. Elsewhere, Jim Davidson, a man once so vile he was almost immune to judgment, was reported for hate speech, at his own birthday party no less (although no action was taken). The comedy goalposts are shifting and there is a demand that the art form gets more socially conscious. But can you be woke and funny? And are we living in a time of such change and heightened awareness that the two can now never be mutually exclusive?

Comedians can say anything and nothing. Which sounds like a contradiction. And a generational one at that. Nomads, history tells us, make the best, most enduring comedians. But now we have the Millennials taking over. And moreover, taking over at a time in history when the most common word used in media headlines seems to be 'crisis'.



Here's how the world looks from the 'say nothing' side of the story:

"When comedians say: 'Oh you can't say ANYTHING these days!', what they are actually saying is, 'I don't know how to be funny without stomping on people.' Which is fair enough: not everyone has those skills," says Danish standup and podcaster Sofie Hagen (Millennial) (photo at the head of the article).

Hagen is part of a new generation of comics retaliating against the old template of comedy. Nights such as The LOL Word (for queer women and non-binary performers) and FOC It Up!, standing for "femmes of colour", have emerged, along with the new comic voices including Chloe Petts, Jodie Mitchell, Kemah Bob and Sara Barron. Hagen is also emblematic of this new kind of comedian. Last year, she demanded that every venue on her Dead Baby Frog tour was "anxiety safe" (meaning audience members with anxiety could be allowed into the venue before others arrived, or be warned of any words or topics that might be triggering for them), had gender-neutral bathrooms and were wheelchair accessible. She had a positive response from fans, but faced an inevitable backlash online.

"The people who come to my shows, the people who enjoy my standup and my podcasts, they're on the right side of history. They get it," she says. "And I know that a lot appreciated it. The negativity I got was mostly online: loads and loads of hateful tweets and comments from people who were never going to go see my show anyway."

Is this the future of funny? Perhaps it is the only way to survive right now? Comic Dane Baptiste (Millennial) thinks it could be detrimental to a comic's career to plough on with problematic humour: "It's not an obligation for comedians to be socially aware in their narrative but I feel that if you have no commentary on the mechanics that affect your life and lives of others, you might find yourself rather detached, and eventually irrelevant."

Comic James Meehan (Millennial), on the other hand, says. "The thing about standup is you can joke about absolutely anything. Nothing is off limits. It's just how well you can write and frame the joke. I know lazy comics who only complain about political correctness because they don't want to update their material. The other people who complain are those who want a platform to spout hateful rhetoric."

But it is not just about laziness; sometimes there is a deliberate attempt to rile. Here's the other side of the contradiction, the 'say anything' story. Before the recent allegations, Louis CK's (Nomad) comedy was subversive: poking fun at the inequalities of American society, while simultaneously acknowledging the ways they benefited him. After allegations of sexual misconduct appeared last year, however, the comic seemed to react with horror at a new world that threatened his unexamined patriarchal mindset. According to reports, at a recent New York show CK made jokes about survivors of gun violence and minorities such as non-binary teens. When some listeners appeared shocked, he allegedly responded: "Fuck it, what are you going to take away, my birthday? My life is over, I don't give a shit."

It was as if CK had reacted to the new wave of wokeness by indicting political correctness; he became an almost Trump-like figure, amplifying for shock value and catering to an audience who probably felt as if accusations about him were false or insignificant.

When it comes to how people balance freedom of speech versus social responsibility in their comedy, there is, it feels like, a generational divide. "The received wisdom would probably be that there is," says comedy writer and actor Liam Williams (Millennial). "Though it would be complacent just to assume that any backlash to increased nuance,

