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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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9-Windows – Sometimes Sufficient; Sometimes Not

The 9-windows system operator is a tool with many uses and applications within TRIZ. A cursory glance at our Problem Explorer template, for example, features the 9-Windows on multiple occasions. It is an excellent way to force ourselves to look around a situation when we are looking for resources and constraints, when we are constructing function analysis models and so on. The windows are designed to act as a reminder that our brain will always tend to view a situation by going to the central 'system-present' box.

Get someone to think about the ideal lawn-mower (as we are often likely to do, at least in workshops), and the strong likelihood is that they will picture themselves pushing (or sitting on – depending on the country) a lawnmower on their lawn. By doing this they have immediately defined what the 'system' is, and also what the 'present' is. When we then ask questions like 'what is the ideal size of lawn-mower?' the fact that our brain has planted itself in that 'system-present' box means that we are likely to give answers like 'as wide as my lawn' or 'as small as possible' or (more usually) 'adaptable'. It is only then when we force ourselves to think about what 'past' and 'future' might mean that we realize there are times when we are not cutting the grass. When we are transporting the lawnmower for example, or storing it, or emptying the grass-cuttings somewhere. Explicitly thinking about the 9-Windows in this type of situation forces us to recognize that the ideal final result size – like when we have to store the lawnmower – is sometimes zero. In other situations there is likely to be a different ideal.

It is when we are looking at these 'other situations' where the 9-Windows can often turn out to be a very crude instrument. In many cases too crude. 'Past' can mean a lot of different things. So can 'future'. This article is about re-thinking the number and type of windows we need to work with. We might think of the theme of the article as an attempt to answer the question 'what is the *ideal* number of windows?'

Immediately we ask this question, we just know that the answer is very likely to involve the classic consultant response 'it depends'. Sometimes nine may be too many; often times it will be too few. So how might we set about solving this contradiction?

Perhaps a start emerges when we examine the roots of the tool. It was initially configured as a means of helping to model a problem situation. In this case, the 9 windows are there to force us to look at the environment immediately relating to that problem. In this sense the past, present and future box labels are really just a short-cut to a fairly specific meaning. As illustrated in Figure 1, what we are looking to do when we are working on a problem is in effect define the *smallest possible complete world* around that problem. Thus 'past' in this sense means the time just before the problem occurs. The emphasis here being on the word 'just', since what we are trying to do is use the past and present windows to try and identify a time envelope in which something has changed. If, for example, we are looking at the problem of tyre-wear on aircraft undercarriage, we may define 'present' as the precise moment when the tyre first touches the runway. 'Past' is then the few milliseconds immediately prior to that touchdown occurring. Here is a situation where the time-span of the windows is very short. In other examples, the time window may need to be bigger. In the recent Lexington air-crash, to take an event with a tragic outcome, the 'past' window may need to extend to the days prior to the crash when, it seems, the runway markings had been re-painted. Whether it is micro-seconds or weeks or years, the emphasis on the 'past' box is to find the smallest time envelope in which the change circumstances causing the problem occurred. We can do exactly the same thing with the 'future' dimension. In problem solving situations where we are simply looking to find a cause of a problem, we may in fact not be interested in these 'future' boxes at all. This is why in ARIZ the problem solver is asked to think about the 'problem space' and 'problem interval' during the first mini-problem definition phase and is expressly asked to think about defining the smallest interval and space within which to bound the problem.

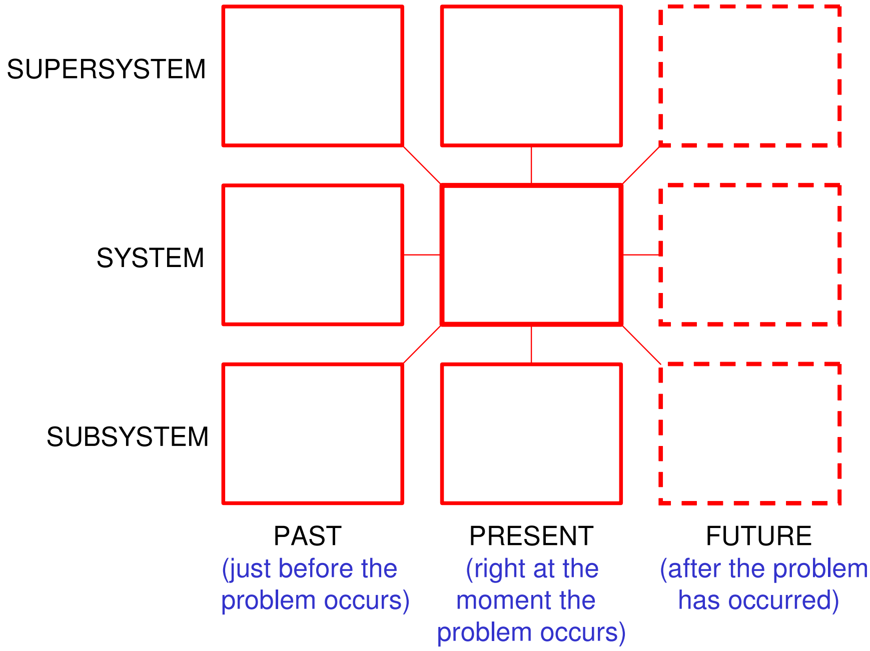


Figure 1: 9-Windows Tool For Specific Problem Solving Application

As soon as our specific problem focus shifts to a more general situation, this Figure 1, 9-Windows view of the world is highly likely to become insufficient. In the problem situation, our aim is to define the smallest possible view of the world. In more general situations, like the 'more ideal lawnmower' scenario for example, we may well need a more broad-ranging view of the world. Our 'more ideal' lawnmower solution may well come through extending the window views broader than anyone else has done. In this sense we may well want to examine a whole range of different time events. The windows in this scenario can be generalized as seen in Figure 2:

