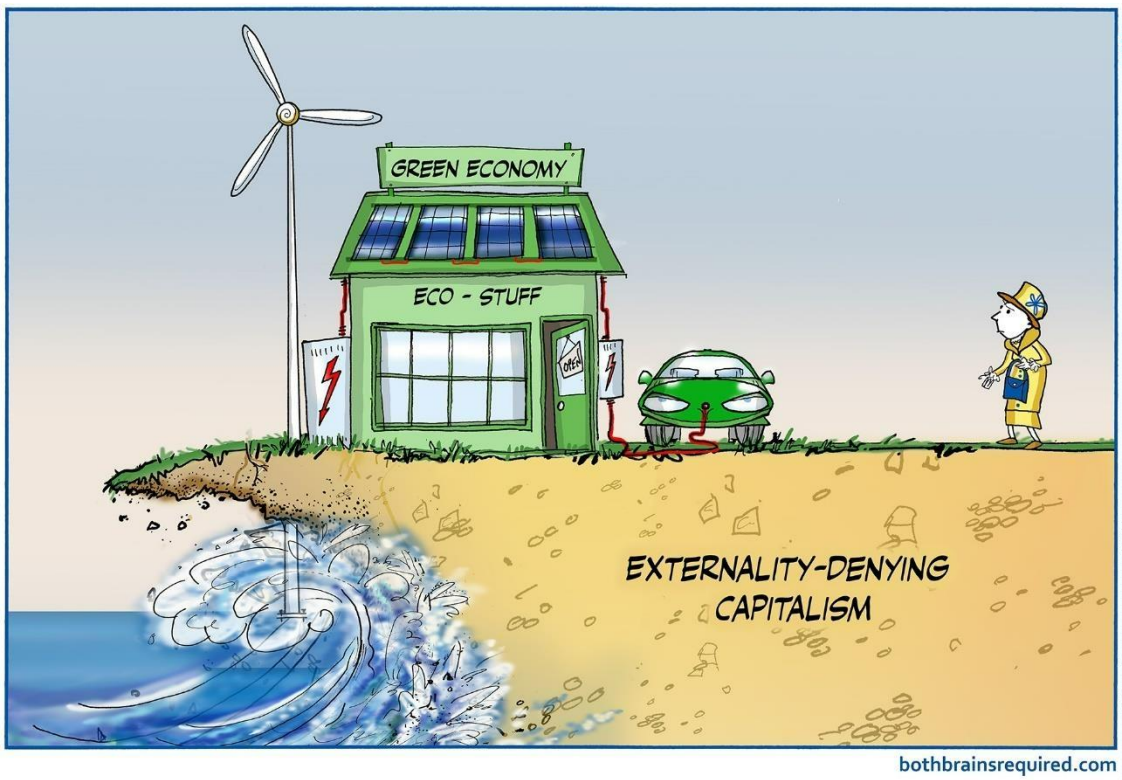
Market-led Sustainability is a 'Fix that Fails'…

… but It May Have Been the Necessary 'Defence at First Depth'



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Summary

* We are a complex system – 'humankind' – in adaptive crisis. All our Voluntary Market-Led (VML) strategies to date – SRI, CSR, ESG, impact, divestment etc. – amount to merely a first response.

* After 25 years, VML strategies exhibit the systems pattern known as a 'fix that fails' - an apparent first-order fix that leads to a delayed or less apparent fail.

* Many VML 'solutions' exhibit rebound and backfire effects, while a discourse 'fix that fails' pattern sees enthusiasm for market-led solutions continuing to divert energy, attention and resources from policy and cultural change.

* More encouraging, though not easy, is that complex systems adapt via a layered response. VML has been a 'defence at first depth' – all we could initially tolerate, and not unhelpful, but now signalling insufficiency. We must graduate from shallow VML strategies to deeper forms of change.

* VML is a 'fix that fails' because externality-denying capitalism is the underlying 'fix that fails'. We do not refer to the prevailing socio-economic system as 'externality-denying capitalism', but that is its proper description. Externality-denying capitalism is not a safe operating system for humankind. Including right now.

* A root cause of our sustainability crisis is that Western thinking has not achieved *sustained acceptance* – very different from *theoretical admission* – of the scale of market externalities, and what that implies for claims made about the superiority of market-led coordination.

* While the market has a beneficial Invisible Hand, it has also always had an Unmentionable Foot. We have celebrated the former, but, well, chosen not to mention the latter.

* The great hope of VML was that there would be a *business case for sustainability*. But if sustainability must mean 'sustainable enough before it is too late', there just is not much of a business case to draw on. Instead, the *moral case for sustainability* will have to carry most of the load from here.

* Policy and culture are prior to markets. The specific problem with the term 'capitalism' is that its mere utterance upholds the entrenched view that markets have primacy over policy and culture, which just locks in the externality-denying capitalism we currently practice.

* While all this is challenging, it may be easier to accept if seen as the sort of meta-learning the complex system of humankind must engage in if we are to adapt before it is too late.

* A powerful catalyst for a more sustainable human future would be for VML practitioners who have sincerely tried to make VML strategies work, but who have seen first-hand the limitations, to declare that 'markets cannot solve this', as an attention-focusing action of the highest order.

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1. WE ARE A COMPLEX SYSTEM IN ADAPTIVE CRISIS

The sustainable business movement is a prolific generator of new terms. From SRI to ESG to impact, now to TCFD and TNFD and Net Zero, one can easily be overwhelmed by detail. At such a time, we might take heed of Wittgenstein's advice:

> *'Don't get involved in partial problems, but always take flight to where there is a free view over the whole* single *great problem, even if this view is still not a clear one.'*[1]

What does the 'whole single great problem' of sustainability look like? I believe something like this:

Over the last half century, a largescale complex adaptive system – 'humankind' – has suddenly noticed and begun responding to a new sense of its external context. We have abruptly perceived that our surroundings are finite and fragile and that we have attained the numbers and technological capacity to destabilize those surroundings in their entirety in harmful and irreversible ways.

In other words, we are a complex system suddenly pitched into adaptive crisis.

We are gleaning that the crisis is multidimensional. We are threatened not just by human-induced climate change, which has been relatively easy to identify and comprehend, but also by human-induced destruction of planetary ecosystems, whose dynamics are more complex. Hence, we are in the early stages of accepting that our challenge is not merely to decarbonize but rather to ecologize. A 'climate solution' that is an 'ecological problem' may prove to be no sustainable solution at all.

There is growing awareness, too, that an adaptive crisis is necessarily a 'race against time'. The 1.5°C and 2°C targets advanced by climate scientists and the resulting flurry of net zero commitments have crystallized that the task is not to become 'more sustainable' but to become 'sustainable enough before it is too late'. For all our familiarity with personal and professional deadlines, the daunting implication is that the whole global economy is now on deadline. And while we instinctively respond to deadlines with urgency, biophysical limits mean we must be wary of haphazard urgency. The creation footprint of a 'green' economy, and the 'business as usual' activity that occurs in the meantime, may itself lead us to transgress irreversible thresholds. The wicked combination of temporal and physical constraints means we already have limited room for manoeuvre to fashion a global transition that is also just.

Our short individual lives make this all hard to grasp, but the situation becomes clearer with a longer time perspective. A Twitter meme goes as follows. Earth is about 4.6 billion years old. If one rescales that to a more relatable 46-year timeframe, our ancestors first controlled fire 24 hours ago, invented agriculture an hour ago and initiated an Industrial Revolution and a 'Great Enrichment' just over a minute ago. With a short lag, a 'Great Acceleration' of environmental damage began 20 seconds ago, prompting us to formulate the idea of the 'Anthropocene' 7 seconds ago. Aptly, this has been described as the 'shock of the Anthropocene' - a shock to the complex system that is humankind.[2]

A Voluntary Market-Led (VML) First Response

Accordingly, though our roughly 6-decade response to global environmental challenges – since Rachel Carson and others alerted us in the 1960s – is a long time for an individual human being, from the perspective of the complex system of humankind, all our efforts to date constitute merely the first adaptive responses we have been able to implement in short order. The form of this emergency response has necessarily been constrained by the patterns of collective behaviour we had arrived at

before recognizing our new context, for reasons that have nothing to do with the new context. It is a crisis precisely because it has not found us prepared – behaviourally, organizationally, even cognitively.

Predominantly a Voluntary Market-led (VML) response

What has been the nature of this first response? Of course, it has been multi-faceted, but as befits our market-centric modern society, it has come to be dominated by **voluntary market-led** strategies under various banners – ethical investing, socially responsible investing (SRI), corporate social responsibility (CSR), environmental, social and governance (ESG) initiatives, impact investing, divestment campaigns, reporting and disclosure frameworks, corporate engagement efforts, stakeholder advocacy and more. (See Figure 1).

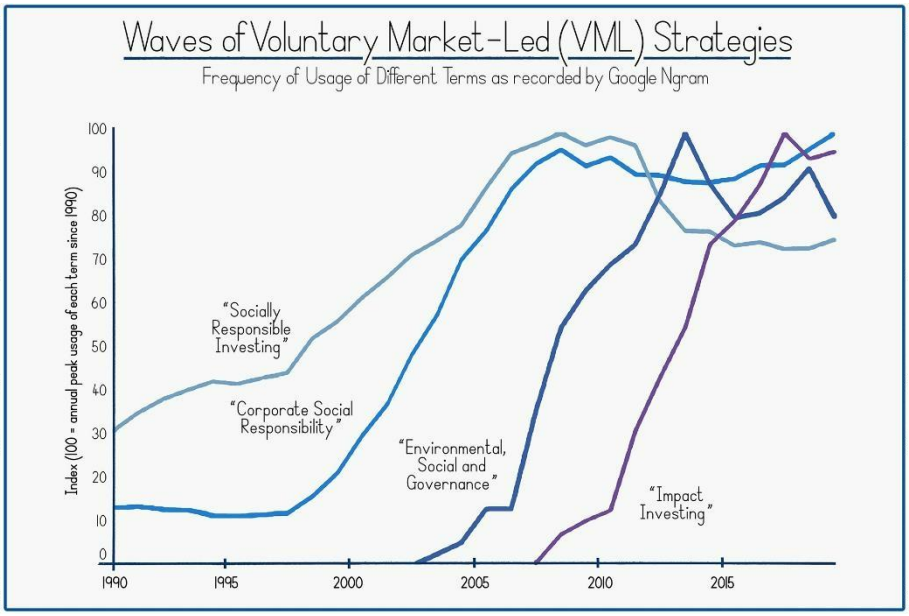


Figure 1: Waves of Voluntary Market-Led (VML) Strategies

Critically, despite the apparent differentiation, these initiatives are all sub-strategies of an overarching voluntary market-led meta-strategy. The unifying premise is that voluntary behaviour changes within established market frameworks will be sufficient for us to become sustainable before it is too late, without recourse to undesirable policy or regulations.

While the last thing we need is yet another sustainability acronym, for the purposes of this essay I will use VML to signify this meta-strategy that has been our predominant response to date to the sustainability crisis. (Often, the term 'ESG' carries this larger connotation, but because certain market-led strategies distinguish themselves from a narrower conception of ESG investing, I am keen to have a term that unambiguously spans the whole universe of voluntary market-led strategies and eliminates room for claims that any of the strategies listed above are not market primacy-reaffirming in their essence).

Defining VML

VML is most easily defined by what it opposes. 'Voluntary' denies, or at least strongly opposes, the need for enforceable regulations and policies to achieve sustainability goals. 'Market-led', implicitly upholds the idea that the key market dynamics of profit maximization and economic growth are not only not impediments to sustainability but critical drivers of the solution. 'Voluntary' and 'market-

led' go hand in hand because the regulations that 'voluntary' seeks to prevent are only likely to have meaningful impact by explicitly constraining certain profit and growth streams contrary to the fundamental faith in market dynamics that 'market-led' represents.

VML's slogans include: 'sustainability is a win-win', 'good for profit and planet', 'doing well by doing good', 'green growth', 'shared value', 'sustainable outperformance', and more. They express the hope that the allocative and innovative dynamics of the market system can be harnessed powerfully enough and fast enough to create a sustainable human culture. Explicitly or not, 'win-win' is baked into every corporate sustainability pitch and sustainable fund manager claim.

Emergence of VML

It is important to recognize that VML emerged as our predominant adaptive strategy from the mid-1990s, not out of any confidence that it would be a sufficient response, but because it was the only scalable response established Western socio-economic norms could tolerate at that time.

In fact, the very first response to awareness of regional and global environmental problems, predating VML, was a flurry of policy and regulatory initiatives through the 1970s and 1980s, reaching a high point of the 1987 Montreal Protocol to control CFCs, now ratified by 197 countries.

However, as the cost of early regulatory efforts began to be felt and as the much larger – and more expensive – problems of climate change and biodiversity protection rose into view, a coalition of largely US corporations organized to oppose environmental policies strenuously and effectively. Their signal victory was to undermine the Kyoto meeting in 1997, where hopes for preliminary binding international carbon regulations were dashed.

Corporations of the time were empowered to thwart environmental policy efforts by a buoyant neoliberalism then spreading through Western societies for political and intellectual reasons that entirely predate awareness of the sustainability crisis. The essence of neoliberalism is that 'markets are the solution, government is the problem'. Seemingly reinforcing this idea were early anecdotal claims of businesses beginning to solve environmental problems in profitable ways, through eco-efficiency measures or new green innovations. Reading the political winds of the time, many groups – including NGOs, foundations, and left-leaning politicians – that might otherwise have continued to press for policy-led solutions instead threw their weight and reputations behind VML strategies.

In short, a major pattern of the last 50 years is that a long-gestating neoliberalism captured a fledgling environmentalism and VML's 'win-win' proposition was about all the environmentalism we could muster. The question today is whether this VML adaptive response can generate 'enough sustainability before it is too late'.

VML as success…?

Twenty-five years after it began to scale in earnest, VML would seem to be flourishing by many metrics. Some examples:

Financial assets managed under sustainable mandates have skyrocketed – even allowing for some recent exaggeration of sustainability claims. The Global Sustainable Investment Alliance reports that 36 percent of global assets are now managed sustainably and have grown 55 percent in just the last four years.[3]

The flagship divestment movement, 350.org, has succeeded in persuading 1,300 asset owners to pledge nearly $15 trillion not to be invested in fossil fuel and related industries.[4] As of September 2021, their ranks now include long-targeted Harvard University with its $42 billion endowment.[5]

A B-Corps movement that encourages firms to create value for all stakeholders, not just shareholders, now has 3,500 certified members in 70 countries.[6]

After Dupont was the first company to appoint a Chief Sustainability Officer (CSO) in 2004, 95 of the world's largest public companies now have CSOs in place.[7]

The Task Force on Climate Disclosure (TCFD) – among the latest in a long line of corporate reporting frameworks – now boasts participation from 1,340 companies with a combined market capitalization of $12.6 trillion and including financial institutions responsible for assets of $150 trillion.[8]

Such metrics represent a considerable and accelerating effort to scale VML strategies globally, but these metrics – and many others routinely cited as indicators of VML's success – are overwhelmingly measures of the *uptake* of VML strategy, not its *impact*.

…while environment deteriorates

In contrast, the real-world backdrop sees ongoing deterioration in most of the global environmental metrics.

Global CO_2 emissions are now 49 percent higher than they were in 1997, the year of the failed Kyoto meeting. Though 2020 saw a 6 percent drop in global emissions on account of the COVID-19 pandemic, virtually all of this drop looks set to be reversed in 2021.[9] A September 2021 IPCC report shows that we are on track for a disastrous 16 percent increase in global emissions by 2030, dangerously far from the 45-50 percent emission cuts required to have a likely chance of stabilizing at around a 1.5°C increase in global temperature.[10] (Indeed, on the trajectories of announced national plans, there may now be less than a 1 percent chance of keeping temperature below 1.5°C, though there is understandable reluctance to give up on a highly symbolic target just yet.)[11]

Though climate change has dominated the sustainability discourse, the deteriorating state of the global ecosystem is also becoming more widely understood. The Dasgupta Review of February 2021 brought a welcome rebalancing of attention to equally worrisome trends regarding biodiversity, noting that between 1992 and 2014, the stock of natural capital per person declined by nearly 40 percent.[12] WWF has reported that population sizes of mammals, birds, fish, amphibians, and reptiles have fallen an average of 68 per cent globally since 1970.[13] The planet's largest single ecosystem – the ocean – may not command the attention it should. The oceans are slowly but surely becoming more acidic as a result of extensive chemical usage, threatening the health of marine plants and animals, which in turn compromises the oceans' ability to regulate the global climate.[14] Dawning recognition of the need to solve simultaneously a climate and a biodiversity crisis was crystallized by the first joint meeting of the two responsible intergovernmental bodies – IPCC and IPBES – in December 2020.[15] (Only now?!)

Moreover, though the principal focus of this essay is our ecological challenge, there is a connected story of local and global social inequities persisting even despite our growing wealth, for the same fundamental reason that market solutions may not be the panacea we thought.

It's not working

While the VML meta-strategy has certainly delivered gains that would not otherwise have occurred – in accelerated green innovations, widespread awareness, and incremental behaviour change – after 25 years, it is becoming apparent VML cannot generate 'enough sustainability in time', which is increasingly the only interpretation of sustainability that matters.

Basically, our first response strategy does not seem to be working.

2. VML IS A 'FIX THAT FAILS'

If VML is the 'first response' of a complex system to an abrupt new awareness of context, certain concepts developed to understand complex systems can help us identify the type and extent of response VML has been and what its limitations now point to.

What I will call 'systems thinking' – sometimes also 'complexity science' or the study of 'complex adaptive systems' – is now inexorably and beneficially on the rise as a counterpoint to the reductionism that has underpinned Western thinking for the last 350 years. Systems thinking promises to round out our comprehension of the world, particularly of living systems, in ways that may prove critical for achieving human sustainability. With the rise of systems thinking, not only can we better understand complex ecological systems upon which we depend, but also we can understand ourselves as a still emerging and adapting complex system. In turn, not only does such thinking help us identify the weakness of the VML strategy, but it also sheds light on developments in human cognition that led us to believe – erroneously – that VML might be a sufficient response.

Systems thinking invites two high-level conclusions about the VML strategy – helpfully both alliterative. First, the tool of Causal Loop Diagrams suggests that VML is a '**fix that fails**' – an ubiquitous pattern in which genuine 'fix' actions are offset or even completely overturned by unintended 'fail' consequences.