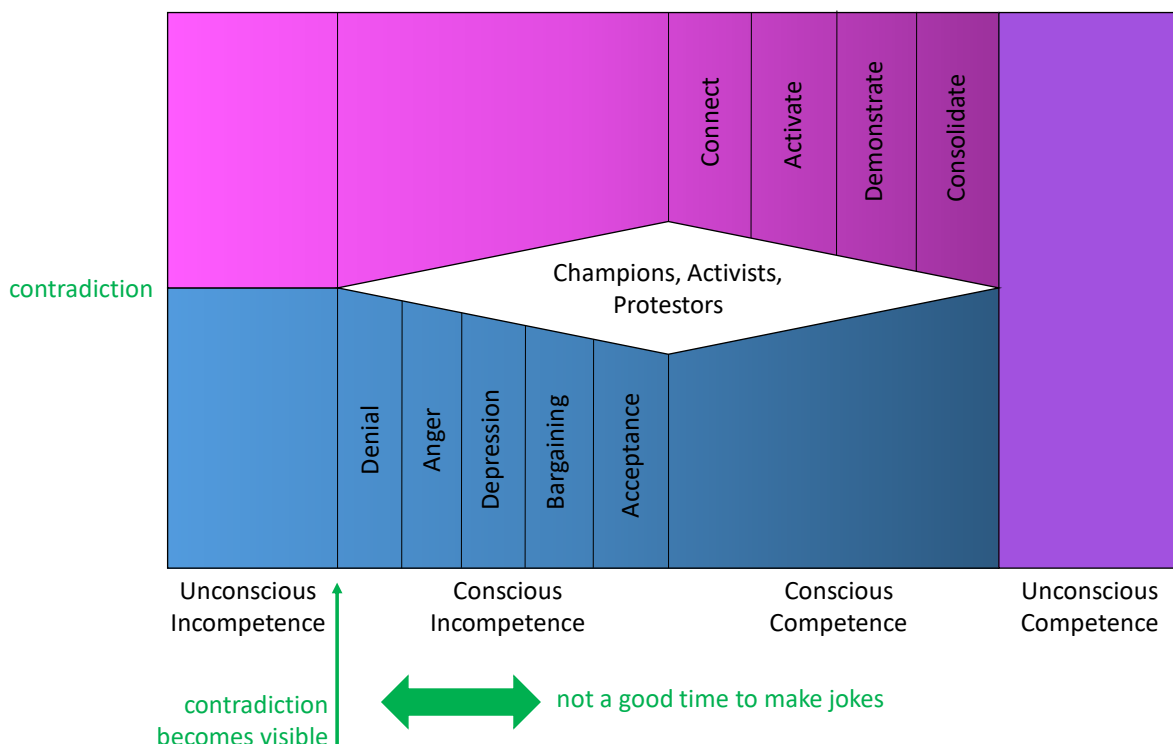
consideration, and empathy in comedy is just coming from nearly-dead Daily Mail readers. There's a new sense of panic about tolerance and not just among older people."

As if to clinch that point, just before Christmas, Russian-British comedian Konstantin Kisin (Millennial) pulled out of a gig for the Unicef on Campus society at London's School of Oriental and African Studies after refusing to sign a "behavioural agreement form". The form stated: "By signing this contract, you are agreeing to our no-tolerance policy with regards to racism, sexism, classism, ageism, ableism, homophobia, biphobia, transphobia, xenophobia, Islamophobia or anti-religion or anti-atheism." Kisin told the Daily Mail: "I grew up under the Soviet Union. When I saw this letter, basically telling me what I could and couldn't say, I thought this was precisely the kind of letter a comic would have been sent there."