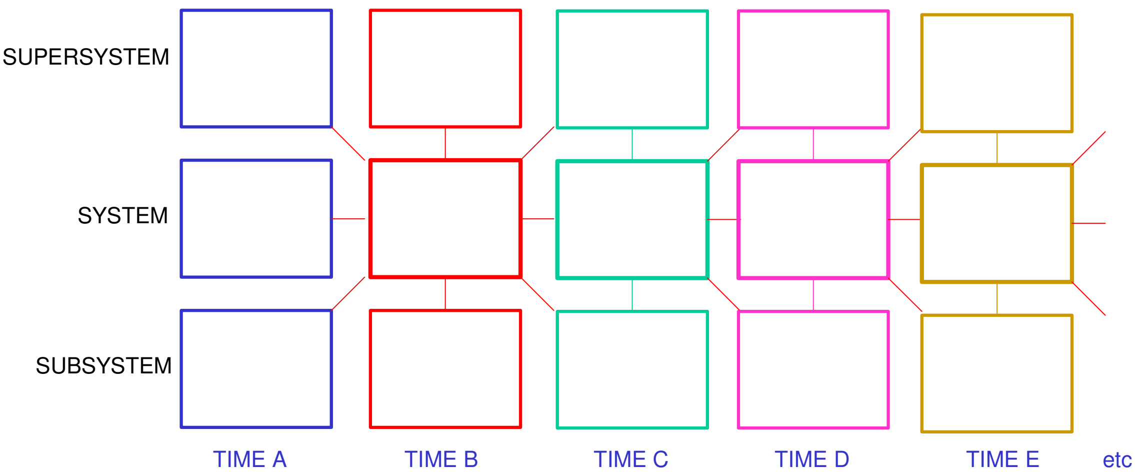


Figure 2: Re-Defining The Windows For More General Situations – Time Dimension

Thus, for a more ideal lawnmower we may wish to imagine a complete flow of events and configure windows for each. We might take this back in time as far as the early R&D on the lawnmower. We might take it as far forward in time to the disposal and recycling of the lawn-mower parts. We might then include a series of windows for every event between these two extremes; from manufacture to packing to display in the store, to the customer carrying the machine home, to… well, you get the picture. The thing is, if we are genuinely interested in answering general questions like ‘what would a more ideal X be’ we need to force ourselves to identify the whole chain of events that determine the start and end of the lifecycle of whatever X might be. We might also wish to do likewise and add more definition to the sub-system/system/super-system dimension. We might wish, for example wish to dig right down to the atomic structure of a material (Figure 3) or out as far as the cosmos.

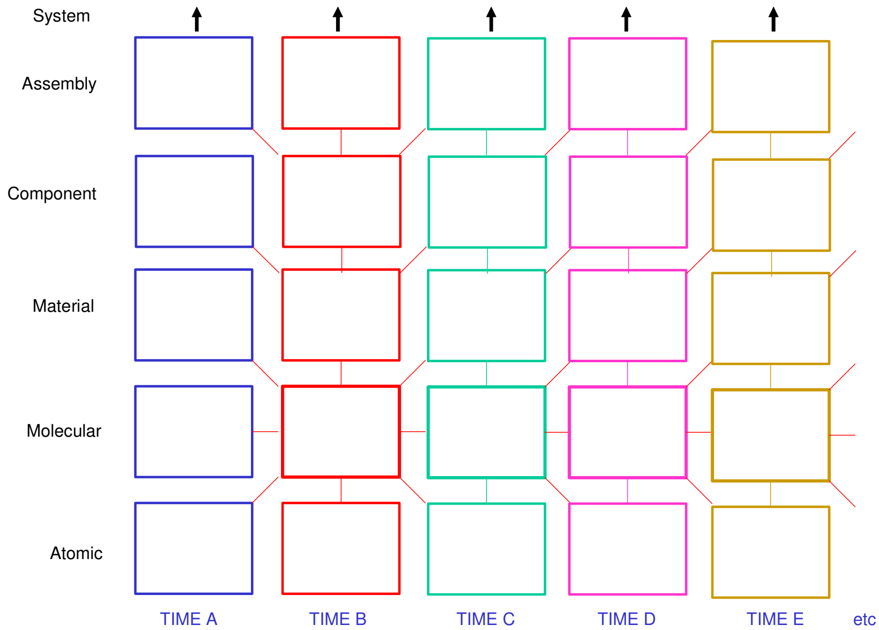


Figure 3: Re-Defining The Windows For More General Situations – Space Dimension

The point is that the ‘ideal’ number of windows will vary according to the job we are trying to do. Solving a specific problem will generally push us towards defining as tightly confined world as possible, whereas big strategic questions ought to cause us to define the world into however many space and time chunks as are required to model the complete world. Herein lies our ideal.

Except (just when you thought things were getting complicated enough!), breakthrough innovations often happen when someone extends their view of the world beyond the windows defined by their competitors. Like for example the retail garden centre that instead of defining their world as ‘selling garden plants and equipment’ sees their world as looking after the plants after the customer has bought them.

Case Studies In TRIZ – Clothes Peg

Part 2: Increasing Decreasing Complexity

Last month we examined how the TRIZ Law Of System Completeness can be utilized to help make better use of the Inventive Principles when working on contradiction problems. This month our focus stays with the Inventive Principles, but the theme shifts to knowing which of the Principles are likely to be more relevant to a problem than others.

Our typical way of introducing the Principles to newcomers describes them as ‘signposts’; they are instructions that point us in the direction of the more ideal system. This is, of course, something of an over-simplification. How can, for example, Principle 1, Segmentation and Principle 5, Merging, both be signposts to the more ideal system when one means the opposite of the other? We can formulate the same question when we look at other Principle pairs. Like 38 and 39, 33 and 40, or 19 and 20, which also form opposing pairs.

We can observe the signpost problem most vividly when we examine some really bad patents. Figure 1 illustrates a few examples we frequently use when trying to highlight to people the fact that 97% of patents will never repay even the cost of filing.

