Connecting Real IP Value To Business Strategy

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Abstract

The paper begins with the hypothesis that current citation-based and classification code based patent search techniques offer little if any value to organizations in terms of either locating disruptive threats or opportunities, or providing leaders with forward looking strategic information. The paper goes on to discuss how the findings of the three-million data-point TRIZ/Systematic Innovation research have uncovered findings capable of addressing a forward-looking, predictive search and analysis capability that allows inventors and problem solvers to assess the likely value of a patent application before it is filed.

Keywords: IP, Inventive Principles, Business Strategy, TRIZ

1.Introduction

Ever since organizations have been subject to legal obligations to report the value of their intangible assets, a seeming industry of IP values has emerged. Understandably, in any industry, the initial ways in which value are measured are crude. Quite sensibly in the case of IP, the manner in which, for example, patents are filed lays open many decades of historical data that can be used to build ways and means of correlating between IP holdings and financial value. Thus it was found that there is a strong correlation between the number of times a given patent is cited by other later patents in the same industry domain and the value of that patent [1,2]. Almost all IP valuation methods thus become focused on this kind of historical analysis.

Given the inevitably slow patent process, the citation process is only able to start one or two years after a patent is filed. And then, because patent lawyers use a rigorous classification structure, a link between one patent and another is only deemed relevant if the two exist within the same internationally agreed classification codes. The big problem this in turn causes is that it completely fails to take into account that nearly every disruptive innovation comes not from a current competitor with an R&D team inventing solutions in a race with yours, but from someone outside your industry who realizes that their solution better serves the functional needs of your customer [3]. The detergent industry, to take a likely up and coming example, busy citing other detergent patents, will be disrupted by a textile industry player that creates self-cleaning fabrics.

The IP valuation industry is built on not just inadequate but the wrong foundations. From a business strategy perspective it is no wonder that the IP function is almost completely divorced – no leader can sensibly run their business with data that is two years out of date and blind-sided to disruptive threat. A patent deemed to have a multi-billion dollar value one day may overnight become worthless when a disruptive jump occurs, but the IP valuation team won't know it's happened until long after it is too late.

Back in the year 2000, the authors initiated a research program to overcome these inbuilt and fundamental problems with the IP valuation industry [4, 5]. Our focus was on building tools and measures for the strategists in the boardroom. Our motivation was to enable leaders to answer the following questions:

1) How much is my IP portfolio currently worth?
2) How will its value change in the coming months and years?
3) What are the disruptive threats that could appear from other industries, what impact could they have on mine, and what do I need to do about it?
4) What are the possibilities for me to exploit my existing IP into other industries?

In simple terms, it was all about giving leaders the ability to drive their business by looking through the windscreen rather than the rear-view mirror.

As it happens, ten years after the start of the research, the past can do a lot to help inventors to predict the future. Study over three million innovation data-points, as we now have, and you begin to see that the future is very highly predictable. Or rather it is provided the story is split into two parts: where and when. Knowing *when* a given technology jump will happen in the future is very difficult, but knowing *where* is governed by directions that are as close to laws as we're ever likely to get. Importantly then, if we know the where, we have the possibility to create the IP that gives us much more control over the when. Let's have a look at both sides of the where/when story in more detail.

2. THE FUTURE 'WHERE'

One of the simplest ways to spot patterns in the evolution of technical systems is to arrange solutions that deliver the same function in chronological order. The following example shows what happens when we do this for a computer keyboard (Figure 1):

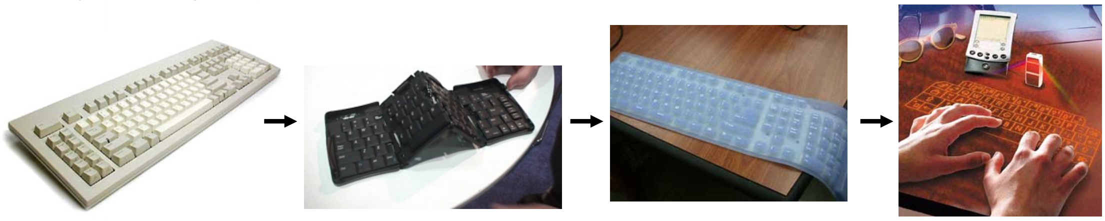

Figure 1: Evolution Of Computer Keyboard

Another example does the same for the function cutting (Figure 2). Each of the stages shown in the chronological progression represents a step-change evolution in the delivery of the function. And while the systems on the left of the progression might still exist, the value very definitely migrates from left to right, with, at each stage, some kind of conflict having to be solved. So, in the evolution of 'cutting', the various stage jumps in turn tackle problems of speed, accuracy, tool-wear and flexibility of use/elimination of waste.