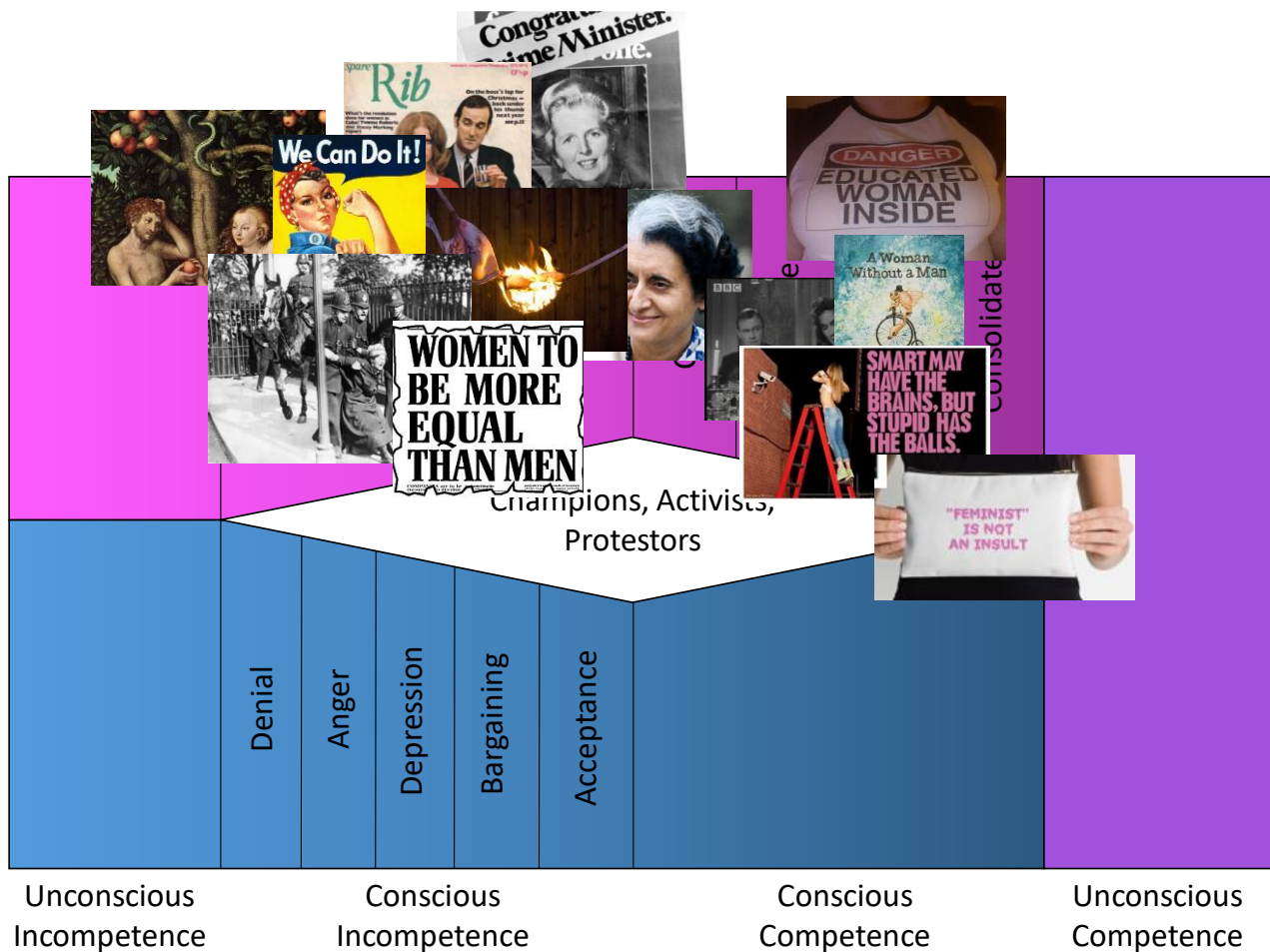
"As far as I could see, the bulk of the outrage – coagulating around the idea that this represented a threat to free expression – came from older comedians and rightwing broadcasters, whereas younger people in the industry seemed to struggle to apprehend what the fuss was about," Williams says of the Kisin incident. "Most decent comedy clubs offer some kind of disclaimer on their websites that abuse or discrimination will not be tolerated, from either audience members or acts. That's not a new thing, but maybe the intensity of the hysteria surrounding it is," he adds.

So, what's going on here? Is comedy about to die in a sea of political correctness? Or is it that the world has made a step-change that comedians are still trying to work their way through? Is James Meehan right when he says its possible to joke about anything? Is the nothing/anything contradiction solvable?

As with all things in comedy, the answer lies in timing. There are times when jokes about a given topic make a lot of sense. And there are times when it doesn't. Just after a problem becomes visibly a problem, there is a lot of anger and depression. This tends not to be a good time to make a joke. It might be funny to a few, but to many it will merely stoke resentment:



Take sexism and the differences between genders, a seemingly perennial comedy topic. Or not. At the peak of the Suffragette movement, it probably wasn't a good idea to joke about the issue. Later, when the anger has turned to depression and bargaining, it's possible to be funny again. And when a majority are consciously competent and can see an end to the problem, it becomes comedy prime time:



The problem the Millennial comedians have to cope with is that, as the world, passes through the current 'Crisis' period, there's a lot of anger and depression about a lot of topics that become effectively out-of-bounds for large swathes of the population. Anything can be funny, just not to all the people all the time. Maybe, therefore, its not that Millennial comedians aren't as funny as the Nomads that preceded them, just that the Millennials have come of age during a period in history when the population at large is looking elsewhere and has other things to think about, and wants to laugh at something that takes peoples' minds of crisis-stuff. Or maybe the main job of Heroes during Crisis periods is to solve the Crisis. Let someone else joke about it afterwards.

Biology – Goldfinch



Goldfinches are some of the most colourful birds to be found in Europe. They eat seeds and houses. Or, more specifically, the mortar that holds houses together. Why do they do this?