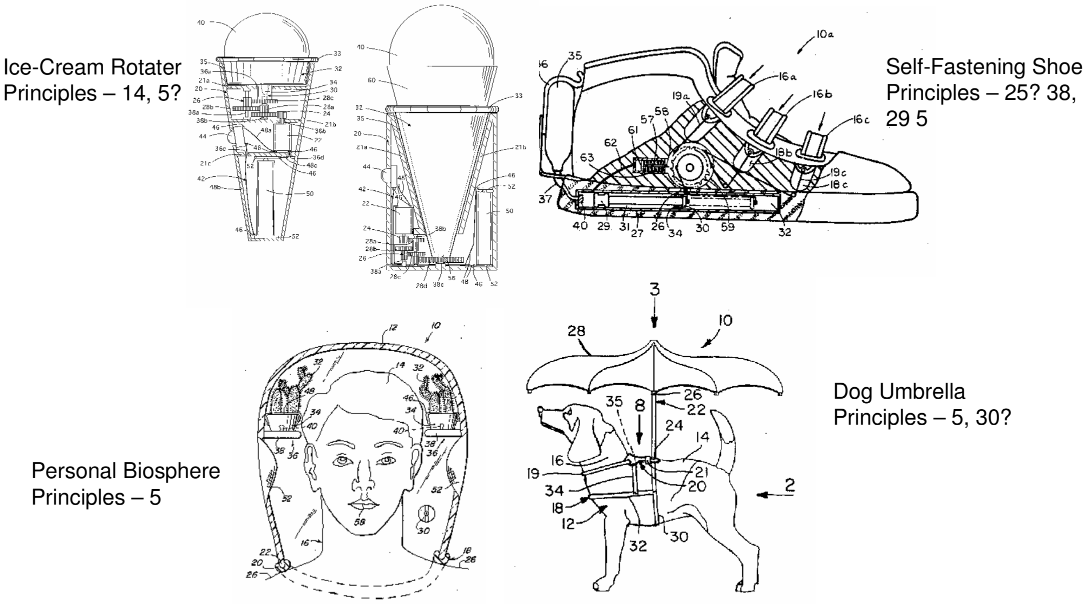


Figure 1: Examples Of Inventive Principle Use?

I think fairly clearly we can see that none of these inventions has delivered a more ideal solution to anyone but their inventor. But at the same time we can also reverse engineer them to fit multiple Principles.

So what? you say to yourself. All that happened here is that we used an Inventive Principle to generate bad ideas rather than good ones; that shouldn’t stop us from ‘believing in the Principles’. Indeed brainstorming through all 40 of the Principles when working on a problem is a commonly used strategy, particularly when we wish to convince ourselves that we have the broadest possible perspective on a problem.

The problem is two-fold; firstly for people new to TRIZ, whenever they encounter an Inventive Principle that gives them a ‘bad’ solution it can very easily cause them to doubt the credibility of the method as a whole. Secondly, when used in this look-at-all-of-them sense, the Principles are doing nothing more than acting as a scatter-gun, pointing randomly in every possible direction – some directions pointing to the more ideal, and others pointing 180degrees away from ideal. When we conduct a 'focused' brainstorming session with all 40 Principles, we are very specifically not being focused. Rather we are conducting a 'comprehensive' brainstorming session, one that will produce both good and bad ideas.

In certain working cultures, I've noticed a strong tendency for people to become very frustrated when they are being forced to connect the 'wrong' Principles to their problem. Time is valuable, and few like to feel that they are wasting it. Especially in a work environment. Not only do these people resent 'wasting' their time generating poor ideas, but they also have to filter them out during the post-brainstorm evaluation activities.

Fortunately, the situation isn't quite as bad as I'm describing it here. In global terms, the 40 Principles *are* pointing us to the more ideal solution. The key here is the phrase 'in global terms'. At that level the Principles are based on a recognition that all systems evolve through periods of increasing and then decreasing complexity. Figure 2 represents an attempt to plot a typical evolution trajectory towards the Ideal Final Result. In it we can see multiple increasing-decreasing complexity cycles.

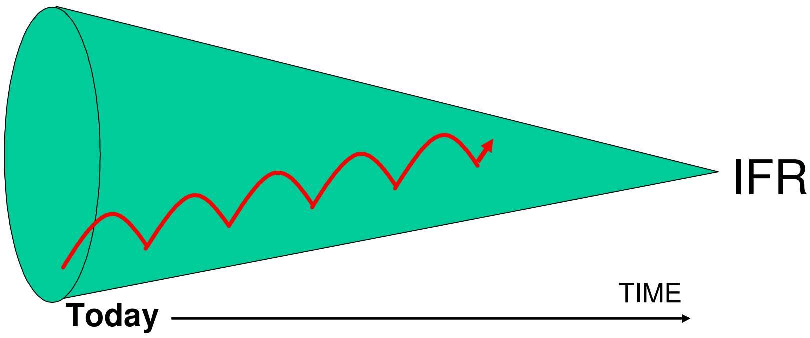


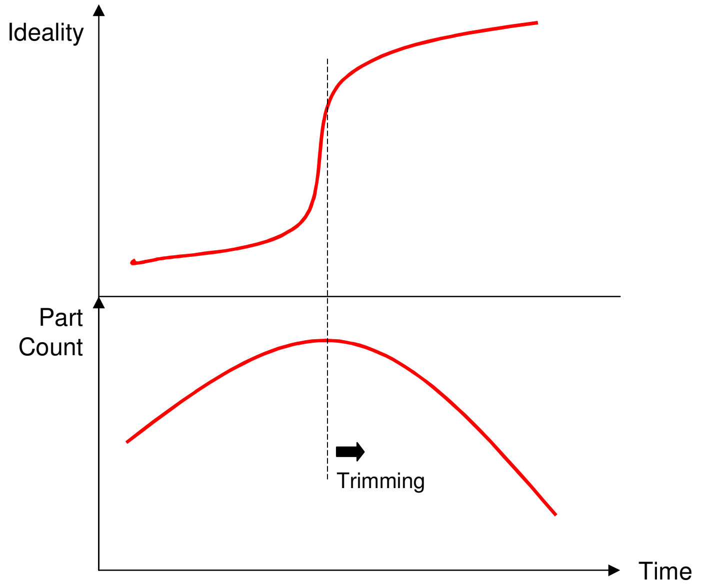
Figure 2: Multiple Increasing-Decreasing Complexity Cycles Along The Road To IFR

This is our *global level* view of the world. The problem with the Principles only starts to occur when we get to a specific local view, and whereabouts the problem we are working on is positioned in the increasing-decreasing cycle. If our system is in the 'increasing' phase of its cycle, then Principle 1, Segmentation is highly likely to help us generate solutions that will look and feel like they are more ideal. Conversely, in the 'decreasing' part of the evolution cycle, Segmentation will very likely give us solutions that will look and feel less ideal.