More encouragingly, reflecting on the layered adaptive architecture of complex systems reveals that VML has been a possibly inevitable, not unhelpful '**defence at first depth**'. Complex systems adapt by working through 'fixes that fail' until they land upon a deeper 'fix that works'. It is within our capabilities to adapt in this way, but it implies we must graduate quickly from the initial shallow response of VML to deeper responses of policy and culture change that now offer the only realistic means of averting climate and ecological crisis in time. Because the nature of these deeper changes conflicts with certain premises of the VML strategy – particularly VML's compromised ability to advocate for economic growth-reducing demand-side measures – initiating such changes requires the conscious giving up of certain beliefs and claims made for VML. As such, among the individuals who can most powerfully and credibly trigger the transition to deeper changes are precisely those individuals who have historically promoted VML strategies, whose public 'change of mind' might now constitute a disproportionately powerful signal of the limitations of our first response.

Causal Loop Diagrams

One of the earliest tools developed to describe complex systems was the Causal Loop Diagram (CLD), pioneered by Jay Forrester of MIT in the 1950s.[16] The basic insight is that a complex system consists of continual processes by which parts of the system influence each other. If one part of a system (A) is in causal relation to another part (B), A either acts to 'reinforce' or make more of B happen, or to 'balance' or make less of B happen. (If A had no effect on B, it could not be said to be in a direct causal relation to B). Hence, one can begin to grasp the key dynamics of a system by mapping these relationships – connecting elements with either reinforcing (+) or balancing (-) lines. In turn, these lines connect to form myriad feedback loops – reinforcing and balancing – that give a system its overall dynamic. (See Figure 2, for example).

These diagrams can be intimidating to the novice – largely because they viscerally convey the complexity of systems most of our conventional diagrams and mental models seek to avoid! In a sense, systems thinking encourages us to see the world as the 'lots of loops' it really is, not just the one or two lines of many other diagrams. There is, of course, a limit to this and it would be wrong to assume that CLDs are a cure-all. In practice, to navigate a complex world, we are forever consigned to 'reduce' it to a manageable model we can hold in mind. As such, even a complicated CLD must still be a simplification of reality, *but it represents a conscious choice to embrace the complexity and perhaps submit to it, not run from it as many other diagrammatic choices lead us to do*.

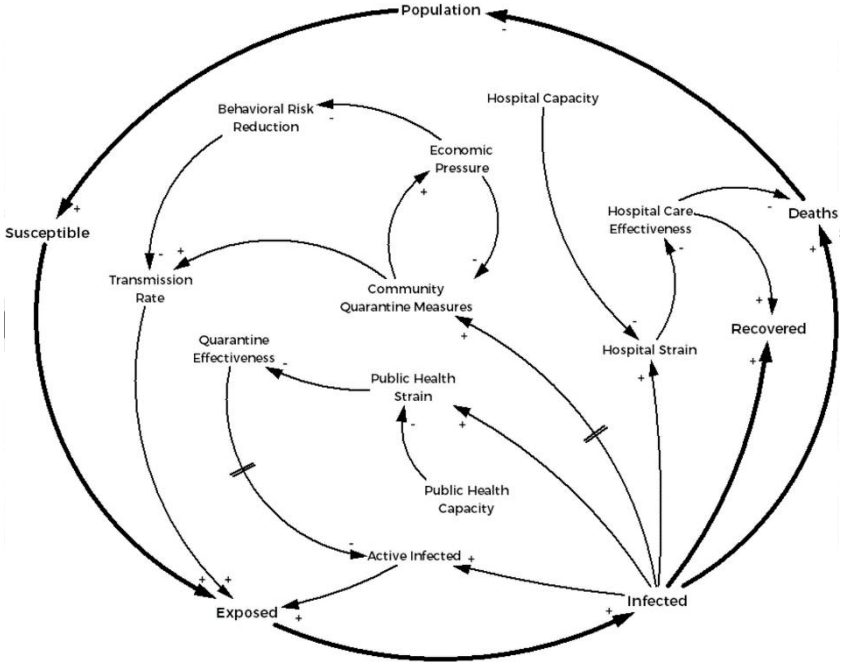


Figure 2: Example of a Causal Loop Diagram: the public health dynamics of a pandemic. (Sy et al, 2020)

How an entire system comes to behave depends on how the reinforcing and balancing loops evolve over time. 'Positive' or reinforcing loops destabilize systems – think of stock market bubbles or vicious spirals – while 'negative' or balancing loops modulate a system – think of a thermostat preventing a house from getting too hot or too cold.

At any time, the overall dynamic of a system depends on whether the reinforcing loops or the balancing loops have the upper hand. In the former, the system as a whole begins to dysregulate, and to fall into a runaway state. Alternatively, if the balancing effects dominate, the system exhibits balance or homeostasis. The adult human body, for example, is a very complex system, whose health – 'sustainability' – results from its continual pursuit of homeostasis – not too hot, not too cold; not too high or too low a blood pressure; the right amount of hydration, etc. The adult body is a marvel of homeostasis – at least until its terminal dysregulation when a pathology achieves a runaway momentum beyond the body's powers to repair.

Systems archetypes

Draw enough of these diagrams and you eventually notice the same sub-patterns, or 'chunks', of causal loops repeatedly appear. Effectively, there are only a limited number of ways you can combine a few variables with reinforcing or balancing connectors. To fix the oft-recurring patterns in mind, early systems thinkers, such as Donella Meadows and Peter Senge, mapped them and invented

memorable labels: e.g., 'success to the successful', 'tragedy of the commons' etc.[17] (See Figure 3). These archetypes may sum up the character of an overall system or a sub-dynamic within a larger system. Once you've understood how an archetype works in one system, you know how it works in another. (Incidentally, this is possibly one of the central skills of polymathism. Polymaths may be less the peerless Big Brains of popular imagination and more just specialists of pattern, fated to wander the campus because there has been no specific department for their speciality).

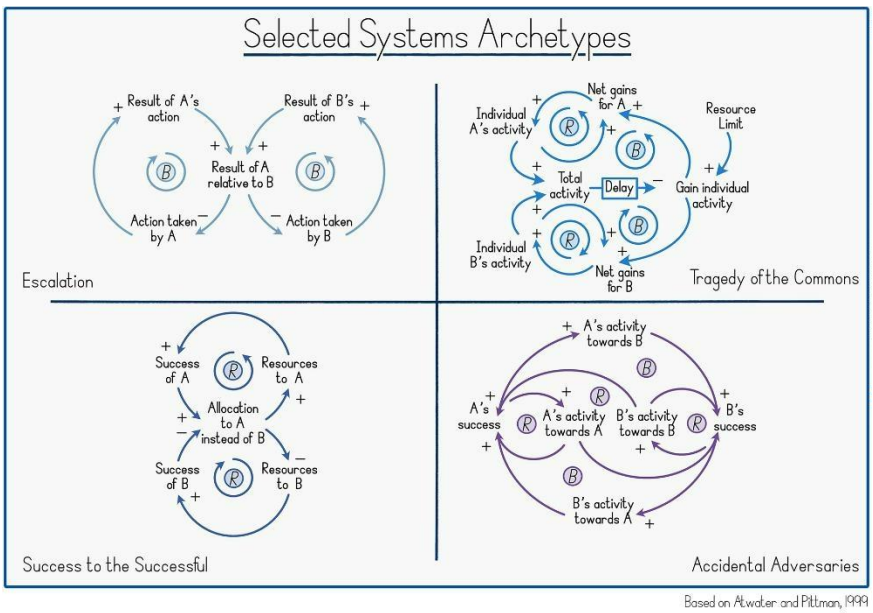


Figure 3: Selected Systems Archetypes

Alas, the archetype that appears to best describe the VML strategy is a 'fix that fails', in which a first-order solution triggers a less apparent or delayed, second-order unintended consequence.[18]

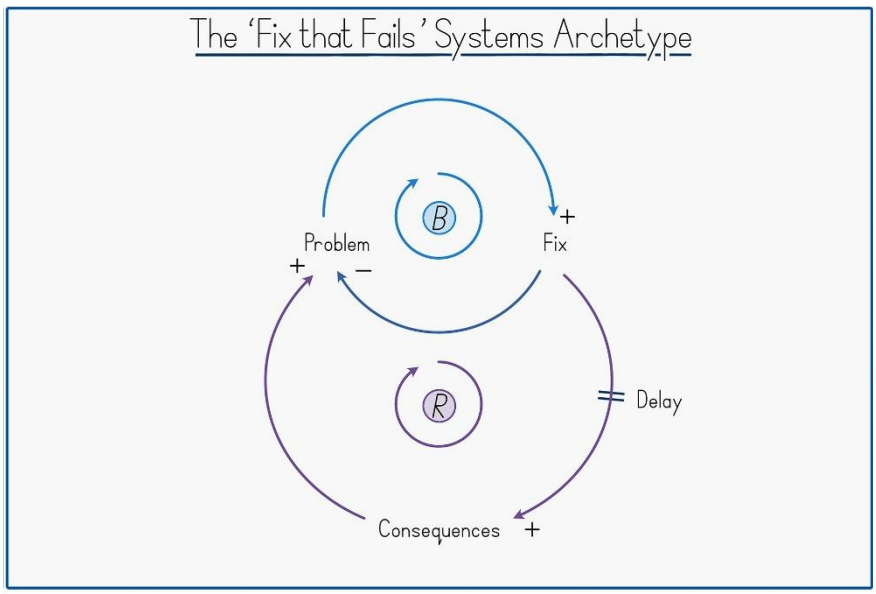


Figure 4: The 'Fix that Fails' Archetype. A top loop 'balances' an initial problem. ('The problem leads to more of a fix that leads to less of the problem'). However, it is offset by a second, delayed, loop that only reinforces the initial problem ('The fix leads to consequences that lead to more of the problem').

All diagrammatic choices have strengths and weaknesses. While the strength of CLDs is their illumination of causal relations, one weakness is they cannot convey the relative strength of different loops, so it becomes an empirical matter whether the aggregate dynamic is more fix than fail (a 'rebound') or more fail than fix (a complete 'backfire'). In the latter, the 'fix' is worse than useless and not worth doing. But, even in the milder rebound case, if the fail loop significantly stalls the rate of overall fixing, the net result may be a fix that is *not fast enough to meet a deadline*, and hence an adaptive fail nonetheless. This is why it is critical to view the sustainability challenge as not being 'more sustainable than before' but being 'sustainable enough before it is too late'.

Project Fixes that Fail

VML can be viewed as a fix that fails on two levels – at the project level and the discourse level.

At the project level, many of the solutions advanced by VML strategies suffer from rebound or even backfire effects whereby initial environmental benefits are either offset or completely overturned by environmental damages elsewhere in the supply chain or broader economy.

EVs are 'fix' and 'fail'

Current debate about the environmental benefits of electric vehicles (EVs) over internal combustion engine (ICE) cars highlights how climate and ecological rebound effects compromise a 'solution'. For example, EVs' advantage over ICEs in usage is offset to some degree by the higher carbon footprint of battery production. Just how much is very sensitive to assumptions about where a car is produced and driven but vary from large – Volvo and VW report that some of their EVs only 'break even' in GHG terms after 6 or 9 years – to relatively trivial – a Nissan Leaf breaks even after 2 years, en route to emitting 3 times less carbon emissions than an equivalent new ICE over a 12-year lifetime.[19]

To the climate calculus must also be weighed the potential ecological cost of EVs. IEA finds that an electric car demands six times the mineral inputs of a conventional car.[20] These quantities add up. *For the UK alone* to meet its EV targets for 2050 would require 'just under two times the current total annual world cobalt production, nearly the entire world production of neodymium, three quarters the world's lithium production and 12% of one year's total annual production of mined copper.'[21] Hard rock mining never occurs without serious pollution. We are also storing up a major end-of-life problem given that as few as 5 percent of EV batteries may be currently recycled.[22] We can either keep recycling rates low and exacerbate waste disposal problems or increase rates at the cost of a higher energy footprint – the intrinsic problem being that EV batteries must be designed to withstand the rigours of thousands of miles of driving, not for easy disassembly.[23]

To the extent that the EV is a 'sustainability solution' – not just a 'climate solution' – it is not clear-cut, so much as a complex life-cycle accounting exercise. Moreover, to anticipate the next section, the ubiquitous EV-versus-ICE framing constitutes a *narrative* 'fail' because it tacitly reinforces that the car is not the problem that needs solving. This, of course, is as car manufacturers would wish – 'If they can get you asking the wrong questions, they don't have to worry about the answers' (Thomas Pynchon).[24]

More than EVs

It is not just EVs. Rebounds and backfires plague many of the components of an envisaged 'clean economy', as Derrick Jensen and colleagues have exhaustively documented in *Bright Green Lies*.[25] For those enthused about a 'clean economy' as ecological salvation, it is a sobering read.

Solar power, for example is heavily dependent on vast quantities of sand, mined using earth-moving equipment that may be impossible to wean off diesel. About 80 percent of the mined and processed

metallurgical silicon is then lost as waste, rendering any land where it is dumped infertile. Ironically, the process of producing silicon metal requires very high amounts of electricity delivered with a consistency that solar energy is unlikely to be able to supply. The liquid waste is highly toxic. Solar panels require 17 rare earth metals, mined in undesirable conditions. Panels that have been designed to withstand the elements then fail after 20 or 25 years, with toxic materials inside that are not easily retrieved for reuse.[26]

Wind technology requires among other things: deep foundations of steel-reinforced concrete; miles of access roads; large-scale tree clearance and herbicide treatments; vast amounts of steel, copper, composite fibres; ongoing supplies of petrochemical based lubricants; and large amounts of land (of which we have already cherry-picked the best locations). Wind farms cause significant numbers of bird and bat deaths, upon already stressed populations.[27] Perhaps most ironic, by harvesting energy from the wind, large-scale wind farms create their own non-negligible warming effects on leeward areas. At some point, they become 'an active player in the climate system'.[28]

It goes on. Hydroelectric dams are a major source of methane, the potent greenhouse gas we can perhaps least afford to release during this critical period.[29] For all the hope for batteries, they have very big shoes to fill: a lithium-ion battery can store about 1 Megajoule per kilogram compared to gasoline at 46 MJ/kg.[30]

Common to all these technologies is the sheer material-intensity. Many of the fast-growing clean energy technologies – wind, solar, batteries etc – require considerably more minerals than the technologies they replace. An onshore wind plant requires nine times more mineral resources than a gas-fired plant, and since 2010 the average amount of minerals needed for a new unit of power generation capacity has increased by 50 percent as the share of renewables has risen.[31]

Moreover, a possibly unnoticed drawback of the target-setting to galvanize action – 'we need a clean economy by 2040' etc. – is that it creates a sense we just need to build a clean economy as a one-off transition, after which we can all breathe a sigh of relief. But this ignores the enormous ongoing material, processing and waste disposal demands of the 'clean economy', whose components generally only last for between 10 and 25 years. Anything that is material-intensive is also invariably energy-intensive. It can't be a clean economy 'all the way down'.

While one can argue the details of individual technologies, the key point is that each 'fix' loop triggers one or more 'fail' loops, invariably not publicized by the technology's promoters, but which compromise the net contribution. The meta-manifestation of the pattern is that many of our climate 'fixes' may be ecosystem 'fails'. Too much focus on 'decarbonization' and we might achieve the Pyrrhic victory of a stable global temperature and a devastated global ecology.

Jevons' Paradox

Today's environmental rebound effects are modern incarnations of the 'fix that fails' pattern William Stanley Jevons identified in 1865 for energy efficiency. Jevons saw that making engines more efficient would fail to reduce total coal usage because first-order energy savings would simply lower the prices of coal and coal-using processes, encouraging more use. Hence, the fix that fails pattern of today's environmental solutions is sometimes known as Jevons' Paradox.[32] The identification of a paradox is always a summons to think again. (Niels Bohr: 'How wonderful that we have met with a paradox. Now we have some hope of making progress.')

What the Jevons' Paradox directs attention to is that if it is deemed desirable to limit absolute amounts of inputs or pollutants, they must be directly targeted and constrained, not vainly addressed by 'solutions' whose theory of change is merely to provide the *possibility* of

reducing those inputs and pollutants, but which may do nothing to limit absolute quantities. If you want to end slavery, you must abolish it, not improve the efficiency of slaves. Sometimes you must explicitly target what you have decided you can no longer tolerate.

The common thread to so many VML 'fixes that fail' is they represent supply-side 'fixes', which market norms of growth and profit-generation can support, rather than demand-side 'fixes' of reduced consumption, material and energy use, antithetical to the market dynamics VML tacitly upholds.

Discourse Fix that Fails

Hence, VML is also a 'fix that fails' in the sense of perpetuating a public narrative or discourse that increasingly crowds out more effective solutions. As a market-based movement, VML cannot but reinforce the already powerful entrenched cultural bias of 'the market is the solution', which makes policy harder, not easier, to implement.

To spell out the causal links: the more the 'win-win' message is promoted, the more reassured people are that 'markets are the solution', the greater the reinforcement of our underlying market-favouring, anti-regulatory norms, and so the harder it becomes to implement meaningful policies – or, equivalently, the easier it is for policy opponents to mobilize existing anti-regulatory sentiment to prevent new policy from appearing. The more that our sustainability inclinations are directed toward market solutions, the emptier the government lobbies become for fossil fuel interests to roam obstructively within. (They have correctly identified lobbying as the better use of their energy. To paraphrase Pynchon: if they can get you out of the government lobbies, they don't have to worry too much about what you are doing).

Hence, a discourse 'fail' loop is the opportunity cost of certain solutions being inhibited by diverting society's finite attention, energy and resources to market-based strategies. Moreover, given the 'race against time' context, this opportunity cost of VML can increasingly be measured in precious time squandered.

The underlying obstacle is that the meaningful policy and cultural changes now required are of a demand-reducing nature at odds with VML's market-supporting character. As a market-based movement, VML has a pro-economic growth bias, dictated by the need for capital to earn a positive return (by the unsustainable way we currently measure returns). This leaves VML unable to support the growth-challenging, demand-reducing actions to which the insight of Jevons' Paradox points.

Effectively, VML stands for two conflicting ideas at once, as people and institutions easily can within complex systems. VML's explicit message is that we must urgently solve social and environmental problems. But the unavoidable, tacit meta-message of VML, as a market-based movement, is that 'markets are the solution', which reinforces many of the underlying dynamics that perpetuate the problems.

Moral licensing

Another way to glean the 'fix that fails' pattern of VML is to see it as a grand form of 'moral licensing'. Moral licensing is the behaviour of the dieter who congratulates himself on his week-long streak of watercress salad lunches by eating an entire chocolate cake on Friday. The good behaviour licenses the bad to questionable overall effect.

At a system level, what is happening is that the aspirational 'good' or 'green' growth of VML efforts is tacitly sanctioning economic growth in general at a time when most growth is not green at all.