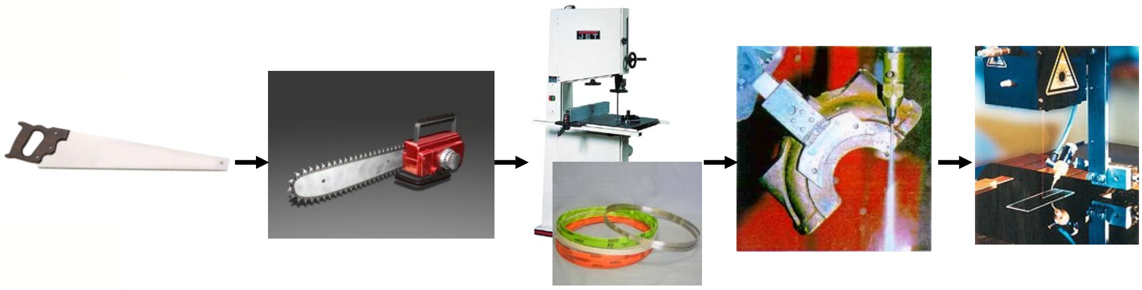

Figure 2: Evolution Of 'Cutting' Technology

Repeat this kind of analysis a few thousand times and a pattern very clearly emerges. It looks something like the progression shown in Figure 3:

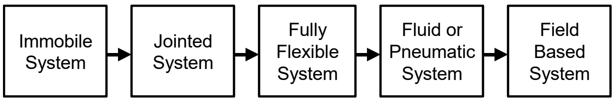

Figure 3: 'Dynamization' Evolution Trend

It is a trend describing how technical systems become progressively more 'dynamized'. It turns out to be one of thirty seven other similar trend patterns, each describing a different aspect of how systems have evolved [6]. The big advantage this offers is that if we take our own system – say we are designing the wing of an aircraft – and see that it is not at the end of the trend, then we immediately have a good idea where it is likely to evolve in the future. Aircraft wings are currently a 'jointed system' (second stage of the trend) and are thus highly likely to jump in the future to a 'fully-flexible' system. We can say this with some certainty because, the trend tells us, tens of thousands of other systems have solved conflicts and been successful by making exactly the same jumps.

When we examine a given system – like a wing – relative to the other trends that the research has uncovered, we can very quickly derive a snapshot view of how far that system has evolved in terms of some kind of universal 'evolution potential' measure. In our research, we tend to draw such evolution potential maps in the form of a radar chart [7]:

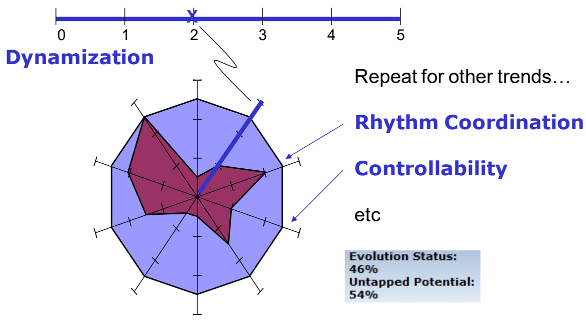

Figure 4: Evolution Potential Radar Plot Construction Method

3. THE FUTURE 'WHEN'

Knowing where things will evolve in the future represents a good start in terms of an IP valuation capability, but in order to give sensible strategic information, we also need to be able to acquire an objective means of assessing the when. The outcome of our research into this timing question has revealed two key factors:

1) How quickly the industry has been jumping in the past, and,
2) How many hierarchical levels exist between the current system type and a future 'ideal' state.

We can examine the second of these two by looking at how the forces of competition drive all industries towards more ideal solutions. The following example examines evolution within the laundry industry (Figure 5). On the left of the picture are the three main industry players together delivering the function 'cleaned clothes'. On the far right hand side is the ultimate solution – the function gets delivered (i.e. the clothes get cleaned in this case) with zero cost and zero negative side effects. The ultimate solution – except if you earn a living making detergent or washing machines – is that the clothes clean themselves. The moment consumers are convinced that such a solution actually works, inherently there is no place for either detergent or washing machine anymore. In such a world – which, thanks to the competitive pressures within the textile industry, is not too far away – the future value of detergent or washing machine IP rapidly tends to zero.