In other words, knowing where our system (product or service or process, etc) is on the increasing-decreasing cycle should allow us to utilize the Principles far more efficiently. In the Hands-On Systematic Innovation book we attempted – in Figure 10.25 – to help match which Principles were useful in which parts of the cycle. The Figure is reproduced here in Figure 3.

Even more focused than this Figure 3 view of the world is the Contradiction Matrix. Especially the 2003 version of the tool, which, unlike some boxes in the 'classical' version, very clearly understands and accommodates the increasing-decreasing complexity cycle (in that the Parameters have been grouped into families that correspond to the shifting focus of problems at different times in the evolution of a system). The business matrix and the new software matrix likewise 'understand' and accommodate the increasing-decreasing complexity cycle, and so, like the technical matrix, the idea is that when the

Matrix suggests Principles, these are the ones that are the real 'shortcuts to the more ideal solution' for our given problem.



'Increasing' Principles	1, 8, 9, 10, 11, 15, 23, 24, 27, 38, 39
'Decreasing' Principles	2 ,3 ,5, 6, 20, 25, 40
Neutral/ Bi-directional Principles	4, 12, 13, 14, 16, 17, 18, 19, 21, 22, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37

Figure 3: Relationship Between Inventive Principles And Complexity Cycle

So, if position on the increasing-decreasing cycle correlation to the Principles is true, how do we go about finding where our system is on the cycle?

Here's where we can come back to our clothes-peg example. We can start this process by plotting a (simplified) evolution history of the device. Early pegs were formed from a single piece of wood. They were fundamentally simple. Subsequent designs have sought to resolve some of the problems of the single-piece designs (ease of use, ability to grip a wider range of widths, etc), and in so doing the complexity of the design has increased:

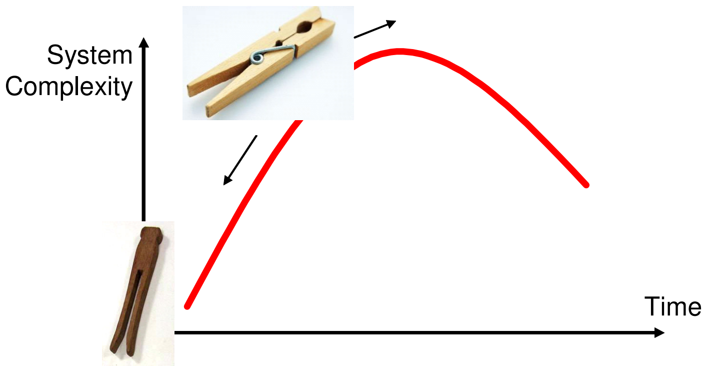


Figure 4: Clothes-Peg Evolution On Increasing-Decreasing Complexity Cycle

What we have to do if we wish to evolve a better design than the current convention is determine whether we wish to increase the complexity any further. The transition from the increasing to the decreasing complexity part of the evolution cycle is frequently triggered by this kind of question, particularly when we put ourselves in the position of what our customer wants. Given that the clothes-peg has one simple function to perform, it seems more likely that we would now like to evolve to a simpler system. This is not to say there isn't a market for a more expensive, multi-functional device – and indeed there is often a bifurcation in the evolution of systems which will result in a high-end 'Rolls-Royce' and a cheap-and-cheerful simple device, but rather that decreasing complexity sounds like a better bet than increasing.

Important to consider when debating where we wish to play in this scenario though is the idea that the high-end versus cheap-and-cheerful bifurcation is merely the two ends of a trade-off. It is effectively a decision on where we want to position ourselves on the increasing-complexity part of the evolution cycle. A truly more ideal solution would, of course, seek to resolve this trade-off and point us in the direction of the end of the decreasing-complexity portion of the curve – Figure 5.

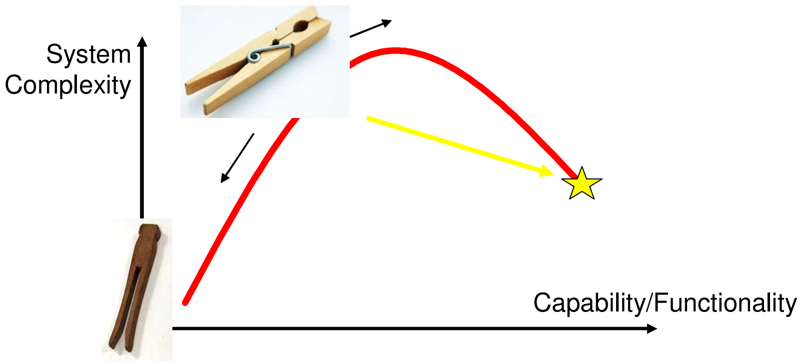


Figure 5: Clothes-Peg Evolution – Solving The Complexity-Functionality Conflict

Note in this Figure how we have re-labelled the x-axis of the graph from 'time' to 'capability/functionality'. We could equally well have labeled it 'ideality'. This is because as time progresses, we expect capability, functionality and ideality to increase. What this revised axis label forces us to do is recognize that our new clothes-peg design is trying to achieve the functionality of the complex device with the simplicity of the first single-piece designs. I.e. it is not trying to find the best trade-off between the two extremes.

We could then map this general functionality/capability versus complexity conflict onto the Matrix as shown in Figure 6:

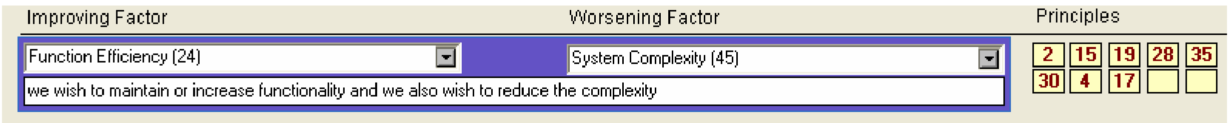


Figure 6: Mapping The Complexity-Functionality Conflict Onto Matrix 2003

At which point we're ready to start using the suggested Principles as genuine shortcuts towards the more ideal clothes-peg. Before we do that, however, we ought to think about one other aspect of the problem – putting the evolution of the clothes-peg in the context of both its sub-system evolution and the evolution of things in the super-system around the peg. That will be our focus in Part 3 of the story next month. Then – fingers-crossed – we might get to some actual breakthrough peg solutions.