Determining the green/non-green mix of the whole global economy would be a considerable task, but the signal from incremental growth is discouraging: a March 2021 UNEP analysis of COVID-19-related fiscal stimulus programs by 50 leading economies identified that only 18 percent of $14.6 trillion planned recovery spending could be considered 'green'.[33] Over three quarters of new stimulus is not 'sustainable'. Against fast-approaching thresholds, most of the growth is not green, most of the building back is not better.

VML practitioners certainly espouse a preference for 'green growth', but that merely reinforces the entrenched bias for growth in general, with the consequence of waving through mostly non-green growth, at a time when environmental tolerances are wearing thin.

Missing the physics for the finance

Plainer still, one can look through the economics to the underlying physical reality. A sustainability discourse conducted in business and economics terms continues to miss the physics for the finance. Our climate and biodiversity challenges are fundamentally driven by human transformation of matter and energy at a scale and pace that exceeds Nature's capacity to absorb. In response, VML aims to transform the world more sustainably, but the building of a clean economy has simply become the new banner by which we accelerate our transformation of the physical world. We frame the build-out of a clean economy as 'greener', but the Earth just registers 'yet more' transformation of matter and energy overwhelming natural processes. VML denies that a large part of our sustainability response requires establishing a slower and gentler interaction with Nature to fall back into balance with its pace. Less, not more.

Rising chorus

It is the growing recognition of VML's rebound effects on the sustainability *discourse* that has prompted a rising chorus of ex-corporate sustainability practitioners to now express concern about VML strategies they once promoted. Tariq Fancy, former head of sustainability at Blackrock believes that ESG investing has become a 'deadly distraction'.[34] Ken Pucker, former COO at Timberland and his colleague, Andrew King, have written of the 'dangerous allure' of win-win thinking.[35] Ralph Thurm argues that ESG has become part of a 'Big Sustainability Illusion', while Auden Schendler contends that 'corporate sustainability' is now 'complicit' in effectively providing cover for the fossil fuel industry to continue largely as before.[36]

A recent article by six business school professors is even more forceful:

> *'…the massive growth of corporate sustainability programs under the business case is not benign. It is a cancer. The longer it metastasizes and continues to crowd out healthier interventions, the greater the risk that it will kill our prospects of pulling back from environmental disaster.'*[37]

These voices are by no means the first or only to claim the VML strategy is counterproductive – most ecological economists and authentic environmental and civil society groups have done so for decades – but the potentially valuable novelty is that these voices constitute a change of mind arising within private firms and business schools, which have been the main institutional promoters of VML.

These voices sound warning at a time when even the credible 'fix' element of VML strategies risks being diluted by ESG newcomers who do not always exhibit the sincerity of earlier CSR and SRI pioneers. The trajectory of the last three decades of sustainable investing has been the gradual inversion of intention from an initial ethical stance ('how can we use finance to make a sustainable world even if it costs something?'), to enthusiasm for win-win ('you know, some of this might be profitable, too'), to today's 'ESG integration' ('how can we exploit the *trend* of sustainability to enhance financial returns?').[38] This arc almost perfectly conforms to Eric Hoffer's 1960s aphorism:

> *'Every great cause begins as a movement, becomes a business, and eventually degenerates into a racket.'*[39]

Neoliberalism's capture of environmentalism is virtually complete.

Increasingly hard to deny

While the claim that VML is a 'fix that fails' is certainly challenging, it is becoming increasingly hard to deny, for both top-down and bottom-up reasons. On a top-down basis, there is the ongoing dissonance between the two-decade-old deployment of VML strategies and the still-worsening trajectory of many of the global environmental metrics VML aims to improve. Possibly this is all just about to change – and it is reasonable to expect VML to be working with a lag – but the turn would have to be dramatic to meet the steep downward reductions in GHG emissions that Paris targets and net zero frameworks demand.

The bottom-up reason is that the proliferation and increasing sophistication of life-cycle analyses (LCAs) and Scope 3-type reporting requirements will continue to tease out rebound and backfire effects, bringing fail loops into the light. A whole new set of 'impact accounting' initiatives will only accelerate our ability to see fail consequences. On the one hand, our ever-improving capacity to do such analyses constitutes a beneficial enhancement of our ability to trace system consequences, but on the other hand such information can be difficult to accept. Indeed, the challenge presented by this new capability emphasizes that the next phase of our sustainability crisis will be characterized much less by the need for more information and much more by the psychological challenge of accepting the information we already have.

'Fixes that Fail' Breed Wishful Thinking

The psychological trap of a 'fix that fails' dynamic is that it is a perfect breeding ground for wishful thinking, because one can selectively observe the 'fix', ignore the 'fail', and sustain belief that the strategy is working overall.

So, it is not that VML has been entirely without benefits. A 'fix that fails' must have some fix to it! One can point to many beneficial green innovations that have been accelerated by widespread adoption of ESG and related strategies, and there has been a noticeable transformation of private sector attitudes to the whole subject of sustainability.

The problem is that the execution of the VML strategy is a causal driver of unintended consequences. Because longer-loop consequences only become apparent with time and reflection, a complex system is continuously engaged in a learning process of connecting the dots – identifying the loops, really. Not incidentally, this is what human brains spend a lot of their time doing – individually and collectively. Virtue of what Jeremy Lent calls our 'patterning instinct', we accumulate knowledge of ever longer and slower causal relationships, to which we continually recalibrate our behaviour.[40] Some of the long loop patterns we have recently been reacting to include causal connections between smoking and lung cancer, between contact sports and neurological disability, and between fossil fuel

burning and climate change. We are currently integrating these newly identified causal relationships into our collective behaviour, which hitherto represented our prior adjustment to all previously identified loops. Our ongoing detection of new loops leads us to continually update our sense of what is 'good' and 'bad', but it is a never-ending process. As Nietzsche put it: '*nobody yet knows* what is good or evil'.[41]

Living within an ever-evolving context that demands continual learning and unlearning, our evaluation of an initial fix – and our attitude towards it – must also evolve over time. Hence, an initial fix strategy may be undertaken with earnest enthusiasm, but as certain unintended consequences are identified and then confirmed, an unsettling sense may arise that the fix is 'wishful thinking'. This may be difficult to accept if one is vested in the fix – say, because it forms the basis of one's business strategy, or because one has staked their personal reputation upon it by publicly promoting it. If so, there may follow increasingly conscious denial either of the unintended consequences or of their relational dependence on the fixing activity – a refusal to see the 'bigger picture' of all the loops. Acceptance unrolls across a population at different paces, depending on people's innate curiosity and whether their life circumstances encourage or discourage acceptance of challenging new information.

Greenwish

This explains why many VML strategies increasingly exhibit an air of 'wishful thinking' – or 'greenwish' – well-intended efforts being celebrated as 'sustainable', but which are not delivering enough real change fast enough.[42]

Greenwish may now be a more formidable barrier to advancing sustainability than greenwash because it overwhelmingly springs from good intention, and so feels unkind to call out. But our knowledge of the system continues ever on and the self-denial it represents will be increasingly hard to maintain. A half-aware greenwish must slip at some point to become a knowing greenwash. Attempts to hold back conscious recognition lead to the familiar problems of psychological dissonance: irritation, anxiety and that soul-eroding feeling of not believing things you feel obliged to say. In many respects, such feelings are an important emotional manifestation of our sustainability crisis. We need to take those feelings seriously. They provide a critical, if unwelcome, signal we too easily rationalize away, possibly because we find allies in those around us trying to do the same.

This, then, is the difficult news. With VML, the sustainable business community is increasingly knowingly propagating a 'win-win' narrative that is too good to be true, to governments and citizens eager to believe it. But both high level trends and our improving visibility of feedback loops, will continue to puncture this narrative.

However, VML does not at all represent the limits of our capacity to adapt. Adaptation involves testing increasingly more effortful or costly fixes until one arrives at a fix that works. Everything points to deeper fixes than VML can provide.

3. VML HAS BEEN 'DEFENCE AT FIRST DEPTH'

If the previous section brought challenging news, understanding the layered architecture of complex systems suggests a way forward. It leads us to see that our first response VML strategy has been a 'defence at first depth' – a not unhelpful, if limited, initial adjustment to a newly identified reality, but one which masks deeper adaptive capabilities.

Layered architecture of complex systems

A universal feature of complex systems is that they emerge or self-organize as hierarchical or layered systems comprised of fast-responding surface adaptive capabilities underpinned by slower-moving capabilities. This results in complex systems responding to adaptive challenges in a layered or cascade fashion. The intuition is most easily developed with a real-life human behaviour. Consider the adaptive response of a human being – another form of complex system – traveling to high altitude (See Figure 5). My interest is less in the details – the reader need not worry about 'capillary density' etc. – but rather in the overall pattern, namely a sequential layered response.[43]

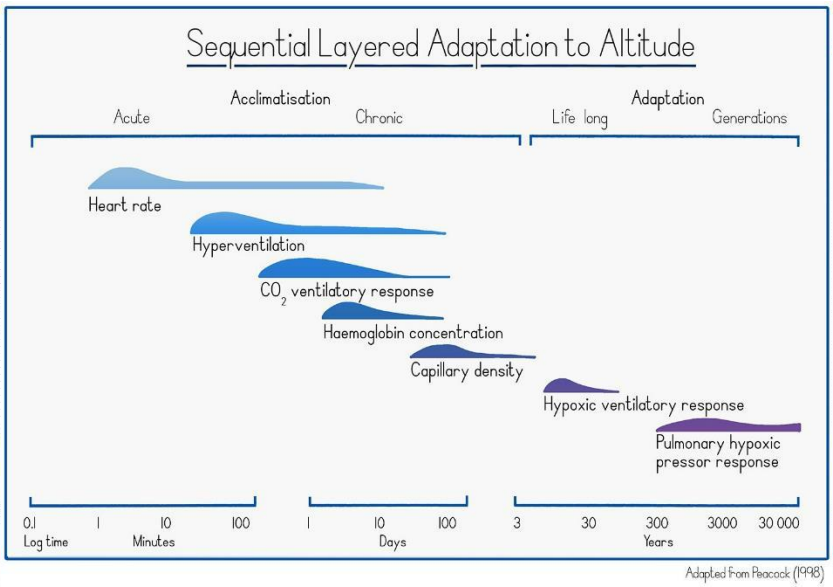


Figure 5: The Layered Response of Human Adaptation to Altitude. (Adapted from Peacock, 1998)

In response to lower oxygen levels, the individual will immediately experience an increase in heart rate, followed shortly after by an increase in respiration rate. Over successive days and weeks, deeper and slower adaptations occur in the cardiovascular system that gradually enable the blood to carry more oxygen through the body. (These are the physiological adaptations athletes seek through altitude training.)

Stay at altitude for long enough and even deeper, more permanent adaptations occur, over generations. The adaptive response thus transitions from being a physiological response within an individual to a genetic response within the population. And, sure enough, highlander Andeans and Tibetans are slightly genetically different to their lowland human brethren.[44] The adaptive response has worked its way *down* through various physiological changes into the genes – the bedrock mechanism that delimits the structure of the complex system that is the human body.

'Trigger and release'

Figure 5 vividly illustrates the sequential, layered response of the human body and how different response capabilities are successively called upon and then released in a process of 'passing down the baton' of responsibility for adaptation. Via this 'trigger and release' dynamic, as the respiratory rate increases, the heart rate reverts to normal. As the blood absorbs more oxygen so the respiratory rate can slow again, etc. Thus, Andeans and Tibetans do not spend their lives gasping for breath, because the necessary adaptation for survival has been 'solved' at a lower level and fixed into that level. This passing down of the adaptive response is beneficial because it restores surface-level first-response capabilities, should, say, the highlander suddenly be confronted by a mountain lion.

Within the body, what triggers change at the next level down is recognition by the system that the first – or second, or third – effort is not yet sufficient for survival. Early changes reach their point of maximum adaptive response, whereupon responsibility for change is passed down and the earlier adaptive process resets to 'normal', or near enough.

Defending in depth

The point of the example is not to invite complacency that our bodies might adapt similarly to a warmer world – our current crisis is too rapid and multi-dimensional for that – but to highlight a universal adaptation strategy of complex systems. Layered behavioural architecture seems to be Evolution's elegant solution for handling the innate challenge facing all living things – from simple organisms to complex societies – namely the need for some *rigidity* to uphold and perpetuate existing beneficial behaviours and yet also some *flexibility* to respond to new circumstances. Both are beneficial but must be in tension.

A layered system permits progressively greater shifts over time so that a response can be calibrated as finely as possible to meet the new circumstance. Of course, there is no perfect blend of rigidity-flexibility – no 'right answer' – and, hence, Nature effectively constitutes billions of ongoing experiments spread along the rigidity-flexibility spectrum. A simple, physical, representation: the oak tree has 'solved' to standing firm in the wind; the tall grass to bending over easily. But there are winds that will blow down even oak trees, and much grass dies for being too easily trampled.

Gregory Bateson termed this layered adaptive response process of complex systems **'defence in depth'**.[45] The defence in depth dynamic is essentially a system working down through successive fixes that fail until they find a 'fix that works.' (See Figure 6). **A complex system in adaptive crisis must find a 'fix that works' *before it is too late*.**

Moreover, deeper changes must be more effortful, or costly, because that is the price that must be paid for the system also to have had lower-level rigidity. If there were no cost to deeper change, the system would not have had the rigidity to exist for very long at all.

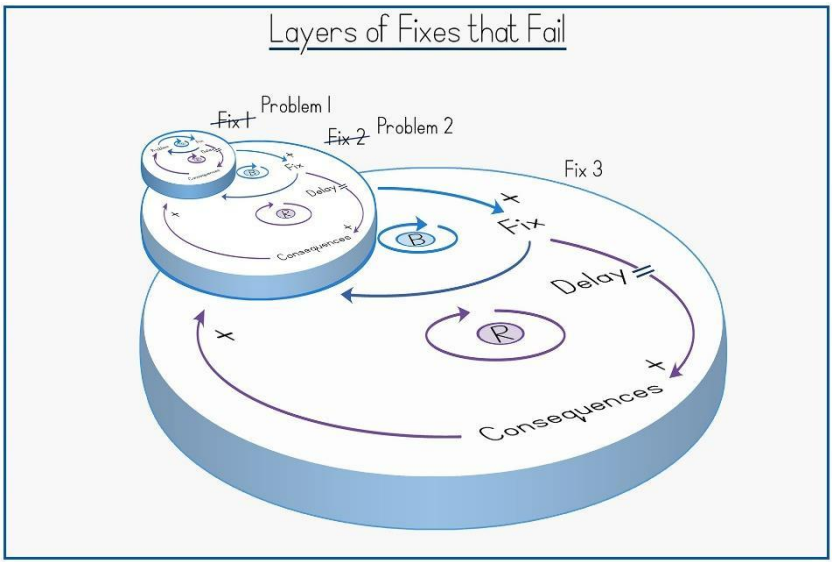


Figure 6: Layers of 'Fixes that Fail'. A system adapts by working down through 'fixes that fail' until it finds a 'fix that works'

Technology and law

If this pattern of surface flexibility and deeper rigidity sounds familiar, it is because we have re-created it in many of our technological and behavioural systems.

The technology world, for example, has iterated to a layered architecture it calls the 'technology stack' or 'solution stack'. This was less of an original design intention and more of a gradual discovery by the industry of the best way to organize computation. Today, everyone is familiar with the flexibility-rigidity trade-off of the technology stack from observing – suffering, perhaps – the upgrade patterns of their devices. My phone seems constantly to be making small updates, while larger updates require it being plugged in overnight. My computer does the same, with bigger changes requiring reboots, or even uninstalls followed by reinstalls. Eventually the hardware proves insufficient and requires replacing, either piecemeal (e.g., more memory or a new hard drive) or in its entirety, all of which is costly and time-consuming. We all now have the intuition that software changes quicker than hardware.

Similarly, lawyers refer to a 'hierarchy of laws' in which foundational documents like Constitutions underpin national statutes, which underpin executive orders, which underpin localized by-laws or temporary ordinances etc. Changing a by-law is normally quite straightforward and allows a flexible response to a short-term or localized situation. In contrast, changing a constitution requires much greater effort, but transforms behaviour much more. Legal structures are particular to countries, so each country's unique heritage of constitutions, laws and policies amounts to its own flexibility-rigidity experiment.

Social layers, too

By the same token, one can depict all human society as exhibiting layers of behaviour from flexible and fast-moving to rigid and slow-moving. Stewart Brand offers one version with his 'Pace Layering' model in Figure 7.[46]

Brand's model rings true for our sustainability response. It is certainly 'fashionable' to be green these days, with all manner of 'eco-' products (perversely) driving consumption. At this point, who in the

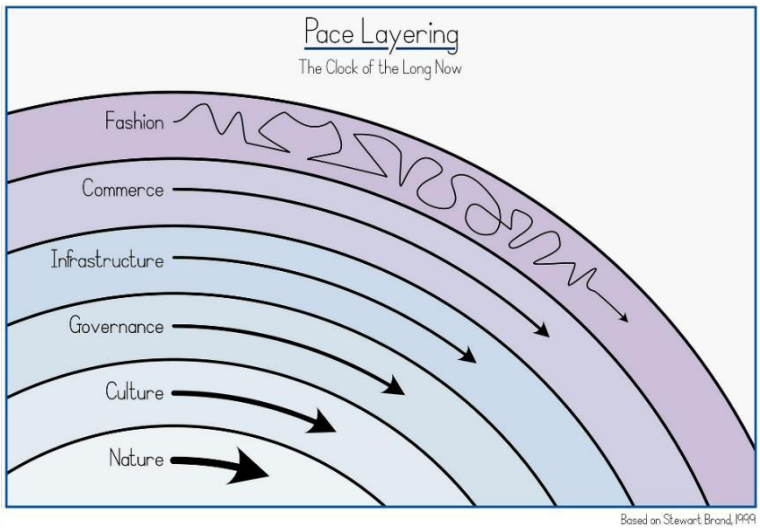


Figure 7: Stewart Brand's Pace Layering framework

Western world hasn't bought themselves a shiny new 'eco-' version of a consumer product to replace a still perfectly functional one they already owned?