Seeds, while nutritious on the inside, usually come with a problem in that they're tough on the outside. Some birds solve this problem by having well-developed jaw muscles that are capable of crushing the seeds. Some birds open them by banging them on hard surfaces. Or dropping them from a great height. All of these solutions come with an annoying downside – they take up a lot of expensive resources. And all because the seeds are tough to open. From a TRIZ Contradiction Matrix perspective, they're too stable, and because they're too stable, the bird's productivity is lower than would be desirable. Here's what that problem looks like when mapped on to the Matrix:

IMPROVING PARAMETERS YOU HAVE
SELECTED:

Productivity (44)

WORSENING PARAMETERS YOU HAVE
SELECTED:

Stability (21)

SUGGESTED INVENTIVE PRINCIPLES:

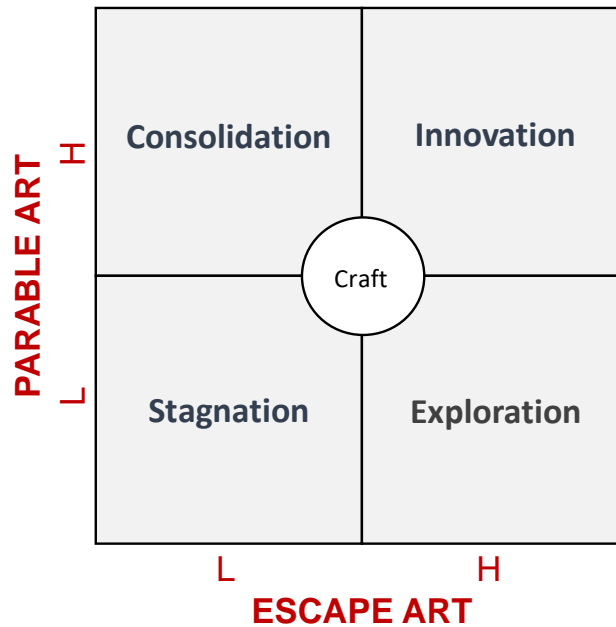
24, 35, 3, 4, 39, 12, 25

Suggestion number 1 is Principle 24, Intermediary. And that's where mortar enters the story. The reason goldfinches eat mortar is because it seems to contain the perfect grit size for crushing seeds as they pass through the bird's crop and into its stomach. Get the grit to do the hard work. Perfect. Apart from my crumbling house. But maybe that's merely the next evolutionary contradiction?



Short Thort

*“There must always be two kinds of art:
escape-art, for man needs escape as he needs food and deep sleep,
and parable-art, that art which shall teach man to unlearn hatred and learn love.”*
W.H. Auden



News

Cardiff University

Darrell's 1-day 'InnovationDNA' workshop is now confirmed for 29 April, and registrations are open at <https://t.co/xpi0FtbLXy>.



InnovationDNA:

The Pragmatist's Guide to Innovation
with Darrell Mann

Darrell will take you through the steps of his COBRA+ innovation process to generate low risk solutions to the challenges you're facing.

for £195

REGISTER NOW!
Mon 29 April 2019
9.30am - 4pm

The Executive Education Suite, Postgraduate Teaching Centre,
Cardiff Business School, CF10 3EU

IMechE TRIZ Workshops

We're happy to be able to confirm that the first '21st Century TRIZ' one-day public workshop of the year will go ahead in Coventry on 9 April. It will be one of only two 'technical' TRIZ workshops we'll be running in the UK this year. The second one is scheduled to take place in London on 10 December. Details of both programmes can be found here: <http://www.imeche.org/training-qualifications/training-details/21st-century-triz>

ICSI Conference, Liverpool

Just a quick reminder that it's not too late to submit a paper or – better yet – an entry to the Global Competition on Systematic Innovation that will be judged at the SI conference in Liverpool from July 8-11. The deadline for submissions is 10 April. We're hoping that one or two students from our programmes at Bath and Buckingham universities will be able to submit something. It looks like we'll have something to submit too... see if we can compete with our winning entry from the 2017 conference. No pressure.

New Projects

This month's new projects from around the Network:

- Government – TrenDNA Anthropology Study
- Agriculture – Design/Make Project
- Agriculture – Design/Make Project
- Power – SI Workshops
- FMCG – TrenDNA Project
- Education – Strategic Study
- Healthcare – ICMM Project
- FMCG – Strategic IP Generation & Bulletproofing Project
- Logistics – SI Workshops