Humour – Time Flies…

A string of words may be interpreted in myriad ways. For example, the string '*Time flies like an arrow'* may be interpreted in a variety of ways:

- time moves quickly just like an arrow does;
- measure the speed of flying insects like you would measure that of an arrow - i.e. *(You should) time flies like you would an arrow.*;
- measure the speed of flying insects like an arrow would - i.e. *Time flies in the same way that an arrow would (time them).*;
- measure the speed of flying insects that are like arrows - i.e. *Time those flies that are like arrows*;
- a type of flying insect, "time-flies," enjoy arrows

Likewise, in the spirit of the oft used joke, we can also analyse the similar string *'Fruit flies like a banana'*:

- fruit-flies like bananas;
- (other) fruit is able to fly just like a banana does
- …and so on…

While some of these interpretations are unlikely to be what the writer intended, others make perfect sense… even though in some the word 'flies' is a noun and in others it is a verb.

By way of an experiment, readers with access to a semantic software tool, designed to search for verbs and noun subjects and noun objects, might like to see how it handles the 'time flies like an arrow' and 'fruit fries like a banana' sentences. Something this simple may turn out to be the ultimate test of man versus machine intelligence. Enjoy the results!

Patent of the Month – Thermoelectric Device

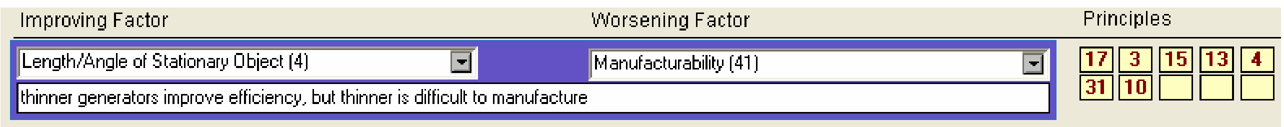
The winners of our Patent of the Month award this month are inventors at the California Institute of Technology. US patent 7,098,393 was granted on August 29. The subject of the invention is the conversion of thermal to electrical energy using a Thermoelectric device with multiple, nanometer scale, elements.

The initial reason for our interest stems back to 1997 and an article in TRIZ Journal by Anders Killander (http://www.triz-journal.com/archives/1997/01/a/index.htm) concerning a novel thermoelectric device based on the Nernst-Ettinghausen Effect. The device was reported to be capable of up to 9W of useful electrical power when placed on top of a stove. Although a useful amount of energy, it didn't feel like there was sufficient to justify the size of the device – the conversion rate being measured in fractions of Watts per cubic centimeter of device.

The University of California patent looks like it has found a way to considerably improve the power density of this type of thermoelectric device. From the invention disclosure abstract:

A thermoelectric device formed of nanowires on the nm scale. The nanowires are preferably of a size that causes quantum confinement effects within the wires. The wires are connected together into a bundle to increase the power density.

What the inventors at the University have understood is that the generation efficiency is positively correlated to the thickness of the generator – the thinner the generator, the higher the efficiency. The traditional problem, then, preventing the realization of thinner devices is the manufacturing difficulty. We can map this problem onto the 2003 Contradiction Matrix as follows:



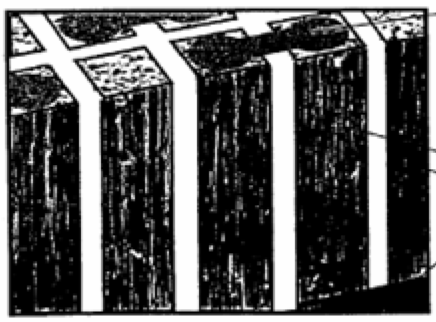
And here is what Claim 1 of the disclosure has to say:

1. A thermoelectric device, comprising: a porous semiconductor having pores therein; a plurality of discrete thermoelectric nanowires formed in said pores of said porous semiconductor, each of the nanowires formed of a Bi/Te alloy, and each having an outer extent of a size at which thermoelectrically significant quantum confinement effects occur, said plurality of thermoelectric nanowires connected to one another to form an operative thermoelectric device.

And also:

The present system may operate using templates of porous alumina. Such templates are commercially available, or can be formed using semiconductor techniques. Templates which have holes on the order of 100 nm by 60 um can be commercially purchased.

It appears clear that porous materials (a.k.a. Principle 31) have played a key role in creating the solution. The inventors have then found a way to form the nanowires into the pores of the template using 'a growth technique'. It is not clear from the disclosure what the technique is and so all we can do as far as reverse engineering the solution is concerned is to record the template idea as an example of Principle 10 – using a pre-arranged structure as the basis for growing the desired nano-wires.



The inventors claim that the reduction in size of the wires may be used to "obtain in excess of 1000 watts/cm^3, depending on the temperature differential and other factors." This represents a remarkable improvement in performance over previous devices. Indeed such improvements open the potential to use the device in many more applications than simply stove tops in Northern Sweden. Like for example in chip designs – where some of the heat being generated could now be turned back into the electrical energy that can in turn be used to drive the chip.

A final interesting aspect of the invention is the discovery by the inventors that:

One aspect of the present system recognizes that the efficiency of the thermoelectric device is increased by decreasing the leg diameter to a size at which quantum confinement effects will occur. A preferred system, therefore, increases the performance efficiency by enhancing the charge carrier mobility using Quantum confinement effects. The thermoelectric devices may be for example of molecular scale in diameter, for example on the order of magnitude of 10 nm diameter (more specifically, anything less than around 100 nm). In addition, these elements may have a high aspect ratio. For example, it may be desirable for the height of the nanowire to be three orders of magnitude greater than the diameter of the nanowire. One example is a nanowire of the order of 10 nm in diameter by 20 to 50 um tall. This may maintain a large .DELTA.V at low heat fluxes, thus further increasing the generator capability.