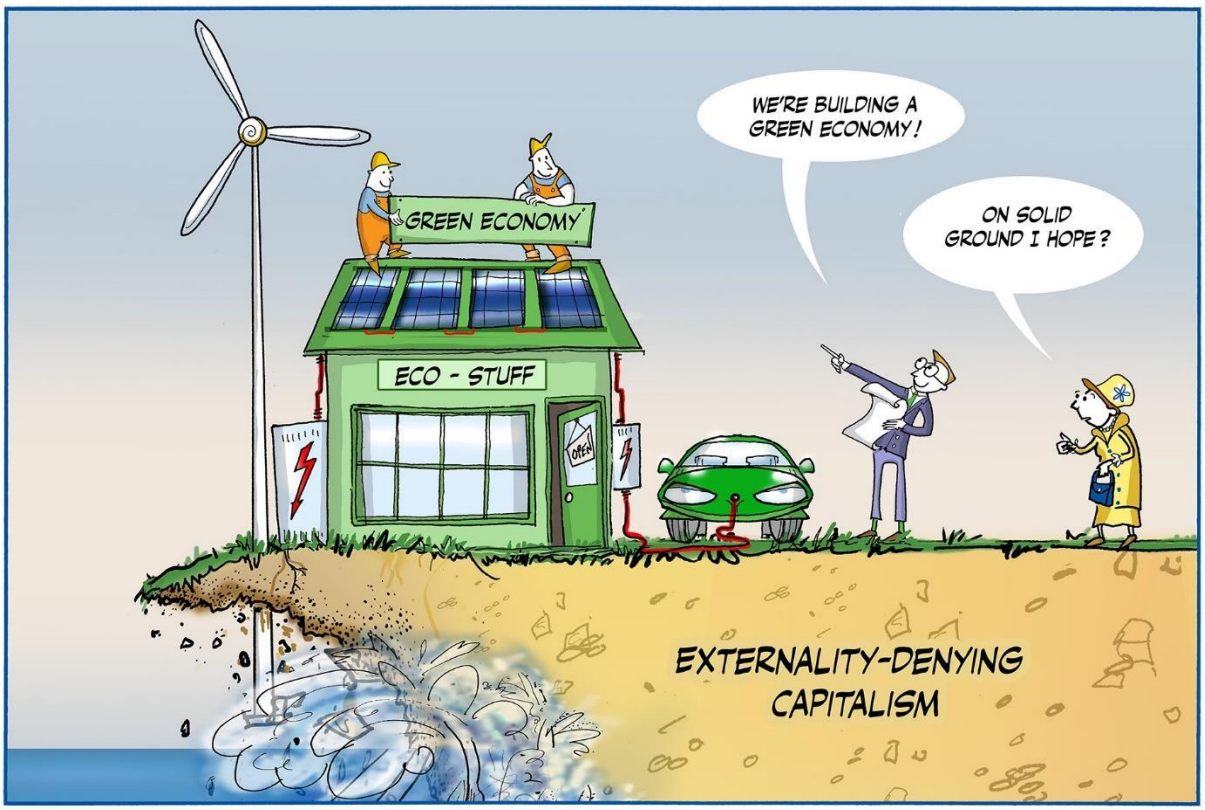
As I have been focusing on, 'Commerce' has begun to internalize the issue via the VML movement in its various forms. Infrastructure, too, is beginning to change with increasingly large public and private efforts to 'build back better'.

There is much more still to be achieved in all these layers, but we have barely begun to initiate deeper governance and cultural changes that might carry the greatest weight of the adaptive burden. Take the idea of a carbon tax as the standout example of a long-identified governance solution that we continue to not really implement. The first op-ed calling for a fossil fuel tax was penned by David Wilson in the early 1970s.[47] Half a century later, less than four percent of global carbon emissions is priced at the $40-80 per ton range the World Bank estimates would be required to reach the Paris temperature targets.[48] If this is an error of governance omission, the ongoing error of commission is maintaining in place global fossil fuel subsidies to the tune of nearly 7 percent of global GDP.[49] Similarly, at the even lower level of 'culture', the predominant Western culture remains firmly anchored around consumerism and has most recently taken to celebrating people playing spaceship.

Ignoring the capricious top layer of fashion, with our heavy dependency on VML strategies to address the sustainability crisis, we are effectively **defending at first depth** only. Governance and culture are certainly more entrenched, slower moving forces, but it is when these gears begin to turn that society really starts to shift. As Brand puts it:

> *'Fast gets all our attention, but slow has all the power.'*

As the profundity of our sustainability crisis sinks in – 'sinks in'– it is becoming clear that we must solve our sustainability challenge at a deeper level than initially thought. In a sense the challenge of our 'race against time' adaptive crisis is to now shift deeper and more powerful mechanisms of social change faster than perhaps ever before. That is not straightforward, because their inertia represents the beneficial rigidity we know as tradition, custom and precedent. Hence to accelerate deeper change requires an emergency review of the – entirely pre-Anthropocenic – thinking implicit in our governance structures and cultural beliefs, how they got that way and how they might be different. It is layers again, not of our institutions, but of our prior cognition and reasoning that first shaped those institutions and is now reinforced by them.


WE'RE BUILDING A GREEN ECONOMY!
ON SOLID GROUND I HOPE?
GREEN ECONOMY
ECO - STUFF
OPEN
EXTERNALITY-DENYING CAPITALISM
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4. A JOURNEY DOWN THE CAUSAL LAYERS…

Another systems-inspired framework is Causal Layered Analysis (CLA), pioneered by Sohail Inayatullah.[50] CLAs depict apparent problems as being merely the visible consequences of underlying, often hidden, assumptions and behaviours (hence also referred to as 'iceberg analysis'). The CLA framework is effectively a flexibility-rigidity stack, not for our institutions, but for the cognition that has produced our institutions.

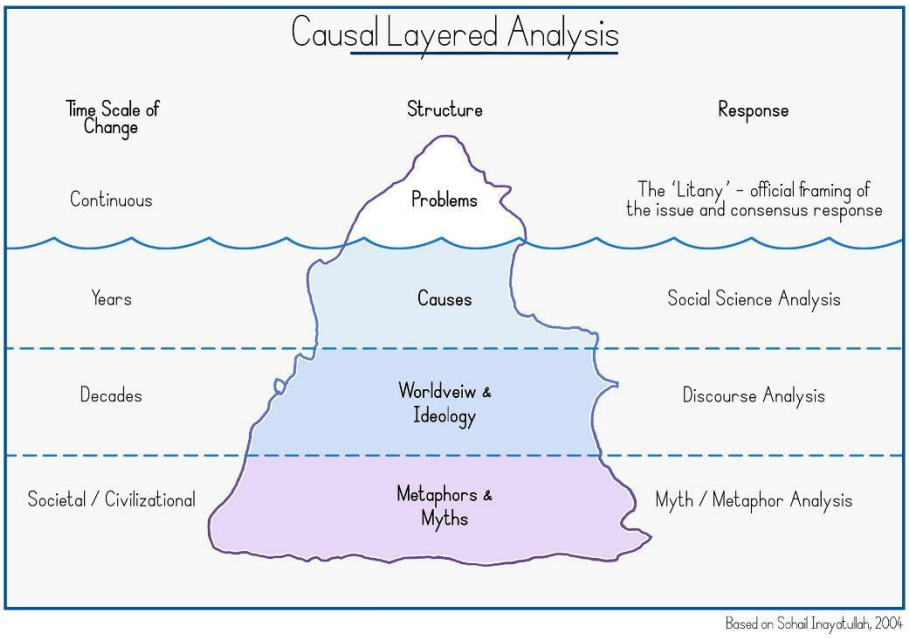


Figure 8: Causal Layered Analysis framework (based on Inayatullah, 2004)

Specifically, the CLA model envisages that everyday problems typically have a widely agreed upon framing (a consensus 'litany') that in turn shapes the approved response. But this framing and the response it induces may often not solve the problem. If not, the CLA structure invites thinking successively about the deeper causes of the problem that may be known to social sciences, the ideological drivers that shape discourse, and the influence of cultural metaphors, all of which evolve at different rates and levels of awareness. CLA essentially embodies the wisdom that solving problems sometimes requires understanding and remedying the issue at a deeper level, accepting that the further one descends the more entrenched – *even unconscious* – the causal factors may be and the harder they may be to even credit as causes.

This is a common enough intuition because many of our problem-solving metaphors convey a sense of depth: 'we haven't yet got to the bottom of the problem' or 'identified the root cause'; 'deeper change will be needed' etc. Also, many other frameworks reflect the same insight, such as 'double- or triple-loop learning' models and Donella Meadows' twelve – *twelve!* – 'leverage points in a system'.[51]

However, my interest in using the CLA framework is that it provides some manageable waypoints for a journey 'down' our cognition to see how our thinking developed over decades and centuries such that VML emerged as the first response strategy to our adaptive crisis. We can then climb back 'up' the same waypoints to reflect on how our taken-for-granted assumptions or perceptions might change to trigger a more effective 'defence at greater depth'.

4.1. Social Science Layer: Externality-Denying Capitalism is a 'Fix that Fails'

Economics – the 'queen of social sciences' – readily identifies the deeper problem, even if it has not accepted it. If VML is a 'fix that fails', it is largely because it rests upon the grander 'fix that fails' of externality-denying capitalism. You might draw it like this.

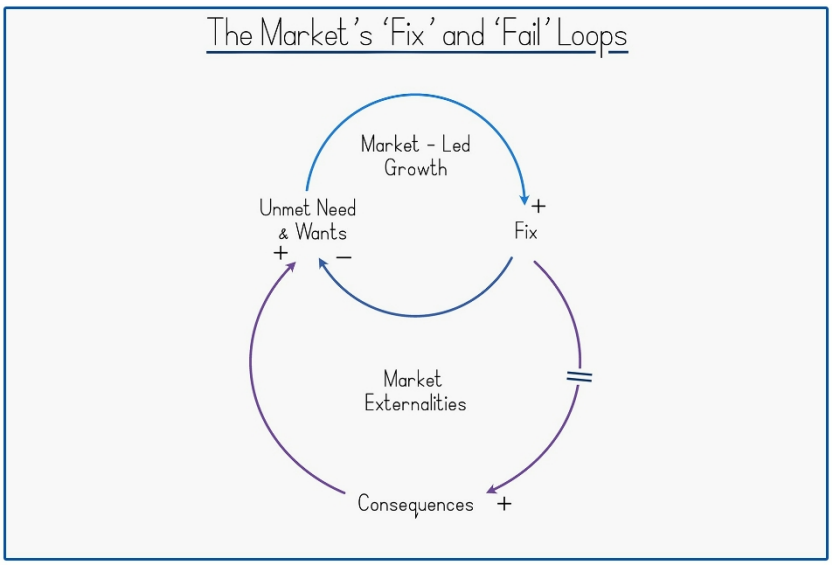


Figure 9: The Market's 'Fix' and 'Fail' Loops

As Aswath Damodaran, the financial valuation expert, recently said of ESG:

> *'The ESG movement's biggest disservice is the message that it has given those who are torn between morality and money, that they can have it all.'*[52]

I agree, but that is because ESG – and VML – have emerged out of the much larger invocation of the hope we 'can have it all' that is externality-denying, limits-rejecting capitalism. As such, VML is not so much a solution to our sustainability crisis as just the latest presenting symptom of a deeper behavioural problem.

For reasons entirely predating our awareness of climate change and the Anthropocene, Western societies have iterated towards a *market primacy* of self-organization over the last two centuries, in the belief that it was the best means by which to advance human welfare. However, market primacy of human self-coordination is itself a fix that fails because the positive benefits of market-driven economic growth and innovation are undermined by lagging, unintended consequences not registered by the market system – 'externalities' – of a scale far greater than most economists and politicians have historically been willing to recognize, and than government and philanthropic efforts currently absorb.

As noted earlier, in any 'fix that fails' dynamic, it is an empirical matter whether the fix or fail loop is stronger, but with the emergence of climate change and the Anthropocene, this is the empirical test we are now conducting in real-time at planetary scale.

Too soon to know

Unfortunately, 'past performance is no guarantee of future results', so capitalism's track record to date can offer little comfort. It is beyond question that the spread of markets over the last two

centuries has supported enormous improvements in average global living standards and life expectancy. So, economic historian, Deirdre McCloskey is justified in looking backward to dub two centuries of 'market-tested betterment' as the 'Great Enrichment'.[53]

However, from the longer time perspective of humankind as a complex adaptive system, two centuries is far too short a period to evaluate such a distinctive experiment in human self-coordination. Inescapably, defenders of externality-denying capitalism can only make a 'so far, so good' argument – the Great Enrichment is merely one side of a still developing ledger. With a very short delay, the 'fix' of the Great Enrichment has triggered the potential large 'fail' of the Great Acceleration. *The experiment is ongoing*, and experiments are not generally deemed to be over, and hence open to meaningful conclusion, until a new steady state has been achieved, which hardly describes our current relationship with Nature.

Externalities may be very large indeed

Moreover, recent estimates of what the market misses are considerable. Valuing ecosystem services in monetary terms is controversial – because it appears to endorse the hazardous idea that ecosystem services should be thought of in monetary terms only – but nonetheless provides important signals of the magnitude of Nature's contribution to human wellbeing. A study by Robert Costanza and colleagues estimated the monetary value of the 'services' provided free by the Earth's ecosystem at $125 trillion in 2011, *nearly twice the value of global GDP* (gross domestic product).[54] Just from this one assessment of some ecosystem benefits, much more 'value' is unknown to the market than known.

Yet, in steering society increasingly by market signals, we have an unintended negative impact on the provision of these services. The same study estimated that annual ecosystem services had been depleted by $20 trillion since 1997, during which time conventionally measured real GDP increased by $29 trillion, for a net gain of $9 trillion.[55] While conventional global GDP grew by 3.5 percent per annum during the period, a fuller measure of 'total wealth creation' would have grown by only 0.3 percent to 1.7 percent per year – that is, 'growth' would have been at most half what we registered, at worst virtually non-existent.

If one were to add in many other sources of environmental damage not included in this estimate – not to mention the many social costs also ignored by the market – the notion that we are 'growing' in any meaningful sense becomes fanciful. What we are effectively doing is counting the positive monetary growth of the market system's 'fix' loop, while ignoring the unmonetized costs of the 'fail' loop.

Fast forward from the 2011 endpoint of this study, with marginally slower global GDP growth and rising environmental damage and costs of social inequality, and it appears that *capitalism's fail loop is starting to overpower its fix loop*.

Acceptance versus admission

Possibly the key driver of our sustainability crisis is that the dominant Western culture has not achieved *sustained acceptance* – distinct from mere *theoretical admission* – of the scale of market externalities and what that must imply for claims made about the superiority of market-led coordination.

Sometimes, what is needed is not new information or new ideas, but a new slant on what is already known.[56] That slant is to ask, not whether we know about externalities, but whether we have accepted them.

Everyone pays lip service to the idea that externality-denying GDP is a broken measure – that 'it measures everything in short, except that which makes life worthwhile' – but we continue to *behave* as if GDP – and profit and productivity, etc. – are not broken measures, which is the only meaningful gauge of our actual beliefs.

We have admitted a problem, but not accepted it on a sustained basis, and the distinction between the two is now decisive. Moreover, our ever more elaborate lip service of admission – through corporate disclosure reports, and now 'impact accounting' approaches – is increasingly the mechanism we use not to foster acceptance but to avoid it. Rather than price or regulate carbon emissions and environmental damage, we are stuck in a seemingly endless process of disclosing in ever more detailed ways.[57]

'We need more data' seems to be the universal belief. No, we don't. We have more than enough data. We need acceptance, which is qualitatively different to admission, such that we cannot simply disclose more and more data and expect to arrive at acceptance. They are altogether different processes. Instead, acceptance will really show itself when impacts that we have long ago measured well enough become widely and meaningfully priced or regulated. (Indeed, confirming that acceptance and admission are fundamentally different processes, if we can grant externalities real prices through policy and regulation, the post-policy price system will autonomously force behavioural adjustment, immediately rendering obsolete laborious shadow accounting efforts).

Pigou and the Dropped Stitch of Economics

The failure of economics to cultivate the sustained acceptance of externalities is increasingly becoming the most pertinent fact about the whole discipline. Not only did economics – the 'science of markets' – not encourage acceptance of externalities, but it also made strenuous effort to downplay or even trivialize them.

Economics has *known* about externalities since the 1920s, when Arthur Pigou first formulated the concept.[58] Pigou's formulation presented an immediate problem for a young discipline that was on the hunt for universal claims comparable to recent discoveries in physics, which had accorded physicists great prestige. Externalities placed limits on how far markets could be said to advance human welfare, threatening in turn, the potential relevance and influence of ambitious economists. Moreover, for a discipline hastily embracing mathematics – again in conscious emulation of much-admired physics – externalities threatened to complicate otherwise elegant models describing how markets could advance human welfare better than any other form of self-coordination – government, community, or otherwise.

Rather than confront Pigou's awkward challenge, economists sought refuge in the exact opposite direction, seeking to establish simple comprehensive frameworks for the discipline. By the 1950s, a very appealing theory of *complete markets* had been developed. No externalities in this theory, none at all. In complete markets, you can sign a contract today to buy any conceivable good or service, at any place in the world, for delivery at any point in time from right now to the far distant future. Complete market theory is the laying down of a conceptual blanket over all our needs and desires that leaves no space for externalities. It is a vision of the market as omniscient

The formulation of complete markets theory was a major milestone for economics. Its authors, Kenneth Arrow and Gérard Debreu, received Nobel Prizes. It helped satisfy the discipline's yearning to be taken seriously as a science. Most important, it provided the cornerstone for the discipline's claim for the superiority of markets as a mechanism for social coordination. The implication of complete market theory is that the market can allocate Earth's finite resources to promote human

wellbeing better than any other system of self-coordination can. Whenever a claim is made for the superiority of market outcomes, complete markets theory is lurking in the background.

Justifying externalities away

To be fairer, economists have always recognized that the theory is a hypothetical ideal and have long *acknowledged* various types of market failures, per Pigou. Textbooks talk of the need for governments – or at least for associations or clubs – to provide lighthouses, national defence, streetlights and more. However, such acknowledgement has taken place within a broader context in which much greater effort has been made to downplay externalities.

Various justifications were provided as to why it was acceptable to proceed as if markets were 'complete enough' to effectively ignore externalities. One sense was that positive and negative externalities might roughly cancel each other out, leaving GDP incomplete as a gauge of human welfare but still reliable as a directional indicator. But that ignores critical asymmetries. Too much of a positive externality is simply too much of a 'free good thing', but excessive negative externalities may accumulate to breach irreversible social and ecological thresholds upon which much else depends.

Economic growth, of course, was the ultimate salve because it could mop up the awkward truth of externalities. Any external social or environmental costs incurred as the economy grew could be subsequently compensated or remedied by precisely the monetary wealth the economic growth delivered. But this relies both on the redistribution from winner to loser occurring – not obviously the case in today's increasingly 'trickle up', society – and that the social and ecological costs incurred along the way did not take the form of irreversible fails, which no amount of future wealth could remedy. Absent compensation or remedy occurring, the failure to take seriously externalities ahead of time becomes highly problematic.