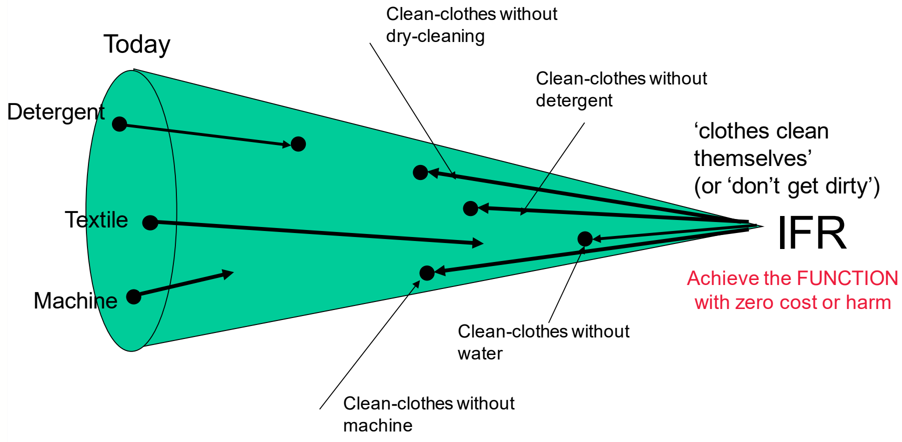

Figure 5: Players And Evolutionary End-Point Of Laundry Function

The main point here is that, as illustrated by the cone in the picture, system evolution is convergent, and in a convergent world there are inevitable losers. And moreover given a choice between detergent, machine or textile, it is extremely clear that there is a hierarchy with textiles at the top, then machines then detergents. A washing machine that cleans clothes without detergent is likely to displace even the best detergent, just as, in turn, even the best washing machine will not prevail over a self-cleaning textile fabric. As is usually the case, the threats to an industry tend to come from outside the industry.

It is relatively easy to construct this kind of conical evolution map for any industry in order to establish the hierarchy of winners and losers. What we still haven't worked out at this stage is *when* a player is likely to take-over a player lower down the hierarchy. The timing calculation is long and involved, depending to a high degree on the whims of the end customer [8, 9]. We can, however, make a significant step towards the timing answer by examining the rate at which an industry has been making jumps in the past.

The way we do this involves the evolution potential concept again. Only to obtain timing information, it is necessary to see how quickly systems at each hierarchical level are making jumps along each of the trends (Figure 6):

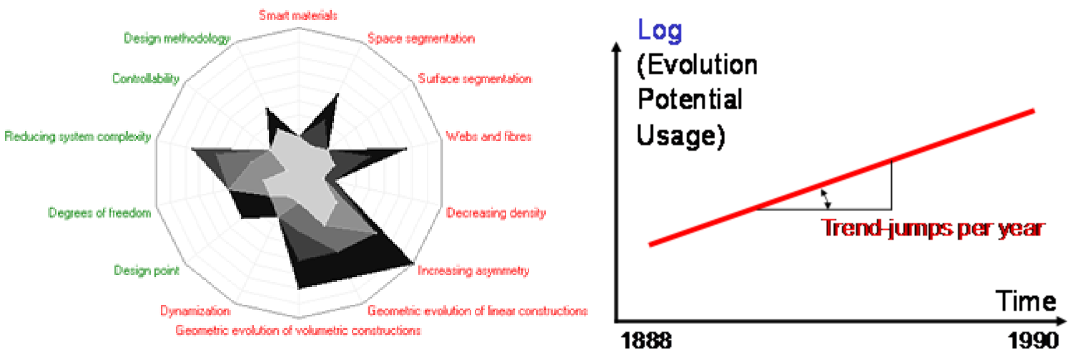

Figure 6: Evolution Potential And Relation To Innovation Timing

Knowing then that, say, the textile industry can be expected to make a step-change jump every five or so years (not quite this simple since we typically have to draw the jump-rate picture on a logarithmic scale), then we have a much clearer idea of how much longer the washing machine and detergent industries have before they become redundant.

4. TOWARDS A FUTURE-FOCUSED IP QUALITY MEASUREMENT CAPABILITY

The above tools and measurement methods provide an objective means of calculating the likely 'where's and 'when's of an industry and the IP held within that industry. The calculation, however, still requires a deal of creative thought and involved analysis. A typical analysis for an IP family will take around 4-6 weeks to answer the questions detailed earlier in this paper. The process is made possible thanks to having a database of three million radar plots and previous analyses, but it is not exactly an interactive analysis that permits live scenario planning activities to take place.