This aspect of the invention is not so much about solving a contradiction, but rather a discovery that there is a non-linear improvement in efficiency that occurs when the wire size is reduced to a certain level. We suspect that this non-linearity will also have significant possibilities in other applications also. No doubt we will be watching this space for future related IP from the California team.

Best of the Month – Why Most Things Fail

Our best of the month selection this month is the new book from controversial economist Paul Ormerod. 'Why Most Things Fail… And How To Avoid It' is Ormerod's third book. The titles of his previous two – The Death Of Economics and Butterfly Economics (a book using a biological complex-systems analogue for economic systems) – perhaps serve to explain why the author is often not the most popular amongst other economists. This fact doesn't stop his books from selling in large quantities, and Why Most Things Fail looks set to achieve the same breadth of exposure.

A quote from the book's introduction: "From biological species to companies to government policies, there appears to be an Iron Law of Failure, which is extremely difficult to break. Yet the existence of failure is one of the great unmentionables. Within economics, we will look in vain for any satisfactory account of why firms fail." The book's main themes grow from this point, firstly attempting to explain failure, and then examining the apparent paradox in which despite mankind's and business's ability to plan and engineer their future (as opposed to nature only being able to respond to events), we still seem to fail more often than we succeed. A third, to be honest as far as this reader is concerned, less satisfactorily dealt with theme, is that failure can be used as a resource to make firms stronger in the long term. This idea of 'what doesn't kill us, makes us stronger' has, of course, strong links to TRIZ and the idea of using resources effectively. Ormerod, unfortunately doesn't appear to have any knowledge of TRIZ or its uncovering of some of the dynamics of change in systems. If he had, the book could have ended with some far stronger conclusions in this third theme area.

Meanwhile, that gripe aside, the book is nevertheless a compelling read, full of useful case study descriptions and statistics. Between 1912 and 1995, for example, 29 of the world's top 100 industrial companies of 1912 went bankrupt. Another 48 have disappeared. And only 19 were still in the top 100 in 1995.

Ormerod casts a large part of the blame for the astonishingly high level of corporate and government failure on economists. And particularly their (in retrospect) naïve assumptions about the way the world works. Quoting satirist P.J. O-Rourke (something that few other economists would care to do in a learned text!), Ormerod sets the scene for understanding why things fail as follows: "One thing that economists do know is that the study of economics is divided into two fields, 'microeconomics' and 'macroeconomics'. Micro is the study of individual behaviour, and macro is the study of how economies behave as a whole. That is, microeconomics concerns things that economists are specifically wrong about, while macroeconomics concerns things economists are wrong about generally.”

A prevailing belief amongst economists as reported by Ormerod is that here is a group of people who still think that their models are ‘right’ and that the way the world works, for example, when the actual results diverge from the expected result is the thing that is somehow in error. Somewhat worryingly, although he doesn’t go out of his way to emphasize the point, there appears to be a trend whereby an economist wins a Nobel prize for his work, only for the world to discover some time later that the prize-winning model was incomplete, ill-founded or plain wrong. As it turns out, these failures to understand the ‘real world’ are, according to Ormerod’s thesis, the basis of why so many things fail. If company managers and governments build their policies on erroneous models of the way the world works, then why would we expect anything other than failure. Some of the major failings of the economic model of the world include assumptions like ‘perfect competition’; that individuals will always act to maximize their own utility; diminishing marginal productivity; ‘general equilibrium’ (the idea that the world is static and the available resources are fixed); ‘traditional’ supply-demand models, and that systems behave according to ‘normal’ curves (here Ormerod compellingly argues the case that most periods of economic depression arise as a result of economists making normal curve assumptions when in fact the world actually behaves according to power laws. Which, to grossly over-simplify, means that extreme events that a normal curve will say will almost certainly never happen, will in fact happen fairly regularly). To the outsider, these assumptions often appear so naïve we wonder how economists manage to delude themselves so profoundly. It must be a very strange thing to travel from home to work through the real world, and then once you arrive into your office cocoon you start to live in another world entirely.

The prevailing economic assumptions are the economics equivalent of the physicists collection of friction-less, weight-less, infinitely small, infinitely large, everything-less world. The only difference being that physicists now accept that it is their assumptions that are wrong. Perhaps here Ormerod’s mission is to facilitate the same transition to reality amongst economists. Alas, entertaining as the book is to non-economists, it is written in a way that is as likely to rile and offend those in the economic professions, rather than to invoke change. In many ways this phenomenon in itself is a common thread explaining why things fail; anything that runs counter to the prevailing common-sense is highly likely to be rejected by those possessing that sense. Provoking change by annoying people is not often the best way to go about instigating change.

Nevertheless, there is lots of material in this book of interest to TRIZ followers irrespective of your interest in economics. Coming from a completely different start point, pretty much everything Ormerod talks about is consistent with the pillars of TRIZ. Or at least we failed to find any inconsistencies (we always look for them you know!) when we read it.

All in all then, Ormerod’s first thesis – on why most things fail – is that we build models on inadequate assumptions. Regarding the second – why do we still fail when we have the ability to design the way ahead – the general message seems to be that the world is complex and behaves as a complex system. If this seems like something of a cop-out answer, it probably is. This is no different to just about every other book on complexity of course, so we shouldn’t attach any kind of blame to Ormerod. After all he has written an excellent book on the problem. And awareness (or ‘acceptance’ more like) of a problem is often more than half way to solving it.

Conference Report – 2nd Japanese TRIZ Symposium, Osaka.

It was a great pleasure to return to what is becoming one of the highlights of the TRIZ calendar. The 2nd Japanese TRIZ conference represented a considerable advance on event last year; more papers, higher quality, more delegates, and – best of all for the non-Japanese-speaker – copies of slides translated into English. For this achievement the organizers receive my deep admiration and gratitude.