Bringing conceptual error to life

Garrett Hardin was a controversial figure, leaving a mixed legacy of insight and prejudice, but as an ecologist, he was clear-eyed about economics' self-deception:

> *Interviewer [to Hardin]: 'But don't economists take account of the environment under the concept of externalities?'*
>
> *Hardin: 'Oh, absolutely. But externalities are things they just don't want to see. Once they invoke the term "externalities", they have sprinkled holy water on the problem, and in their calculations, it no longer exists and therefore has no effect in our decision-making processes.'*[59]

Lip service, holy water, corporate impact disclosures – all of a kind.

Certain economists caught the problem in real-time, not that it mattered much. Eichner and Kragel in the Journal of Economic Literature in 1975 commented that the goal of neoclassical theory was 'to demonstrate the social optimality of markets *as if the real world were to resemble the model.*'[60]

Writ large, a major, highly dubious accomplishment of 20th century economics is that it is the process by which we made it intellectually – and then socially – acceptable to ignore knowable harms. By offering intellectual respectability for the neglect of externalities, economics provided an ostensibly 'scientific' foundation for Hayek, Friedman and others to press their case for market primacy, or neoliberalism.

But with the turn to neoliberalism, we simply brought this error of omission to life and entrenched it at the heart of our social arrangements. As Bateson ironically put it:

> *'Epistemological error is all right, it's fine, up to the point at which you create around yourself a universe in which that error becomes immanent in monstrous changes of the universe that you have created and now try to live in.'*[61]

We have made a flawed economic model immanent. We are trying to live in it.

GAAP or GAD?

The tendrils of this flawed model spread far. The more market-centric a society becomes, the more it directs its energy, time and resources where profit leads, on the assumption that 'profit' is 'good' (as would be the case in the hypothetical world of complete markets). To that end, we have developed Generally Accepted Accounting Principles (GAAP) to try and ensure the financial statements that generate the all-important profit signals are reliable.

But GAAP is just a Generally Accepted Delusion by which we have agreed not to charge companies the damage we know they cause. This is not fraudulent in the narrow legal sense but, worse, an elaborate form of collective self-denial. Financial statements aim to answer whether a company or project is profitable, but the deeper question they silently, persistently pose is: why are some costs on a financial statement and not others? And is the tax line – so often honoured in the breach – really making up the difference?

The Unmentionable Foot

An honest accounting of how capitalism generates its wealth must now come to terms with how the market system acts to deny many of its costs. At the level of the whole market, we are effectively internalizing gain and externalizing cost. Of course, capitalism recognizes a great many costs, but the problem is it does not recognize all of them, leading to an inevitable accumulation of social and ecological problems.

William Kapp, a rare voice to argue for the significance of externalities in the 1950s tried to force greater recognition by describing the market as an innately 'cost-shifting' mechanism.[62] As Clive Spash, the ecological economist, has subsequently expressed it, capitalism creates wealth not just through the magic of the Invisible Hand but also via the force of a cost-shifting foot.[63] But in a shrinking, more transparent world, it is becoming harder for this foot to kick costs permanently out of sight, and it is beginning to appear as though our accumulated 'wealth' owes less to the Invisible Hand and more to the Unmentionable Foot.

To clarify, it is not that there is *no* Invisible Hand – the market's allocative and innovative dynamics *for what is already commodified* are real and remarkable – only that, *in the incompleteness of markets, the market must also have an Unmentionable Foot*. To believe that economic growth can solve all social and environmental problems is to believe that the Invisible Hand can repair what the Unmentionable Foot damages before irreversible harm occurs.

Critically, the so-called Nobel Prize for Economics – modelled on established prizes for sciences not averse to empirical test – has been a major reinforcer and intellectual legitimizer of the partial, 'ceteris paribus', thinking that excluded externalities. So, no Nobel Prizes for Pigou, Kapp, Herman Daly – *or a whole school of ecological economists!* – who have had the temerity to argue that the existence of large-scale externalities must bound claims for the superiority of markets, and instead, prizes galore for those producing elegant models that helped keep discipline-threatening externalities at bay.

Teaching economics inside-out

The bias persists to the disservice of today's economics students. In today's leading economics textbook, *Principles of Economics* by Gregory Mankiw, the concept of externalities is first developed in Chapter 10 after core market dynamics have been presented. It is starting to feel as if this is nine chapters too late.[64] Today's economics students look set to live in a world where externalities are not mere residuals to the market, so much as the main event.

We are effectively teaching economics inside-out, privileging the monetized economy as the central driver of human welfare rather than clarifying that the market can only grasp and direct the subset of influences on human wellbeing that can be propertied and commodified, and as it directs those entities it may create adverse spill-over effects beyond its domain. An outside-in approach to economics would establish ecological and sociological fundamentals first and then describe the economy as a beneficial, if leaky, sub-system nested within ecology and society.

The failure of economics to cultivate acceptance of externalities is increasingly the dropped stitch that defines the whole discipline. It is not that economics has not uncovered powerful and compelling truths about how markets work – it clearly has – but rather that the discipline has not done nearly enough to admit the limitations of its insights for real-world settings where markets can

grasp only a minority of the influences on human wellbeing. The genuinely exciting prospect for 21st Century economics is to unravel economic thinking back to pick up the dropped stitch of 1920 and to rebuild economics as if externalities were real. Some are already engaged in this effort, but many more hands are needed.

The deregulated market is dysregulating

For now, though, the institutionalized denial of many real and accumulating costs leaves us trapped in a fast-dysregulating market system. A centrepiece of neoliberal policy was widespread market deregulation, but this has simply induced market *dysregulation*.

Complex systems are said to dysregulate when reinforcing loops gain the upper hand and the system as a whole enters into a runway behaviour beyond its own powers to balance or re-regulate. Psychologists, for example, talk of dysregulated individuals from children susceptible to hyperactivity or meltdowns to adults suffering from the endless loops of OCD or the unbreakable cycles of substance dependency. Such individuals often can only re-regulate with external intervention from a therapist or other third party, who can provide the regulating input from outside that cannot be summoned from within.

The hope of early economists, subsequently bolstered by ideals of complete market theory, was that market systems would be self-regulating, removing or minimising the need for government regulation. And, certainly, an economy contains many balancing processes. If the demand for bread increases, the price of bread will rise inducing more supply so bringing the price back down again. The market contains a great many 'self-regulating' or rebalancing, loops.

However, the market is *not only* self-regulating, *but also* susceptible to positive reinforcement loops that can become runaway problems. This was crystallized by Brian Arthur in 1990, when he identified that economic systems did not just exhibit 'diminishing returns' – or balancing loops – but also, quite commonly, 'increasing returns' – or reinforcing loops.[65] This may have been hard to spot in 1990 but is now much easier to grasp in a world of 'winner take all' businesses and technology platforms.

Moreover, the possibility of reinforcing loops *in* the economic system can accumulate to make a reinforcing loop of the whole system! Because neoliberalism has granted markets primacy, and because markets are vulnerable to large-scale runaway effects, neoliberalism is effectively a runaway feedback loop of a human operating system in which large swathes of the global population are now caught up.

The telling signal is that many of our biggest problems - global debt accumulation, wealth inequality, climate change and biodiversity loss – all exhibit runaway, vicious spiral, dynamics seemingly beyond the powers of the market to rein in. VML is the market's internal effort to stop the runaway sustainability crisis, but there is precious little rebalancing to see.

If the market system has dysregulated, it needs re-regulating input from outside that its own processes cannot generate. But we have denied ourselves this solution because of the long line of political and economic thinking – all pre-Anthropocenic – that culminated in today's dominant neoliberal ideology. And so, we need to go to the next layer down.

4.2. Ideology Layer: Neoliberalism is a Runaway Feedback Loop of a Social Operating System

Neoliberalism is the ideology that advocates market primacy of social coordination. Its effective slogan is 'markets are the solution, government is the problem'. It was Reagan, freshly inaugurated as US President in 1980 who offered that 'government is the problem', Mrs Thatcher who further elevated the market by declaring 'there is no such thing as society'.

While right-wing support for neoliberal ideas was to be expected, it was the subsequent endorsement of these ideas by left-wing governments in the early 1990s that proved the real moment of entrenchment. It was Bill Clinton who said: 'it's the economy, stupid' and Clinton's adviser, James Carville, who declared the bond market was the real seat of power, with his celebrated line that he hoped to be reincarnated as the bond market, in which form he would have the power to intimidate everyone. Similarly, in the UK, Tony Blair's effective embrace of Thatcher's neoliberalism led Thatcher to subsequently muse that her greatest achievement was: 'New Labour. We got them to change their minds'. Bit by bit, much of the world has followed suit by mix of imposition ('the Washington Consensus') or emulation.

The significance of these developments is that governments have steadily lost their ability to provide re-regulating input to a market system exhibiting runaway behaviours. One of the real values of government is its potential not to *amplify* market forces but to *modulate* them. This used to be more widely accepted, for example, in the notion that government deficits should be 'counter-cyclical' – that government ought to save for society when times are good and spend for society when times are bad – an idea that dates to Joseph.

The erosion of the government's capacity to modulate market forces is itself the consequence of certain powerful reinforcing loops intrinsic to neoliberal logic.

In what might be called 'Friedman's Feedback Loop', corporations' 'social responsibility to maximize profits' has, over time, seen them spend large amounts of money lobbying government to change the rules to allow them to increase profits, providing them with more resources to lobby governments etc.... As this inexorable process of regulatory capture persists, a society progressively steers less by a sense of what is 'good' and more by what is 'profitable'.[66]

Equally, in what might be called 'Reagan's Reinforcing Loop', if perception spreads that 'markets are the solution and government is the problem', human talent will slowly but surely be drawn towards the private sector and away from public service. 'Come work with us, we're part of the problem' is a compromised recruiting strategy that ultimately ensures 'government is the problem' is a self-fulfilling prophecy.

One-way market expansion

These loops have worked to instil the modern view that 'small government' should unleash market forces and then stand back. Over time, this has led markets to grow considerably, *but in one direction only*. Consider, for example, that over the last decade my Google search for 'carbon emissions' has been commodified and now commands a price – not to me, but to advertisers bidding for my attention – while my actual carbon emissions remain unpriced despite economists making a serious case for such pricing for nearly half a century.

The simplest explanation is that markets appear where those who have power to make markets would like them to appear. This power is often *de facto* rather than explicitly granted. Our current socio-economic arrangements empower corporations to reach out and appropriate – to make new property of – new things that may be profitable for them. Such as your internet searches or your travel

movements. However, corporations also have extraordinary power through lobbying and regulatory obstruction to prevent any new commodification of entities that would result in new costs for them. So, our still extending – and so still incomplete – market system continues to annex new, previously uncommodified, realms, but in asymmetrical fashion. It opens new frontiers of profit but cordons off areas of potential cost.

This asymmetric expansion of the market system presents a considerable challenge for the standard 'free market' case because it amounts to a selective application of the all-powerful price system. The classic free market position is becoming increasingly untenable.

The argument for market primacy is predicated on the power of price signals to achieve a more efficient allocation of goods and services than might be achieved by the cumbersome and coercive 'central planner', but in practice, this power of price signals can now only be extended to generate new profits, not new costs. And so, we are denying ourselves the use of the market system and its price signals to tackle possibly the most critical scarcity problems we have ever identified – limited atmospheric capacity for greenhouse gas emissions and limited capacity of ecosystems to absorb or tolerate our activities.

Aha! So, the neoliberal slogan should really be: '*some* markets are the solution, government is the problem', or 'markets we like, not ones we don't'. Call it half an ideological position. As such, one can turn the tables and ask: if we don't need prices for the greenhouse gas emissions driving runaway climate change, and we can instead rely on people *voluntarily* to take the steps consistent with those prices without them being implemented, *why bother having prices for anything at all*? Why not just assume that people will always voluntarily behave in ways that collectively advance human welfare?

The market doesn't know what the market doesn't know

Among the more effusive accolades made of the market system is that it is a form of 'intelligence'. And while there is something to this in the autonomous way the market system marshals goods, services and human time and effort, it can only be a partial intelligence because the market has no inkling of the non-commoditized and non-priced world. It is an algorithmic or machine-like intelligence, helpful for human wellbeing in proportion to its grasp of what influences human wellbeing.

It will not win poetry prizes, but I'm desperate enough to press the point that I will venture a simple ditty to describe the runaway trap we have created for ourselves:

> *The market doesn't know*
> *What the market doesn't know,*
> *Yet we've self-organized*
> *To defer to it even so.*
>
> *Sometimes, we come to know*
> *What the market doesn't know,*
> *Yet should this be new cost,*
> *The market functions not to know.*

A market-centric culture commits to follow where profit leads. Quite important, then, that either we calculate profit sustainably or we temper our market-centricity.

4.3. Metaphor Layer: 'World as Machine' Primed an Excessive Faith in Markets.

At a yet deeper level, one can trace the threads of today's market-acquiescing VML response to momentous cognitive developments of the 17th century that shifted the Western world onto an entirely new cultural metaphor, which in turn paved the way for our excessive credulity in the power of markets, and our equating of market growth with moral improvement.

I appreciate we are now a long way below the surface of today's concerns about ESG taxonomies and TCFD disclosures, but to be brought to such depths is only to recognize that the sustainability crisis poses far more fundamental questions of our behaviour, self-organization, and cognition than most 'practical' debate gives any hint of yet understanding.

Stories matter

Novelist Ben Okri has said of stories:

> *'It is easy to forget how mysterious and mighty stories are. They do their work in silence, invisibly. They work with all the internal materials of your mind and self. They become part of you while changing you. Beware the stories you read or tell; subtly, at night, beneath the waters of consciousness, they are altering your world.'*[67]

Something similar is true of the stories whole cultures tell themselves together. The story the Western world has been telling itself for nearly four centuries now is that the 'World is a Machine'. But this is not always the story humans have told themselves, nor need it be the last.

Cultural paradigms

In his cognitive history of humankind, *The Patterning Instinct*, Jeremy Lent describes how cultures self-organize around deep shared myths or metaphors that shape all the thinking and behaviour that occurs above, even though they may only be dimly perceived in our daily lives. These myths provide a foundational pattern of meaning by which a culture perceives the world and responds to it. Moreover, through long human history, these metaphors have changed, with changes often signifying epochal shifts. Lent offers some monikers for the implicit metaphors that guided our ancestors in different periods, including: 'Everything is Connected', 'Hierarchy of the Gods', 'Split Cosmos, Split Human', 'Harmonic Web of Life' etc.[68]

Effectively, Lent describes a grander, slower version for whole cultures of the process Thomas Kuhn famously identified for individual scientific paradigms.[69] Kuhn's 1962 thesis argued – to much consternation at the time – that science was not the entirely objective process of its own telling, but instead advanced in lurching fashion, paradigm by paradigm, or narrative by narrative.[70]

A scientific discipline would self-organize around a powerful new basic insight – say, around Newton's theory of gravity – upon which investigation, or 'normal science', might fruitfully proceed for decades or even centuries, during which time certain foundations of the insight became so taken for granted they were effectively accepted as truths beyond contention. But, at some point, empirical evidence might accumulate that became more and more difficult to accommodate into the accepted model, forcing the digging up and reappraisal of long-settled axioms. This set the stage for a typically wrenching 'paradigm shift', which some resisted, and others promoted, until some new explanatory foundation was established. Whereupon the cycle started anew.

In similar fashion, the evolution of human culture has seen a succession of cultural metaphors that guide human behaviours for long periods until they seem not to work any more as the best way to make sense of the world and guide our behaviour in it (which ultimately is what our sense-making is

in service to). And just as scientists rarely waste time questioning long-established axioms of their discipline, so our shared myths or metaphors warrant little comment or reflection because, after all, the view from within a culture is that it is so obviously the way the world is and must be!

'Nature as Machine'

Since the 17th Century until very recently, one of our most powerful shared metaphors has been the view of 'Nature as Machine'. This was a change of perception that had been creeping into Western consciousness for some time before Descartes powerfully articulated the idea, expressing among other things:

> *'I do not recognize any difference between the machines made by craftsmen and the various bodies that nature alone composes.'*[71]

The mechanical view of the world received stunning endorsement from Newton's discovery soon after that the motions of the Universe could be described with a few simple equations. It seemed to all intelligent people of that place and time that the Universe was indeed a clockwork machine awaiting deciphering by the – uniquely non-mechanical – human mind. And so, off we went.

If you see the world as a machine…

If you come to see the world as a machine, you are inevitably drawn to a reductionist mode of knowledge acquisition. The essence of reductionism is that knowledge can best be acquired by breaking things down to pieces, learning how the pieces work and then 'adding back up' this knowledge to arrive at a greater comprehension of the whole. And, indeed, for machines and inanimate machine-like objects – from tiny atoms to large barren planets – it is an enormously powerful method by which to come to understand the 'dead' parts of the universe. So powerful that at the dawn of the Scientific Revolution, reductionism profoundly shaped our sense of what science even was. A scientific method was then 'too hastily expanded' into other fields of investigation, including – fatefully – those concerned with living, complex things. This had the inadvertent consequence of rendering other methods of investigation more suitable for living things as 'non-scientific' – a pejorative designation that has catastrophically held back our comprehension of the living world, including ourselves, and encouraged a dismissiveness of non-Western insights and traditions.

However, the slowly-dawning meta-learning of the Scientific Revolution, spearheaded by the rise of systems thinking, is that as you move 'up' from inanimate objects to more complex systems – from 'dead' things to 'living' things – so reductionism gradually loses its power as an explanatory method, because the 'add back up' assumption breaks down. A core essence of systemism is that 'the whole is more than – or different to – the sum of the parts'. Hence as we move up, we repeatedly encounter new levels of organization whose behaviours cannot be fully anticipated even with complete knowledge of the parts. These 'discontinuities' in emergent complex systems represent new levels of complexity, requiring understanding in their own right. Most important of all – though we cannot get into it here – is that at some point on this upward journey, we encounter something we have come to call a 'mind', capable of deriving meaning from the world and forming expectations about it, both critical, but subjective, capacities of living things brutally excised from the reductionist 'scientific' view of the world.

The Valley of Reductionism

Essentially, the Western mind fell into a Valley of Reductionism, which was positively beneficial for physics and chemistry, but which has been a decidedly poor vantage point from which to understand living systems, including human society and global ecology. Through the 20th Century, natural and social sciences have been clambering out of the Valley and shaking themselves off, but economics

was among the last to fall in and is among the last to clamber out. Systems thinking is one of the ropes with which the discipline can pull itself out. Alas, the greatest casualty of this whole development is that economics has been the most influential of social sciences and we have made the world in the neoliberal image its narrow theories advanced. Effectively, we somehow managed to reduce ourselves.

If you buy into reductionism…

The mechanical reductionist worldview opened the door for several developments that ultimately led us to believe that markets might be a more complete system of social organization than they are.