In order to solve that particular problem, we have built a number of fully automated IP value assessment algorithms built on the findings accrued from the three million data-points. Because the measurement needs to be future-focused rather than historical, we have considerably down-graded the significance of traditional measures of IP quality like citations, classifications and litigation. Instead, we have built search tools that take advantage of evolution trend information like the earlier 'dynamization' trend [10]. By searching through the IP database looking for functional use of key words like 'joint', 'flexible', 'pneumatic', 'field', etc it is possible to rapidly assess the maturity and number of jumps that a current solution hasn't made yet. A more comprehensive set of search terms, emerging from the other trends is provided in the Appendix.

The output from the machine assessment measures IP against two important dimensions; the first looking at its current strength; the second looking at future potential:

Current Value Index – in this dimension we mine, for example, patent text looking for key-words that make the solution easy to circumvent. We have also identified a number of other correlating 'strength' factors such as number of independent Claims, length of Claim text, presence of quantified data, etc.

Future Value Index – this dimension very specifically uses the aforementioned trend keywords, but we also make a TRIZ-based (subject-action-object) semantic search looking for function words in order that we can establish a hierarchical position of the IP under investigation relative to a universal hierarchy of functions.

The resulting output is typically plotted as shown in Figure 7.

The plot divides the IP world into four distinct domains:

Duds – these are the solutions that deliver little or no value to the organization either currently or in the future, and as such are candidates for not spending more money preserving.

Rembrandts – are solutions that have little current value, but have potentially high value in the future due to the possibility that the technology may be transferred to other domains, or the solution is likely to take over the function of something lower in the universal function hierarchy.

Blindsiders – these are simultaneously the most valuable of an organizations current assets, but due to their low future value index are the ones most likely to blind-side an organization to future disruption by alternative technologies or higher level functional solutions

Stars – these are the solutions with both a high current and future value index. These are patents that are particularly well written and have anticipated as many of the future trend jumps as are achievable with current capabilities.

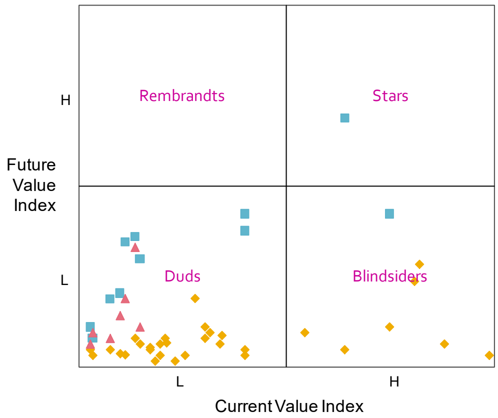

Figure 7: Current/Future IP Value Measurement Framework

The main purposes of the output is to first of all benchmark the IP of different players within an industry, or within a certain function. Looking within the portfolio for an organization, it is then aimed at providing portfolio management information – which are the things that can be dropped, ring-fenced or nurtured for example. Because the analysis is forward looking, its biggest value comes when used in conjunction with the trend information. In this role, it becomes possible for inventors and IP generators to assess the Future Value Index of a patent application before it is submitted. In this way, a piece of IP with a low score can be identified early and the inventor is able to look at the un-exploited trend jumps and determine which should then be incorporated into the invention disclosure.

It is still early days for this kind of forward-looking IP measurement tool, and as such the algorithms are still being optimized over the course of a series of client engagements. Readers are invited to explore the tool at [11]. Even in its current form, however, we believe that it already delivers previously unheard of levels of strategic capability to leaders. Just as we might not like what we see when we look through our windscreen, it has to be a better way of driving than spending the whole time looking in a rear-view mirror.