Perhaps the most remarkable first thing to report about the conference is the number of delegates. Last year's event attracted around a hundred delegates. The 2006 event raised that number to an impressive 170. Compare that to the stagnant numbers at the US event and the gradual increases recorded at the main European event. One of the overriding messages at last year's event from talking to delegates was that it was no longer a case of 'if' TRIZ would take off, but 'how quickly'. The number of participants present in 2006 seemed to offer clear evidence that that the answer is rapidly becoming 'very quickly indeed'. Not only are the numbers impressive, but so was the number of people from actual companies doing actual work with TRIZ.

Admittedly, not many of those company's were particularly forthcoming in presenting case studies, but there were nevertheless clear signs all around that TRIZ was a method that was being used. In fact, when speaking to this author at least, there seemed to be some kind of competition between important figures in Toshiba, Panasonic and Hitachi to tell me how many success stories they have inside their respective companies, and how 'even when the patents are granted' they still wouldn't be presenting them as TRIZ success stories. We're talking of case studies in the hundreds here if I was being told the truth. Oh well.

Completists will no doubt head to Professor Toru Nakagawa's TRIZ Home Page In Japan site for a list of all of the papers presented at the conference. Our discussion here will focus on the aspects that struck us the most vividly.

Let's start with the first day of the conference. The invited paper from SANNO (Manabu Sawaguchi) was a nice enough lead in to TRIZ for any audience members who may not have had much prior exposure to the method. A bit disappointing that there was a very heavy bias towards 'classical' (i.e. Ideation) TRIZ throughout. A newcomer may well have left the presentation with the distinct impression that nothing had changed since 1983. Fortunately some of the questions at the end (can we apply this to business, software, etc) at least started to redress the balance. Also useful on the first day was a presentation from what feels like a near-lone voice at NEC explaining how he was trying to introduce TRIZ into the company. Many parallels here with industrial stories in other parts of the world. Many parallels too in the paper from the Takano Company on a novel weld-less joining method for tubular steel fittings. Although definitely patentable, it seemed to me that TRIZ had been used to create a design that was considerably (i.e. really, really considerably) more complicated than the initial welding solution. Moreover, the final solution, still had some ugly features that were not much more attractive than the original weld. Great that the company – a relatively small SME – was using TRIZ; not so good that they didn't appear to have quite finished the new design yet. Or maybe I was just being too critical. Or maybe the problem was that the company used out of date tools and consequently got a less than ideal solution.

Day 2 started on a high with the keynote address from Professor Linde of Coburg University in Germany. The subject – no surprise – was his WOIS variation on the TRIZ theme. Congratulations to the Professor for cramming so much into the available time. Nothing new for anyone who has heard the presentation before alas, but it always feels like a great pleasure to hear the material again. Next up was yours truly and a paper on TRIZ for Software. Lots of interest generated. Mainly in 'why hasn't the book been published yet?' I'm beginning to get a nervous tic about this subject.

Nothing much for me to say about the next paper from Panasonic on 'How should we use TRIZ for Managing Industries' except to say that there was no real conclusion and little if any content. A marked contrast with the paper from Infosys – which reported a very nice business case study, using some of our tools. Look out for this paper ('Changing The Paradigm in Business English Learning Using TRIZ') in a future edition of TRIZ Journal.

If this paper was one of the main highlights of the conference, the day quickly swung to the other end of the spectrum with papers from Ik-Cheol Kim and Valery Krasnoslobodtsev. Mr Kim took his 31-different root-cause classes of problem to a yet higher level of nonsense than his introduction to the concept last year. I suppose you have to admire the persistence, especially in the face of the difficult questioning he received when presenting in 2005. But then again there is persistence and there is delusional persistence. This year the emphasis appeared to be on the delusional side. A cursory glance through Mr Kim's 31 problem types will quickly reveal that one of the types is 'contradiction'. Which in turn tends to make 28 of the other 30 types kind of irrelevant since they could all be classed as a sub-type of a contradiction problem. Best ignored to be honest; it sounds like a compelling concept, but the reality is a big fat non-event. If we criticize Mr Kim for ill-founded concepts, Mr Krasnoslobodtsev should receive our award for creating really bad design solutions using a really bad physical contradiction problem formulation technique. Anyone with even a passing knowledge of Ideal Final Result thinking would have realized that the presented solutions (for a Samsung inkjet cartridge) were the wrong solution to the wrong start question. To make matters worse, when challenged about his technique, Mr Krasnoslobodtsev turned rather defensive and if I heard right seemed to suggest that he knew better than the Japanese questioners because he'd been using TRIZ for longer. What's the Russian for 'garbage in, garbage out' I wonder? Because that's what we got two times over in this paper – bad problem definition leads to bad solution; arrogant mental attitude leads to inability to see better ways of doing things. No doubt this paper will also find its way into TRIZ Journal in the coming months, so I hope readers of this publication will make up their own minds on the subject.

Anyway, finishing on a low would be very unfair to the conference. All in all it was a great experience, and for me quite likely the TRIZ event of the year. The only place we go where it is possible to have deep and detailed conversations about TRIZ and obtain some genuine new insights into where the subject is going and what is needed to make it happen.

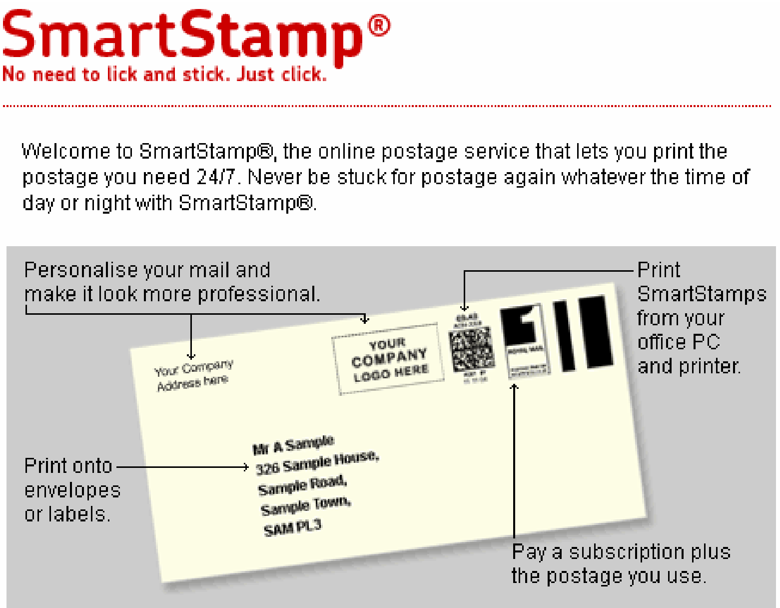
My sincere thanks to the conference organizers and in particular Professor Nakagawa for escorting me halfway across Osaka to find me an Internet connection when the conference venue turned out not to have one.