First, reductionism licensed at grand scale the accumulation of partial – or silo-ed – knowledge – and so ushered in today's high degree of disciplinary specialization at the cost of generalism, polymathism and interdisciplinary thinking. The economist, alas, is not expected to know any ecology. ('Of course not' is your instinctive reaction, which just confirms the norm of specialization, even though it is a rare economic decision that does not affect our ecology). More generally, there is a greatly diminished pool of people who might 'stitch together' the silo-ed knowledge we continue to produce at a staggering rate.

Second, this blinkering of knowledge acquisition repeats again within economics with the tunnel vision induced by liberal use of the 'ceteris paribus' – assume all else remains equal – assumption, with which so many economic theories start. Where systems thinking reaches out for the complexity, economics heads in the opposite direction. With blinkers on, the search begins for ideal or elegant models and the fantastical world building proceeds, culminating in ideas like complete markets theory.

Greed slips through the market net

Third, even before reaching the mathematical heights of 20th Century economics, an earlier, dimmer sense of the power of the market to 'add back up' was central to the cultural accommodation of markets as a new centrepiece of social organization.

It is hard to imagine from today's market-centric society just how small a role markets played in the social arrangements of the 17th and 18th Century, and how much their acceptance and acceleration required overcoming long-established mores and admonitions against personal greed. As economic historian Tomas Sedlacek neatly recounts, it was a cultural 'flip' more than any technological breakthrough or mineral discovery that propelled human society into the current Market Era. And the essence of that 'flip' was the sanctioning of self-interest.[72]

Hence, in 1714's *The Fable of the Bees* – among the first panegyrics to the market system – Bernard de Mandeville emphasized the market's seemingly magical power to transmute the individual 'Vice' of greed into the 'Virtue' of greater good. Not only did the market have the power to neutralize greed, but it also positively required greed as, in modern terms, the multiplier of effective demand and hence the driver of the economy overall.[73]

De Mandeville's commendation of greed met strenuous and widespread objection. John Wesley, the contemporary theologian, condemned Mandeville as a latter-day Machiavelli:

> *'…till now I imagined there had never been in the world such a book as the works of Machiavel. But de Mandeville goes far beyond it.'*[74]

But events took their course, with the practical benefits of markets asserting themselves, such that Adam Smith – *60 years later!* – could offer a more palatable account of market dynamics. Mandeville's 'vice' became 'self-love' and 'self-interest' in Smith's telling. Where Mandeville had

been the radical breaking new ground, Smith had the luxury of placing a professorial seal on the matter for an audience already won over.

At the heart of this shift was a major cultural reappraisal of the character of 'greed' – or 'Vice' or 'self-interest' or 'self-love'. Over a relatively short period, human culture flipped from a narrative of 'greed is bad' to an exciting new hypothesis: 'greed might be OK, you know'. Over time, conviction would grow. By 1987, of course, 'greed was good'.[75]

A critical part of the rationalization that bolstered real-world advance was the sense that markets could assimilate these articulations of greed and 'add them back up' to produce an overall economy able to generate more good for more people. Hence, Smith's famous quote:

> *"It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest."*[76]

The best the baker could do to help the butcher was to become the most profitable baker he could be.

The problem is not that Smith or Mandeville were wrong about the market's powers to transform greed into good, but that we came to believe that the market could *fully* capture and neutralize greed. But if markets are incomplete – if externalities exist – then markets do not capture and neutralize all the effects of greed, with the consequence that some greed slips through the market net and behaves like, well, plain old greed with excesses that destabilize the social and ecological system.

Admonitions against greed reflect a social learned wisdom – doubtless intuited long before it was ever rationalized or even verbalized – that excessive pursuit of self-interest can accumulate to have a dysregulating effect on social relations or on limited resource bases. In other words, teachings against greed are not just a staple of our oldest written traditions, but likely have much older evolutionary roots. Indeed, experiments have shown that primates can exhibit a strong aversion to unfairness and would rather go without any treat at all than be fobbed off with an unfair allocation.[77]

It was this age-old wariness of greed that churchman Wesley sought to uphold. Where economic histories recount a progressive sanctioning of self-interest from the 18th Century to today, Wesley would doubtless have perceived only the inexorable deshaming of greed. Today, there seems to be very little effective stigma associated with greed. When recessions loom, we are often exhorted to consume more for the good of the economy, while the wealth accumulations of the very rich are excused by an entrenched market narrative that presumes the wealth they have 'earned' must be their fair share of doubtless much greater 'value' they have created for the economy. We have lost sight of the earlier, intuited, understanding that admonitions against greed constituted an important balancing loop in the complex system of human society.

Having given greed freer rein, we have gradually super-sized the impulse via the creation of corporations – 'corporate persons'. These larger-than-life figures roam the cultural landscape leaving us at Lilliputian scale to thread a careful path among them. Not only are they 1,000-fold – or 10,000- or 100,000-fold – larger than individual persons – the original 'person' concept – but they are legally bound to pursue self-interest in a way that we would never think of legally binding real individuals, and which no non-sociopath would ever accept. Indeed, we have effectively created gargantuan sociopaths and given them full protection of the law and increasing capacity to shape those laws.[78] Challenging these entities of our own creation is becoming difficult: exercise some moral leadership from within and you risk being denigrated as a 'whistle-blower'. We have both super-sized and super-empowered self-interest, out of a fundamental belief that the market system can adequately harness the consequences.

Today, then, we have a market system that does not 'add everything back up' and so cannot neutralize all greed, some of which spills out to drive inequality and destroy the ecosystem. At the same time, old cultural injunctions against greed have lost their potency. With incomplete markets and diminished capacity to appeal to individuals' moral sense, we find ourselves systemically and institutionally induced to free ride upon each other and the social and ecological costs slowly accumulate in the background.

4.4. Concluding the Downward Journey

Looking at the whole CLA structure from bottom up, VML is not so much a solution to the sustainability crisis as a symptom of more profoundly unsustainable foundations of human behaviour. Our first response has taken the VML form it has because its market-conforming nature was dictated by centuries of earlier thought and development.

Though we have tended to perceive our ecological challenges as dating from the mid-20th Century, I believe we will not be able to solve them until we recognize them as a lagged response to profound cultural shifts dating back to (at least) the 17th Century. That does not imply that we need to roll back the clock and reinstate a pre-market society, only that we need to re-assess each link of the chain of thought that brought us to this point to see whether each link still makes sense in the abruptly different context of the Anthropocene.

Unconscious incompetency

I hope that some of what I have said has been revelatory, possibly even surprising. If so, it is because the ability to function in a human society does not require full comprehension of the reasons why we behave the way we do. As philosopher A.N. Whitehead put it:

> *'Civilization advances by extending the number of important operations which we can perform without thinking about them.'*

The same is true of individuals. The acquisition of a skill, from piano playing to driving to giving a speech, is the process of making an initially effortful conscious activity an unconscious habitual one. Our capacity to transfer activities to our unconscious is highly beneficial because it reserves 'expensive' consciousness for more valuable needs. In Bateson's words, in a complex and challenging world,

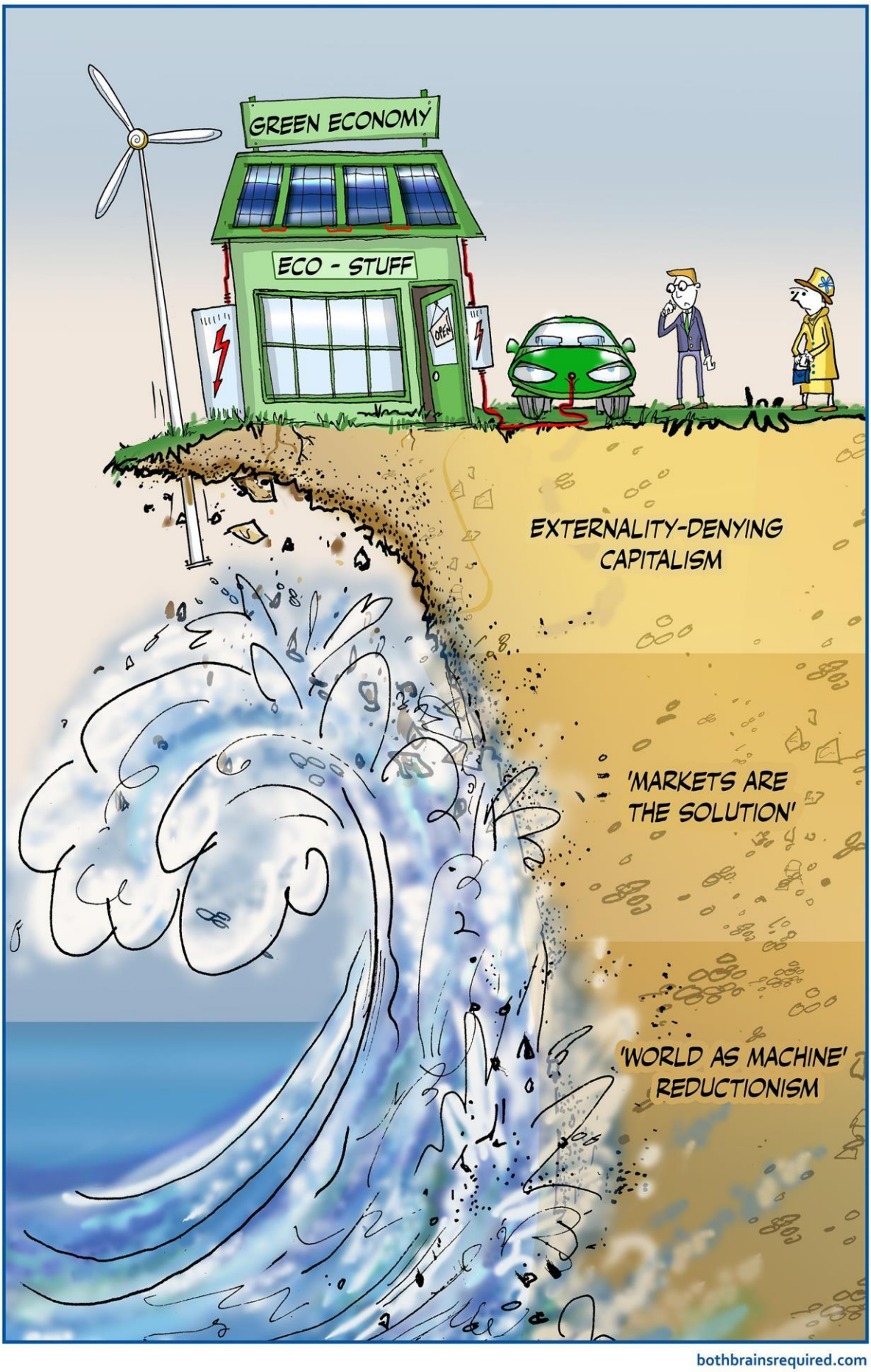
> *'no organism can afford to be conscious of matters with which it could deal at an unconscious level.'*

Mastery of a skill or a profession is the development of *unconscious competency*. Unfortunately, at both individual and collective level, the process is – and must be – fallible because habits or customs made unconscious by practice and positive reinforcement in one context may prove to be dysfunctional in an un-anticipatable new context.

As a result, if the context changes around a culture – as with the shock of the Anthropocene – a whole culture may end up displaying *unconscious incompetency*, by, say, polluting its own atmosphere, destroying its natural base, or creating social inequalities that slowly tear society apart. Worse, because of the power of cultural conformity, the only way for an individual to succeed, even survive, in such a culture may be *to master the incompetency that is being rewarded*! In the private sector, this may be principally, if unwittingly, accomplished by organizing to maximize GAAP profits despite the maximization of GAAP profits being precisely the process which generates the spill-over costs undermining our society and ecology.

The new context of the Anthropocene reveals our culture is shot through with habitual thoughts and behaviours that, though they may have been beneficial at an earlier time and comfortingly familiar today, are now dysfunctional. Periodically, at both an individual and collective level, there is a need to 'dig up' old thoughts and beliefs that have become habits, customs, even 'truths' to see whether they are functional or dysfunctional by the light of the new context. This is not easy, not just because of the psychological effort but because certain ideas may have sunk so far, they are hard to retrieve at all. What is repeatedly assumed is eventually forgotten.

Today's challenge is to bring our collective incompetency to conscious attention, reconfigure behaviours and habits and then, once aligned to the new situation, let them re-settle into our unconscious so we can become unconsciously competent in more sustainable ways of being.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5. … AND BACK UP AGAIN

David Graeber, the late anthropologist once said:

> *'The ultimate, hidden truth of the world, is that it is something that we make, and could just as easily make differently.'*

We can grasp a sense of an alternative world we could have made – *and might yet make* – by reflecting on a contrasting layered structure of cognition to the one we have. It is easiest to work from the bottom-up.

5.1. Metaphor Layer: From 'World as Machine' to 'World as Emergent Nested System'

Instead of seeing the world as a machine, we might see it as something like an Emergent Nested Complex System.[79] If this feels different, it is only to glimpse how the idea of world as machine might have felt strange to earlier generations. Yet structures like these seem to flow naturally from a systems view. Figure 10 kindles intuition – Gregg Henriques' 'big picture' view of emergent nested complexity as it has developed on Earth.[80]

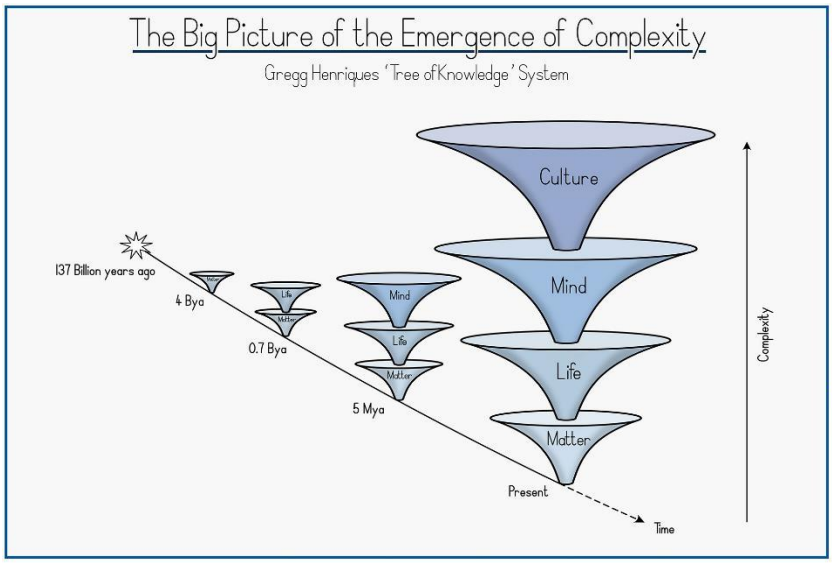


Figure 10: The Big Picture of the Emergence of Complexity (Gregg Henriques' TOK system)

Henriques' diagram conveys a sense of how complexity has 'emerged' or 'self-organized' over a long period of time to create a hierarchical or layered structure – very crude in this depiction. Each layer is both dependent on the layer below and constrained by it. Hence, biology (Life) cannot contradict the laws of physics (Matter), but then engages in outward and upward 'complexifying' and exploration of possibilities. As before, the structure exhibits a flexibility-rigidity trade-off. The laws of physics are unyielding, biology evolves slowly, but minds and cultures can change more quickly.

Emergence of human complexity

A version of Henriques' diagram focusing on the emergence of human complexity to today's market-centric social arrangements, might look as follows.

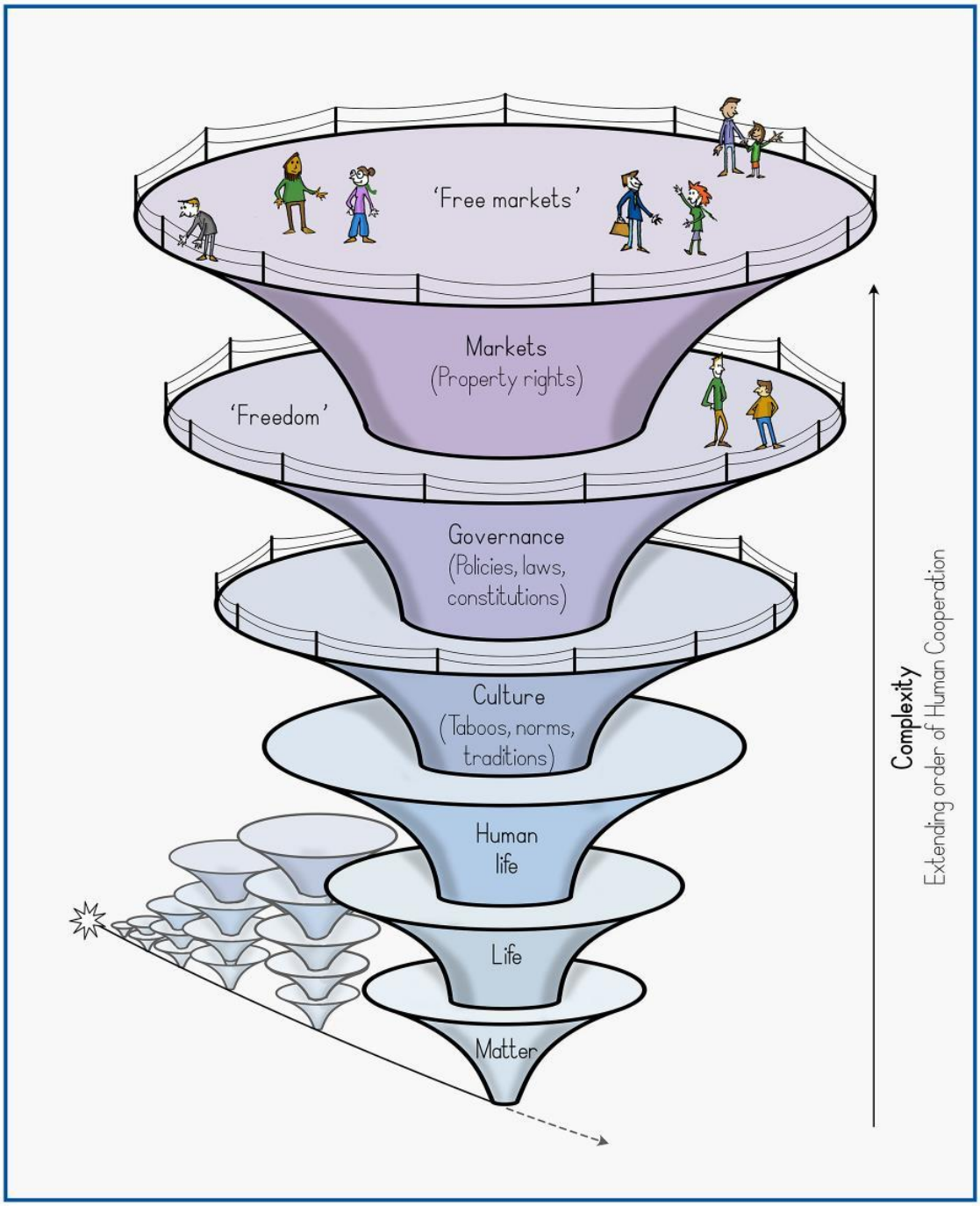


Figure 11: Emergence of Human Complexity

Again, each level establishes constraints that delimit what happens above it. For example, human physiology cannot contradict underlying laws of biology, and culture is delimited by physiology (e.g., our living arrangements are shaped by our reproductive patterns). But, at each level, there is considerable exploration of new possibilities.