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APPENDIX

	Trend/Principle	**Patent Search Words**
1	Segmentation	split, segment, multi-, constituents, divide,bi-furcate, staged, nano, micro, particle, powder
2	Taking Out/Separation	separate, extract, remove, comparator
3	Local Quality	local, rib, protrusion, groove, channel, non-homogenous, (non-)uniform, isolate, keyway, zonal, hierarchical, gradient, layer, differential, partial, window, nano, micro, (up/down)stream, logarithmic, rough, smooth, spot
4	Asymmetry	asymmetry, Poke-Yoke, ergonomic, unequal, eccentric, cam, directional
5	Merging	merge, integrate, combine, multi, mix(er), blend, bi-, tri-
6	Universality	universal, standard, ISO, BS, Def Stan, plug, socket, protocol, language
7	Nested Doll	nest, telescopic, sleeve, hierarchical, retract, stack, tunnel
8	Counter-Weight	(counter-)balance, lift, buoyancy, aero-, hydro-
9	Prior Counter-Action	sequence, buffer, pre-, prior, preliminary, partial, mask, reverse, retard, expend, deform, surge, choke
10	Prior Action	prior, preliminary, partial, pre-, early, late, sequence, reverse, post, store, temporary
11	Beforehand Cushioning	emergency, back-up, relief, spare, temporary, (non-) linear, fail, graceful, benign
12	Equi-Potentiality	equal, balance, tension, spring, pre-, flow, compress, release
13	Other Way Around	reverse, opposite, unconventional, surprising, unexpected, upside-down, inside-out,
14	Curvature	curve, spiral, rotary, circular, twist, centrifugal, fillet, radius, helical, parabolic, hyperbolic, screw, sphere, orbital, ball, arch, dome, conical, flare, spin, vortex, cyclone, coil
15	Dynamize	dynamic, stationary, design-point, optimize, variable, flexible, rigid, stiff, relax, free, adapt
16	Slightly Less/Slightly More	over-, under-
17	Another Dimension	non-planar, conical, frusto, serrate, scallop, stack, (re-)orient,
18	Vibration	vibrate, ultrasound, resonance, hammer, piezo-, sono-, oscillate
19	Periodic Action	pulse, pendulum, timer, frequency, variable, rhythm, mode
20	Continuity Of Useful Action	template, constant, pace, continuous, optimum
21	Skipping/Hurrying	Instant, flash, drop, critical, explode, shock, accelerate
22	Blessing In Disguise	waste, vaccine, unexpected, surprising, explode
23	Feedback	feedback, sensor, control, Fourier, monitor, proportional, integral, differential, adapt, intelligent, damp
24	Intermediary	intermediary, liner, guard, layer, (inter-)connect

25	Self-Service	self, auto(matic), intelligent, waste
26	Copying	optical, virtual, shadow, reflect(ion), UV, IR
27	Cheap Disposable	disposable, cheap, replace
28	Mechanics Substitution/ Another Sense	electrical, magnetic, laser, nuclear, optical, wireless, scent, aural, acoustic, visual, kinaesthetic, gastric, (micro)wave, field
29	Fluids & Pneumatics	fluid, hydraulic, pneumatic, gel, plasma
30	Flexible Shells & Thin Films	film, shell, coating, sheath, inflatable, liner, leaf, web, sail, thread, fibre
31	Holes/Porous Materials	hole, pore, void, foam, cavity, transpiration
32	Colour Change	colour, emissivity, pattern, camouflage, IR, UV, transparent, -chromic
33	Homogeneity	Homogeneous
34	Discarding & Recovering	discard, recover, dissolve, retrieve, lost
35	Parameter Changes	pressure, temperature, concentration, viscosity (think of any parameter relevant to the subject you are interested in)
36	Phase Transition	phase, melt, boil, freeze, vapour, latent
37	Thermal Expansion/Relative Change	thermal, bi-metallic, relative
38	Strong Oxidants	oxidise, oxygen, reduction, ozone, ionize, radiate
39	Inert Atmosphere	inert, vacuum, isolate, flash, damp, absorb, retard
40	Composite Materials	composite, multi, filler, fibre, hierarchical, (inter-)layer, grid, pattern, ratio

AUTHOR BIOGRAPHY

Darrell Mann is an engineer by background, having spent 15 years working at Rolls-Royce in various long-term R&D related positions, and ultimately becoming responsible for the company's long-term future engine strategy. He left the company in 1996 to help set up a high technology company before entering a program of systematic innovation and creativity research at the University of Bath. He first started using TRIZ in 1992, and by the time he left Rolls-Royce had generated over a dozen patents and patent applications. In 1998 he started teaching TRIZ and related methods to both technical and business audiences, and to date has given courses to more than 3,000 delegates across a broad spectrum of industries and disciplines. He continues to actively use, teach and research systematic innovation techniques and is author of the best selling book series *Hands-On Systematic Innovation*. Contact Darrell Mann at darrell.mann (at) systematic-innovation.com or visit http://www.systematic-innovation.com.

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