Investments – Self Printing

Something a little different this month. A) because we're not sure it is possible to invest in the UK's Royal Mail, and b) because we never thought we'd ever see the Royal Mail in any article we ever wrote about innovation. The investment recommendation is really about the Royal Mail's most recent idea and the possibility of finding other applications in other fields.

In many ways the Royal Mails new 'self-printing stamp' system is not new. Certainly anyone that has ever printed out a boarding pass at home in order to avoid the check-in queues at airports is familiar with the basic idea. The new Royal Mail 'SmartStamp' service offers the same sort of convenience benefits as that self-print boarding pass. Post offices in the UK open during the traditional 9am to 5.30pm high street shopping period. Anyone that wants to post a letter outside this period either has to remember to keep a stock of stamps or try and find a functioning stamp dispenser machine. Both of these assuming they have a standard size and weight of letter or parcel. Anything out of the ordinary and there is virtually no chance of getting your mail into the system because you don't know what value stamp to put on it without asking a post-office staff member.

SmartStamp allows people to print out a 'stamp' in the comfort of their own home. In fact the system allows the user to print out not just the stamp but a whole professional looking envelope, complete with your own logo:



Our first 'wow' of the month. Rapidly followed by a 'why didn't they think of this earlier' moment often indicative of those wow solutions.

So, the investment question now becomes 'where else might this kind of 'self-print' idea enhance consumer convenience? We suspect the boarding pass and SmartStamp are the mere tip of a self-print iceberg. The race is on to find and own the other killer app solutions. If you think you have one… we might just have an investor who may be interested.

Biology – Feather Mite

All birds have a tiny arthropod called a feather mite that lives in their feathers. These mites are a symbiotic organism. The birds benefit from the relationship because the mites digest oil and fungi, thus cleaning the bird and keeping the bird healthy. In return, the mites get both a place to live and a regular supply of food.

The complication in this arrangement is that periodically, the birds moult, shedding their feathers so that new ones can grow. If the mites were to stay on a feather being moulted, they would lose their food source. Likewise the birds would lose their cleaning service. Spanish biologists studying this phenomenon, however, have discovered that feathers about to be shed were free of mites. Before the feathers are shed, the mites get off and concentrate themselves on feathers that are not shed. The question is "how do the mites know when the feather they are on is about to be shed and it is time to move?"

In a study of 63 songbirds in 13 species, all of them showed this capacity. The mites are now known to be able to pick up changes in the vibration characteristics of the feathers that are generated when the feathers to be shed begin loosening in the bird.

The feather mite has thus found a way to resolve an interesting conflict between the need to stay attached to the feather and not knowing when the feather will be shed. We can map the conflict onto the 2003 Contradiction Matrix as follows:

Improving Factor	Worsening Factor	Principles
Safety/Vulnerability (38)	Ability to Detect/Measure (47)	28, 32, 37, 17, 3, 13, 26
the mite desires to stay attached to the bird feather but doesn't know when the bird will remove the feather		
Reliability/Robustness (35)	Ability to Detect/Measure (47)	28, 40, 25, 32, 37, 18, 3
the mite desires to stay attached to the bird feather, but doesn't know when the bird will remove the feather		

The feather mite solution, being based on both vibration (Principle 18) and relative change (Principle 37 in its generalised form), can thus be seen to equate nicely with the strategies used by human problem solvers working on similar conflicts. Mmm.

(BTW: Sort of interesting aside: at least one website uses the feather mite's evolved solution as evidence to support an 'intelligent design' theory – *"When God designed living things, He planned down to the shedding of feathers and for those organisms dependent on the feathers. These behaviors cannot be a product of the organism's reasoning, but they can be the result of an infinite Intelligence that planned all aspects of the organism's existence."* Logical or deluded; you decide.)

Short Thort

"Academic scholars set out with the understanding that they are merely trying to add a brick to a large existing pyramid of learning. Their efforts are useless if they cannot be fitted into the context of what those who came before them have discovered or what their contemporaries are in the process of learning. Commercial researchers, working under the constraints of time and budget are apt to pay only perfunctory attention to what has been done before, much of which may remain the private secrets of companies in competition with their own clients."
Leo Bogart, 'Finding Out: Personal Adventures In Social research – discovering What People Think, Say, And Do'

Does the brick called 'TRIZ' fit into this existing pyramid of learning for most academics?

What happens when the bricks no longer fit the current pyramid? Do we have to re-build the pyramid? Or start a new one?

Is academia capable of doing such a job?

Is the commercial sector far more likely to be capable of such a job?
If the commercial sector is, will the results ever be made public?
Is there a danger that we might end up building multiple pyramids?
Would building a multitude of pyramids be a bad thing?

News

Jordan
Systematic Innovation associate Jabir Walji has been invited to give a Key Note Speech at the Technology Commercialization Programme in Jordan in November. This prestigious event, run under the patronage of the Princess of Jordan, will this year focus on Business Planning & Development, Product Development, Intellectual Property Strategy and Marketing Strategy. Jabir will be featuring our methods and cases studies extensively in his keynote address.

Knowledge Summit
We are pleased to announce our presence at the Infovision 2006 Knowledge Summit to be held in Bangalore on 28 and 29 September. We will be speaking in the Innovation and IP Management session at the on the 29th. For more details, check out the conference website at http://www.infovision.org.in/

Live Systematic Innovation Workshops
Due to client commitments, we have shifted the planned October UK systematic Innovation workshop until the end of January 2007. The November event on the 2nd and 3rd of the month will proceed as per plan. We already have a number of people registered on the event, so it looks like it will be a good networking as well as learning experience.