One might place the 'free market' at the top of this structure today as being among the latest cultural developments, made possible by formal property rights. Interestingly, Hayek, for all that he bequeathed us the neoliberal trap we find ourselves in, offered a very helpful phrase for capitalism. He didn't much like the term, preferring to refer to the market system as the 'extended order of human cooperation'.[81] Whether or not he visualized it like Figure 11, he was alert to the idea that the market had emerged out of earlier human cooperation to form something substantially new. With hindsight, his mistake that we are now suffering from is that in his eagerness to limit the powers of government, which might easily stray to authoritarianism, he overestimated the degree to which the 'extended order' market system could fully supersede the underlying layers in promoting long-term human wellbeing. I return to this in the next section.

Seeing the world as an Emergent Nested Complex System brings three key features of living systems into view that enable us to understand how complex systems might adapt in a crisis.

1. Enabling constraints

The innate structure of a complex system is the counterintuitive idea of 'enabling constraints' or 'constraints that deconstrain'.[82] We commonly view constraints as restrictive only, which encourages the idea that layer upon layer of constraints might progressively constrain a system until it can do nothing at all. But that is not what happens in practice, because a system's naturally emergent character acts as a counterforce, constantly exploring what might be possible.[83] The result is that constraints serve to 'scaffold' and usefully bound an emergent complexity.

'Constraints that deconstrain' expresses the idea that the pay-off to the constraint is a new, 'higher' space for the system to explore. The idea that a constraint is an enabler or, in reverse, that 'freedom comes from constraint' is counterintuitive but it pervades systems architecture and is everywhere once one starts to look for it. For example, it is a key enabler of human creativity. For years, poets have understood that it is the tightly prescribed form of the sonnet or the haiku that frees the brain to generate creativity. Twitter users know the 280-character limit is a blessing in disguise. It imposes a brevity that benefits both writer and reader and which stimulates creativity. The advertising industry has also worked this out. 'Give me the freedom of a tight brief', David Ogilvy once remarked of the creative process.

Technology also provides a good analogy. In building his program atop an established Android or iOS operating system, the app designer is 'freed' from having to make sure his program will work on many different devices but is simultaneously constrained by the established parameters of the operating system. Even as the developer must work within the limits of the lower operating system, the benefits are that his creation will work on many different devices and that, overall, there will be many more apps available than would be the case if every developer had to reinvent the operating system.

'Freedom'

Curiously what pops out towards the top of the human stack of constraints are experiences we describe as 'free'. Individual freedom is dependent on the underlying enabling constraint of a Rule of Law and prior norms of justice. What gives us our freedom is everyone else constraining themselves to respect our rights.

Similarly, the misleadingly named 'free market' is entirely dependent on the enabling constraint of legally enforceable property rights. No property rights, no markets. Why would you ever pay for something if you could not be sure of asserting ownership of it? So, we don't have 'free markets' so much as 'markets enabled by the constraint of property' – I'm not allowed to simply help myself to your possessions, nor you mine. Irksome, I know, but it seems to work quite well.

Constraints have a bad rap, because we bristle at new ones, even as we barely notice the many established enabling ones. Yet constraints are the *sine qua non* for the self-organization of an emergent system. They are the scaffolding that brings complex life up out of the primordial soup.

2. Path dependency

A second critical feature is that each stack, or complex system, has a history and so a path-dependency. Its structure embeds and reflects past decisions made in past contexts upon past knowledge bases. Complex systems simply have not had enough time in the history of the Universe to try all possible solutions to land on the optimal path, so each complex system constitutes a highly path-dependent exploration of a vast 'possibility space'.

Constraints are identified and created which make sense for the time and context in which they are first developed. As time passes, past decisions are cemented into the stack. There may be whimsical 'frozen accidents' (e.g. the QWERTY keyboard); more deliberate 'frozen seemed-like-good-ideas-at-the-time' (e.g. 2 digits to record the year, not four); and much 'frozen wisdom' in the form of developments that continue to prove their worth (such as much of what is contained in our DNA).

As the stack progresses up, a geology-like sedimentation takes place in which earlier developments become more and more fixed into the structure and so harder to change. Old constraints 'sink in'.

One visualization of our sustainability crisis is that our human complex system has emerged in a context of an effectively limitless world with new frontiers always on hand, only to abruptly find itself in a finite and fragile world. Our emergent behaviour was not premised on this assumption and many 'old' ideas, habits, traditions and customs are no longer consistent with it, even though they are familiar and engrained. In some sense, the human 'stack' is now perceived to be in the wrong place relative to where it needs to be.

3. Two directions of adaptation

A third feature is that there are two principal types of learning and adaptation within a complex system, which can be visualized as two different directions of travel. (See Figure 12).

Upwards…

The obvious direction is the upward emergence of more complexity, as Henriques' diagram helpfully captures. Effectively, the emergence of each complex adaptive system represents an upward exploration within the space laid out by lower constraints, of which the base immoveable constraints are the laws of physics and upon which each successive layer establishes successive guardrails directing further upward movement.

This complexifying is a combinatorial learning in which different ideas and materials are iteratively combined and recombined within the space enabled and shaped by lower constraints. 'Good' ideas are fixed into the structure over time, based on how the system perceives – or values – 'good' and 'bad'.

This upward 'learning' is what the natural biosphere has been doing for billions of years, and of which our mentally- and now computer-guided technological development can be seen as the latest, highest shoot. As Stuart Kauffman puts it:

> *'Something in living biospheres surges 'upward' in diversity and complexity.'*[84]

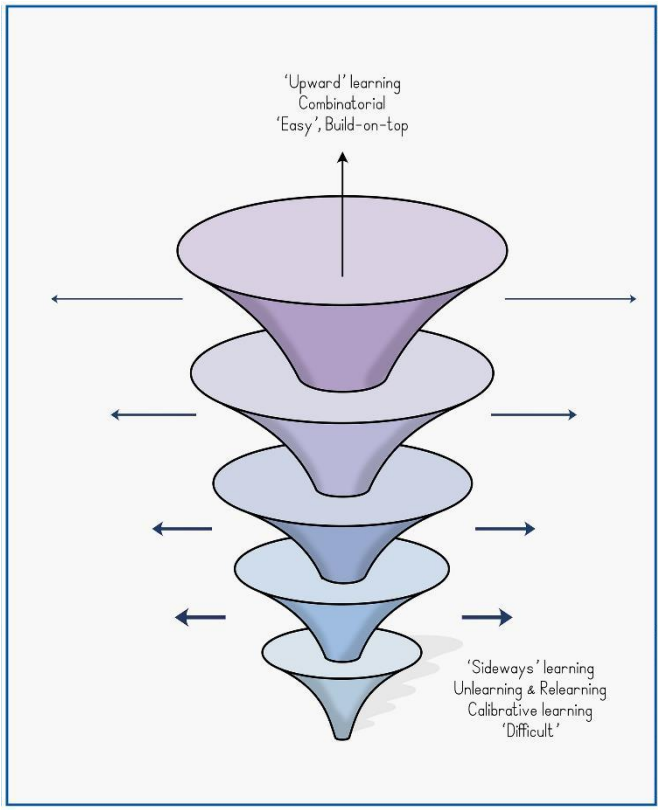


Figure 12: Two Directions of Adaptation of a Complex System

With the 'extended order' market system now on top of the human stack, we have found a mechanism that accelerates upward innovation via the spur of individual profit gain. New ideas are 'market-tested' to see what works and what does not. But the implication is that we are emerging upwards where profit directs. Profit has become synonymous with 'good' in terms of acting as the key criteria to determine what new complexity should be retained.

... and across

In contrast, there is a second type of learning which can be visualized as moving sideways, in an 'unlearning and relearning' process – or an 'uninstall and reinstall'. It might also be termed 'calibrative' learning because it amounts to recalibrating some existing parts of the established structure in the face of new context. In a sense, a complex system is continually correcting for imbalance.

Such learning is effortful and costly, because it is not just the 'building on top' of upward learning but the intentional breaking of a trusty habit or once-cherished custom, which may have been justified at an earlier time but is now deemed wrong or unhelpful. Part of the cost of sideways learning is the difficult crystallization of a psychic loss, or that what we may have been doing for years or decades is now 'wrong', by today's contextual demands. It is the breaking and re-setting of constraints just as sometimes bones and muscles must be painfully broken or torn to be re-lain straight.

Hence, for all that we celebrate and cultivate 'learning', we seem less enthusiastic about the equally important process of unlearning. We teach our children how to learn but do we teach them the difficult, but equally crucial business of unlearning? Yet, as Keynes put it, for many of our problems,

> *'the difficulty lies not so much in developing new ideas as in escaping from old ones.'*

The tension between upwards and sideways learning appears in many forms, as Table 1 indicates.

Table 1: Upwards and Sideways Learning

Upwards learning	**Sideways learning**
Adaptation via innovation	Adaptation via recalibration
Combinatorial learning	Calibrative learning
'Build on top' learning	Unlearn to relearn
'Easy'	'Difficult'
Growth	Restructuring
'Win-win'	Trade-off
Deemed practical	Resisted as impractical
Download a new app	Uninstall and reinstall the OS
Supply-side solutions	Demand-side solutions
New consumer product	New constitution
Profit-generating	Asset-stranding
New habit-forming	Old habit-breaking
Identity-reinforcing	Identity-changing
Business case	Moral case
'Something in biospheres surges upwards in diversity and complexity.'	*'The difficulty lies not so much in developing new ideas as in escaping from old ones.'*

In addition, the scope for sideways movement is dictated by the flexibility-rigidity nature of the stack and diminishes as one goes down. At the bottom, the laws of physics are not going to budge, but towards the top, human laws can be changed with some effort, taboos over a longer period etc. (See Figure 12).

VML and policy head in different directions

To return to the issue at hand, the innate tension between VML strategies and policy and cultural changes is that they represent two fundamentally different directions of adaptive response. VML represents the effort to adapt to the sustainability crisis through 'upward' innovation and further complexifying that pre-empts the need for more difficult 'sideways' change of policy and cultural adjustment. VML is about harnessing the profit-led, growth-resulting market system to generate innovations that avoid the need for effortful, disruptive, and demand-reducing recalibration. VML is our preference for a growth story over a restructuring story.

When one reflects on it, many of our green solutions represent yet more complexity, not just in the design of more high-tech components – from intricacies of new batteries to advanced materials – but in the more complicated supply chains and two-way, intermittency-handling electricity grids behind the scenes. All the 'clever' sensors, smart meters and real-time demand management programs add up to more complexity. Overwhelmingly, our VML strategies are upward movements.

Can't we just parallel process?

The question that has doubtless been tugging at the reader's mind is: 'can't we just do everything all at once, particularly given the urgency of the situation? Can't we parallel process?' The answer to that is 'yes and no'.

Of course, to some degree, a complex system is continually changing at all levels simultaneously. One of the better-known visualizations of complex system behaviour – the 'panarchy' model – is premised on the idea of 'nested adaptive cycles' in which different levels of system are engaged in constant, interactive adaptation.[85] Even though my initial physiological example of adapting to altitude (Figure 5, earlier) was presented as strictly layered change, the human body would simultaneously be adjusting to other daily and seasonal changes of context. Moreover, my other examples clearly demonstrate the possibility of parallel processing across multiple layers. In the technology stack, improvements are simultaneously made at every level from applications to operating systems to hardware. Similarly, countries' legal systems are in slow flux at all levels. New bylaws and policies may be issued while constitutional amendments are being debated.

However, the nested structure of complex systems helps us understand some of the tensions and primacies that exist between the layers.

Lower levels supersede the higher levels by delimiting the space in which higher level activity occurs. So, in technology, an app cannot do what the underlying operating system does not permit, and the operating system must work within the limitations of the hardware. The same for legal hierarchies: bylaws and ordinances may be easily changed but they cannot contradict underlying laws or be unconstitutional. Life has evolved to create myriad species, but Life cannot contravene the underlying laws of physics.

The beneficial adaptive power that lower levels have over the higher levels is that they can reframe the space in which higher level complexity can take place. Hence, with its powers to set property rights, prices and regulations, government has the capacity to re-shape the entire 'market space'. The real adaptive value of this power is to *constrain* or abolish activities currently taking place at the higher level, which are now deemed to be a threat to the system. The capacity for sideways movement is an enormously important element of our adaptive repertoire, but it comes at a cost as it represents the shifting of the slower adapting processes that provide rigidity to the system.

These costs take several forms. First, the finite resources and attention of a complex system must be directed to lower-level change. An individual analogy: when you want to break a bad habit, you must devote some of your 'expensive' consciousness to the process. A country-level analogy: if your country decides to leave the European Union, say, exiting existing treaties and establishing new international relations will consume an enormous amount of your government's finite decision-making bandwidth, temporarily compromising their ability to attend to other matters.

Second, lower-level change must be disruptive for higher-level processes because they work by upsetting or overturning assumptions that are implicit in higher level behaviour. Hence, higher level processes will either be suspended or permanently curtailed.

The cost of lower change is why our first-choice strategy is invariably to try and avoid it. Sometimes we can. In our earlier altitude example, oxygen masks are a technology that pre-empts the body's need to recalibrate to the lower oxygen levels of high elevations. Similarly, clever software fixes can postpone the need for lower-level hardware changes. Upward innovation within the existing enabled space can sometimes prevent the need for calibration, albeit at the expense of yet more complexity.

Policy and culture are prior to markets

The widespread inclination by VML practitioners to believe that any sustainability effort is better than none at all misses the tension that exists between VML and policy strategies.

The natural enthusiasm for VML is in part a manifestation of the difficulty of calibrative learning. We are hoping that market-led innovation may obviate the need for wrenching uninstall and reinstall of

property rights, laws and cultural norms, but it is looking less and less likely that will work. Yet, as a market-reaffirming movement, the execution of VML strategies is a daily reinforcement of market primacy, which postpones deeper level policy and cultural changes whose beneficial adaptive power is precisely that they can choke off certain market activities we can no longer tolerate, in a way that market-conforming VML strategies cannot.

The British economist Sir Paul Collier, sees the problem as a train derailing, rather than a system dysregulating, but makes the same point that market logic must be superseded, if required:

> *'Periodically throughout its 250-year history, capitalism has derailed. And when that happens, it's been up to public policy to get it back on the rails—public policy and the efforts of private citizens, of firms and families.'*

Policy and culture are prior to markets, but we have forgotten so.

5.2. Discourse Layer: From 'Markets Are the Solution' to 'Markets Are Useful'

If the long-term viability of a complex system relies on the ability both to move up and to move across, one way to view neoliberalism is as the self-imposed limitation of our ability to move sideways at the governance 'joint'. By shifting effective decision-making power to the market from lower governance processes – *'the market is the solution, the government is the problem'* – we effectively rigidified the stack, just as an individual after injury or illness may lose flexibility in their spine and only be able to 'bend' at the neck. The consequence is that, for problems that cannot be solved by market logic, we have denied ourselves the solution of lower-level recalibration. For now.

Polanyi and disembedding

Ironically, a contemporary of Hayek warned us of just this possibility. Karl Polanyi was not privy to modern systems language either, but used the interesting term 'disembedded' to express his fears about a market-centric society. He described a process by which markets would disembed from their social and ecological foundations – again, consistent with Figure 11 – and create an absorbing new decision-making arena such that we would increasingly steer society by market signals unaware of negative spill-over effects back from the market upon its very foundations. Effectively, Polanyi worried that the market was not Hayek's benign 'extended order', so much as a phenomenon destined to become a hazardous 'overextended order'.

Polanyi's conclusion:

> *'To allow the market mechanism to be **sole director** of the fate of human beings and their natural environment... would result in the demolition of society.'*[86] *(emphasis added)*

It was a nuanced warning, which probably impeded its spread. Polanyi's admonition was not that we should dispense with markets entirely, but that we should avoid letting them become the *sole director* of human affairs. Alas, this qualified advice lost out to the much more confident assertions by Hayek and Friedman that installing the market as (almost) the sole director of human affairs was exactly the way to go.

Polanyi's emphasis on 'disembedding' has caused a certain amount of confusion with many protesting it is nonsense to think of the market system disembedding from the real world, when it so evidently marshals real goods and products and directs real people's behaviour and time.

The model of an emergent nested system makes Polanyi's meaning more accessible. The market emerges – Polanyi says 'disembeds', Hayek says 'extends' – out of earlier cultural and governance

layers to form a substantially new arena for human decision-making. Because of the seeming coherence and completeness of that system, not to mention its short-term fruits, our perception and decision-making is disembedded from some of the underlying social and ecological truths – externalities – but our market-led actions and consequences remain very real.

So, it is not that the market *actually* disembeds from society and ecology and becomes somehow completely and safely detached, as it would be if it were all just a game, but it remains embedded in society and ecology while inducing us as 'consumers' and 'producers' to transform the social and physical world with a dull and blinkered sense of what we actually do. Markets are made possible by lower enabling layers, but evolve to deny their dependency on those foundations such that they become unaware of the damage they do to those foundations.

'Enabled by constraint' markets

To counter this easily induced disembeddedness ('it's the economy, stupid'!), it might be helpful to bear in mind that there are no such things as 'free' markets, only 'enabled by constraint' markets. Without enabling property rights, *conferrable only by a non-market institution*, markets could not exist.

Moreover, not only is there a *general* conception of property that enables markets, but there are also *specific* constraints that determine which things can be propertied or commodified. For example, different cultures have arrived at different views about whether beaches can be privately owned. In some cases, property constraints have evolved to enable private ownership (e.g., the US), in others to preclude it (e.g., the UK).

The general conception of property rights makes markets possible in the first place but the subsequent choice of which specific entities are granted property rights effectively shapes or steers the higher-level market space. There is then a huge pre-market lever of adaptation that exists by establishing or changing specific property rights to nudge the market dynamics of allocation and innovation in one direction or another.

This is the huge power of adaptation we have denied ourselves by making it seemingly impossible to price GHG emissions or valuable biodiversity resources – through tax, regulation, or prohibition. And it flows from the aversion to having governments *intervene* in markets – *'some markets are the solution, government is still the problem'*.

Central planning or central direction?

Resistance to government intervention is often argued in terms of 'central planning' being much less efficient than the market system, dating from an important economic debate in the first half of the 20th Century. And, indeed, it seems true that government-run supermarkets or furniture stores would be a bad idea. Where the market surpasses government is in its real-time facility to respond to ever-changing supply and demand signals. Markets are great at detail. Central planning of the breakfast cereal aisle sounds like a bad idea.

However, an emergent nested view of human society suggests that a better conception of government is as a 'central director' not as a 'central planner'.

What a central director can do much more effectively than markets is work at a lower level of the system to redirect the innovation space in broad brush strokes by adjusting property rights. Of course, this will always create winners and losers, and losers will challenge the legitimacy of a central director to change the rules from – literally – underneath them, but as noted before, *deeper changes must always be costly* because that is the price that must be paid for a system to have had rigidity.

Granting that a 'central director' – preferably of capable, elected human beings – can see broader and further into the future than partially-sighted markets, would be to hitch a complementary intelligence to the market intelligence we largely steer by today. Of course, government is a fallible institution – as are markets – but helpfully some of their respective fallibilities are offsetting.

Re-legitimizing government's role to establish new property rights – *'you know, government might be a key part of the solution'* – should now be a central goal of any business with sustainability aspirations. It would effectively be to re-embed markets that have become, as Polanyi warned, too disembedded. It would be to make markets a tool of human culture, not human culture the by-product of markets.

5.3. Social Science Layer: From 'Externality-Denying Capitalism' to 'Limits-Respecting Coordination'

Re-embedding markets in this way would amount to a shift from today's externality-denying capitalism to a complex systems-inspired model of social coordination. A key benefit would be the government's ability to respond to real biophysical limits in a way markets cannot.

It will dawn on people that an immediate consequence of limits-respecting markets must be a slowdown in 'growth' as we have been measuring it because they would reflect new limits we have not been considering.

In the real world of very incomplete markets, things of human value lie in two separate realms – the marketed domain and the non-marketed domain. Some of the growth of the marketed economy genuinely arises from human ingenuity and creativity unlocking better ideas and products from new combinations of inputs. This seems like 'good' growth, which ought to be celebrated and encouraged. However, other parts of monetized 'growth' arise from simply running down the stocks of what is valuable but in the non-marketed realm. This is the illusion of wealth creation based on registering the increase in marketed value, but not recording the decrease in unmarketed values. In contrast to growth from genuine ingenuity, this is 'wealth' conjured up by the Unmentionable Cost-Shifting Foot.

So, our measured economic 'growth' overall combines in unknown proportions a 'creative growth', which we want to encourage, and a 'parasitic growth', which we do not. At an aggregate level, it is almost impossible to trace the origins – creative or parasitic – of GDP growth, and very few official metrics make any attempt to do so.

Is profit good or evil?

This should deeply unsettle our views about economic growth. Our working assumption is that all economic growth is good. However, in not knowing the real-world mix between creative and parasitic growth, do we want more GDP growth, or less? It is not clear. And, given that companies work to the same price register as GDP, do we want companies to beat profit expectations or would it be better if they missed them? Who really knows? To echo Nietzsche from earlier, we cannot be sure whether a profit is good or evil, yet a market-centric society unthinkingly scores all profit as good. The equivalency of 'profit' with 'good' is, again, bequeathed us by the hypothesis of complete markets, but in a world of incomplete markets, the equivalency does not necessarily hold. And yet I never detected any embarrassment or even hesitancy from a CEO reporting better than expected profits on a quarterly call.

The same is true of market *efficiency*, held to be one of the great benefits of the market system. But if we do not know whether the growth that results from an efficient market is good or bad, do we want markets to be more efficient or less efficient? Who knows?

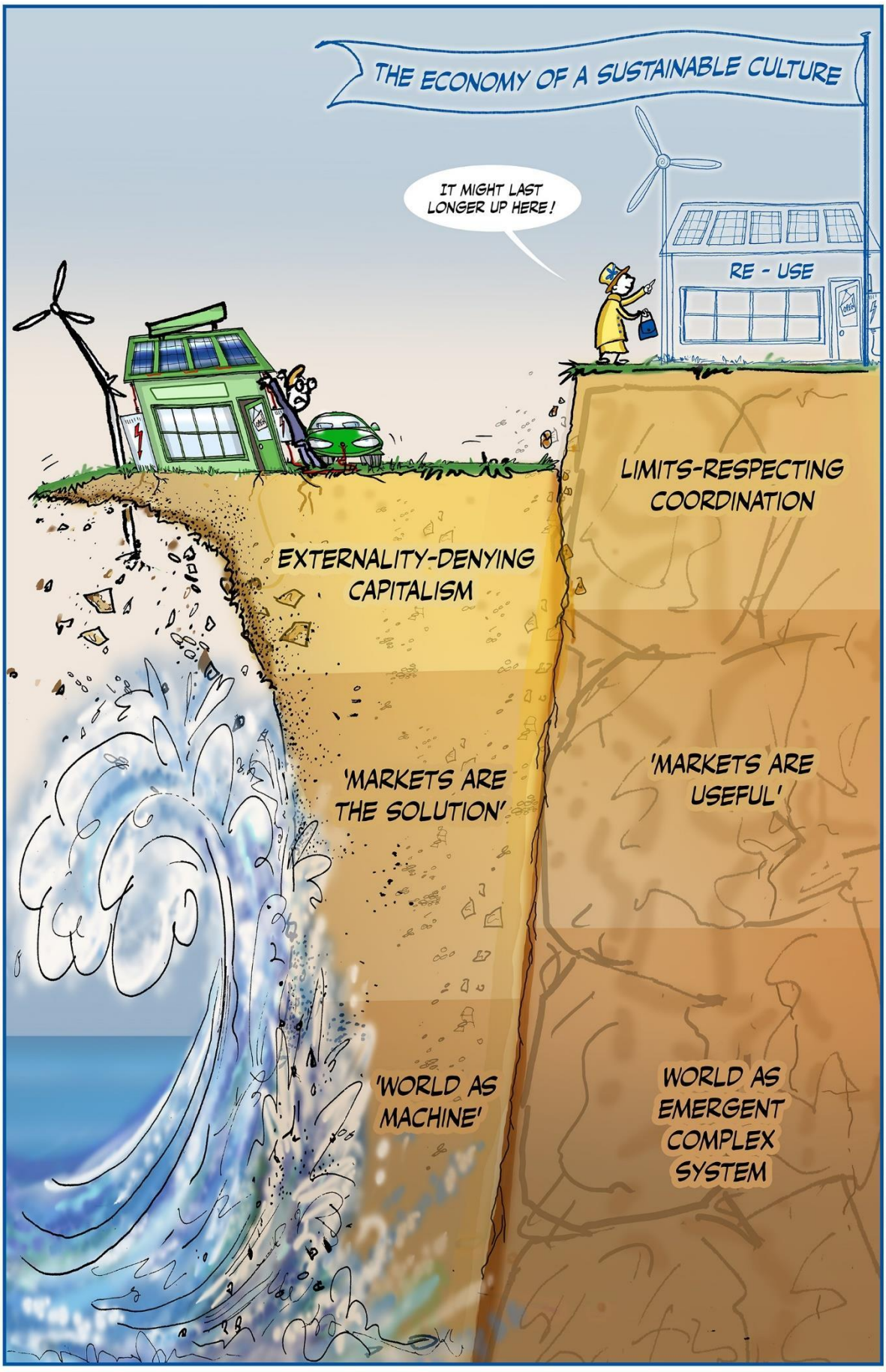
I don't know if the term 'capitalism' would survive the journey to this new cultural ground – or whether that would even be desirable. The specific problem with the term 'capitalism' is that its mere utterance upholds the entrenched view that markets have primacy over policy and culture, which just locks in the externality-denying capitalism we currently practice. Instead, the goal must be to have a market system that operates within a human cultural context that recognizes market externalities are real and significant. This wouldn't be capitalism or socialism so much as a model of limits-respecting social coordination, for which I am not sure there is yet a name.

5.4. At the Surface Again: The Economy of a Sustainable Culture

Returning to the surface, we arrive not at a 'sustainable economy' but at the 'economy of a sustainable culture'.

We will have effectively internalized that sustainability is a property of the whole, not of the parts. To claim to be a 'sustainable' business in an unsustainable economy is likely to prove hollow, as is the idea of a 'sustainable economy' in an unsustainable culture. What might ultimately become sustainable is the whole of our collective behaviour from our perception of the world up to our more careful and knowing transformation of and interaction with it.

As such we don't need 'sustainable businesses' and 'sustainable economies' so much as the businesses and economy of a sustainable culture. Certainly, this will include many of the elements to which sincere businesses and investors are now striving – cleaner energy, better materials, organic foods – but it will critically be on more solid cognitive and behavioural ground than those efforts are today taking place on. Upon that ground, we will also have the ability to explicitly curtail, ban, or limit those activities which we know today are problems or 'fails', but which at the moment continue to catch a free ride on the 'green economy transition'. There would also be significant cultural adjustments, too – less veneration of consumption, much more re-use than recycling, more appreciation for what has already been made and built, which might simply be maintained.


THE ECONOMY OF A SUSTAINABLE CULTURE
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RE - USE
LIMITS-RESPECTING COORDINATION
EXTERNALITY-DENYING CAPITALISM
'MARKETS ARE USEFUL'
'MARKETS ARE THE SOLUTION'
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6. CONCLUSIONS

With the rise of systems thinking, not only can we better understand complex systems, but also we can understand ourselves as a still emerging and adapting complex system.

We are a complex system in adaptive crisis.

Our 'first response' of voluntary market-led (VML) strategies appears to be a 'fix that is failing', but a view of complex systems as having layered adaptive capabilities suggests VML may have been an inevitable, not unhelpful 'defence at first depth'. It has triggered important innovations and accelerated awareness of our challenge.

The deeper defences of policy and cultural change now need urgent acceleration, but deeper changes are more effortful or costly as the price that must be paid for a complex system to have any rigidity. The specific tension between VML and policy strategies is that for policy changes to be effective, they will have to be demand-reducing and explicitly curtail certain market behaviours contra to VML's tacit support for profit-led, growth-resulting markets as the best solution for sustainability.

We might reconcile ourselves to more costly policy changes by recognizing that the sustainability crisis threatens some of our older and deeper ways of thinking. Working through those layers in a Causal Layered Analysis reveals that our current market primacy of self-coordination is rooted in thinking that is entirely pre-Anthropocenic. It would be a surprise indeed if that thinking were entirely compatible with newly identified threats to long-term human sustainability. In particular, it led us to today's market primacy, which continues to deny the legitimacy of government to direct markets to accelerate our adaptation to the new context of the Anthropocene.

VML practitioners could be a critical voice

The pool of businesspeople attracted to VML strategies now represent a large and influential repository of humanity's impulse to be more sustainable. As such, VML practitioners – from ESG investors to CEOs of 'sustainable businesses' – may now be among the most important actors in promoting human sustainability, *just not in the way they think they might be or are currently set up to be*.

The most powerful trigger I can think of that will accelerate policy developments would be for those who have tried to make the VML 'defence at first depth' work, but who have viscerally experienced its limitations as a sustainability strategy, to articulate VML's deficiencies. A clear signal from this group that we will need policy solutions as soon as possible – no matter the adverse consequences for conventional business and financial metrics – would provide an attention-focusing moment of the highest order. A clear and repeated message from VML practitioners that 'markets can't solve this' would be powerfully animating.

Undoubtedly, this will all be challenging, but it may be easier to accept if recognized as nothing less than the learning process of a complex system. The meta-learning of 25 years of VML effort is that we need to update the business metaphor. **The hope was that achieving a sustainable economy might be an appealing 'green growth' story, but it increasingly appears to be the mother of all restructurings** – a restructuring at the level of the whole global economy and likely to be multi-decadal in duration. Almost certainly, we will have to take some restructuring charges.

I know, I know, markets never like a restructuring story, but they are as central to a functioning market system as more appealing growth stories. They crystallize the moment when the market system 'unlearns' prior behaviours and capital allocations that no longer fit today's context, and for that reason there is pain associated with the loss. After all, what is a 'stranded asset' but an old good

idea that was given physical form and is now deemed to be a bad idea. It is what it is, but we've got to the point where accepting the reality of that fact may now be the most powerful catalyst to moving towards a sustainable culture – or continuing to deny it, the impediment we can least afford.

Sustainability is within human capabilities – excellent news! – but it will cost us something, at least by the (unsustainable) way we currently recognize 'profit' and 'cost'. Those costs will both be the need to allocate capital at sub-market, negative returns to build technologies that are practically possible, but not deemed 'profitable', and in foregone growth we erroneously thought we might have, but now realize the planet cannot tolerate. It is increasingly unhelpful to perpetuate a 'win-win' narrative that pretends such costs will not arise.

Business case or moral case?

Similarly, the great hope of the VML strategy was that there would be *a business case for sustainability*. But, if sustainability must mean 'sustainable enough before it is too late', the meta-learning is that there is just not much of a business case to rely on. The business case is simply too weak and compromised a force to promote enough change fast enough. Instead, *the moral case for sustainability* is going to have to carry most of the load from here.

This places corporate leaders in a difficult position. Any individual has the scope for moral leadership *as an individual*, but corporate executives are so bound by fiduciary duty, incentives, and business conventions that their scope to exercise moral leadership *as a corporate executive* is so compromised as to be virtually non-existent. We have designed corporations in such a way that the only moral choices they can promote are the subset that overlaps with profitability. Corporate leaders must always approach sustainability issues with a 'what is in it for us' mentality. For the great many moral decisions which are unprofitable by the way we measure 'profit' today, corporate executives can certainly pay lip service, but their hands are too bound to the profit maximizing wheel to do much more, while their daily discharge of their corporate duties only reinforces cultural norms to favour profit over morality. The unsustainability of many private sector professional duties and obligations is simply another manifestation of market logic not being able to solve this.

Optimism versus pessimism

There are real psychological barriers in accepting this. Doubtless, many may shrink from this as being all too pessimistic. Unfortunately, a cultural bias in favour of optimism over pessimism inhibits the acceptance of difficult truths, whose internalization might be the critical catalyst to real sustainable adaptation

We prefer optimism for all the obvious reasons – it is a far more agreeable emotion than pessimism and more pleasant to be around. Indeed, it sometimes feels as though there is almost a taboo against pessimism, particularly in the business environment, which generally rewards a can-do spirit. You can be marked down at review time for being too despondent.

But the merits of optimism and pessimism must always be weighed alongside the realism or denial to which they are attached. Optimism attached to realism can be a motivating force for genuine change. Optimism hitched to denial is a recipe for disaster – it is wishful thinking that achieves nothing until it is perhaps too late.

Pessimism may be an important signal we should heed. As the psychology books routinely express, pessimism, even depression, may be an entirely appropriate response to external conditions. Why would we have evolved such a powerful emotion if it did not serve some purpose? Possibly we should attend to its signal rather than rush to suppress it with ever more ubiquitous pills. Ultimately, we

need reality-based optimism, but pessimism might provide the necessary regrounding to reality that must come first.

The difficulty of changing your mind

The other psychological barrier is that for VML practitioners to now articulate limitations for strategies they have publicly promoted or pitched to clients amounts to a difficult change of mind and reversal of earlier positions. Changes of mind are challenging, more so when they are played out in public.

Keynes once said:

> *'When the facts change, I change my mind. What do you do?'*

Easy enough for him. He was an academic, a profession slightly more tolerant of mind changes. (It is sort of what they are meant to do). Harder when you have made promises and pronouncements as a public figure or head of a private corporation. Harder still when such pronouncements have shaped your identity.

In a sense, an individual's belief system is another example of a rigidity-flexibility stack. Trivial news items land upon our comprehension of the world with barely a surface ripple, but underneath are layers of mental models, beliefs, firm convictions, and 'must-be-truths', representing deeper and deeper thoughts to which we are progressively more attached, and which ultimately reach down to mould our identity.

Bateson – him again! – offered:

> *'If a man achieves or suffers change in premises which are deeply embedded in his mind, he will surely find that the results of that change will ramify throughout his whole universe.'*

'Suffers' is the masterstroke, because it speaks to the psychological turmoil that must accompany a change of deeper premise, as higher-level thoughts and behaviours lurch tectonically into new alignment in ensuing months and years. This is why the sustainability challenge is proving so formidable, because ultimately the critical 'theatre of operations' is the thinking enshrined in and encouraged by institutions shaped by Western cognition that exert so much influence over the modern world.

The shock of the Anthropocene profoundly challenges some of the core assumptions of the last 50 years – if not 300 years – of Western culture. The sustainability challenge is nothing less than our ability to transcend the neoliberal stage of development we had reached and prematurely thought might be the end of our quest for the ideal form of human self-organization. But, it has seen those that would defend today's capitalism merely defending an externality-denying capitalism we cannot afford. A greater signal, even, than leading VML practitioners sounding the limits of VML strategies, would be today's high-profile capitalists – *de facto* opinion leaders in a market-centric culture – acknowledging that externality-denying capitalism is the root cause of the problem.

There are glimmers of business writers starting to force moral questions into a VML discourse that has largely been the grafting of sustainability concerns onto business conventions. Alan Schwartz and Reuben Finighan have recently challenged whether sustainable investors can even be termed 'sustainable' if they do not have an authentic program of advocating for policy change, no matter the cost of those policies.[87] InfluenceMap are shifting public attention away from companies' physical footprints to what might be called their 'policy footprints' – i.e., what are they authentically doing to lobby for policy change?[88] Similarly, Paul Polman, former CEO at Unilever, has recently suggested

that executives should 'develop a sense of shame' about their high pay. This sounds very different to the City's usual fare of tweaking pay to 'better align' it, and re-focuses us back on fundamental values of greed, fairness, and 'how much is too much', that have too long been submerged by our cultural submission to market dynamics.[89]

In essence, to counter the usurpation of markets over culture, we now need a reverse usurpation whereby those who can see what has happened work to re-legitimize government and other cultural institutions to take the tough, moral decisions that are beyond the reach of corporations duty- and norm-bound to profit-maximize.

The long-run goal for a sustainable business should be to help forge a sustainable culture. Such a development would imply that sustainability has been 'solved' at the deeper and more convincing level of legislated rules and cultural norms, which would bind all actors not just those volunteering to be sustainable.

It easily may be true that the 'win-win' narrative of VML strategies has been both an inevitable and beneficial early response to our sustainability challenge and is now an inhibitor to the deeper change required. A future sustainable human culture may look back at the last three decades of the VML movement as an important moment of rising awareness and early effort. But, ultimately, the crowning legacy of the VML movement might be that it forced millions of people in the business community to learn enough about our environmental and social problems to recognize that the current market-led strategy is not the answer.

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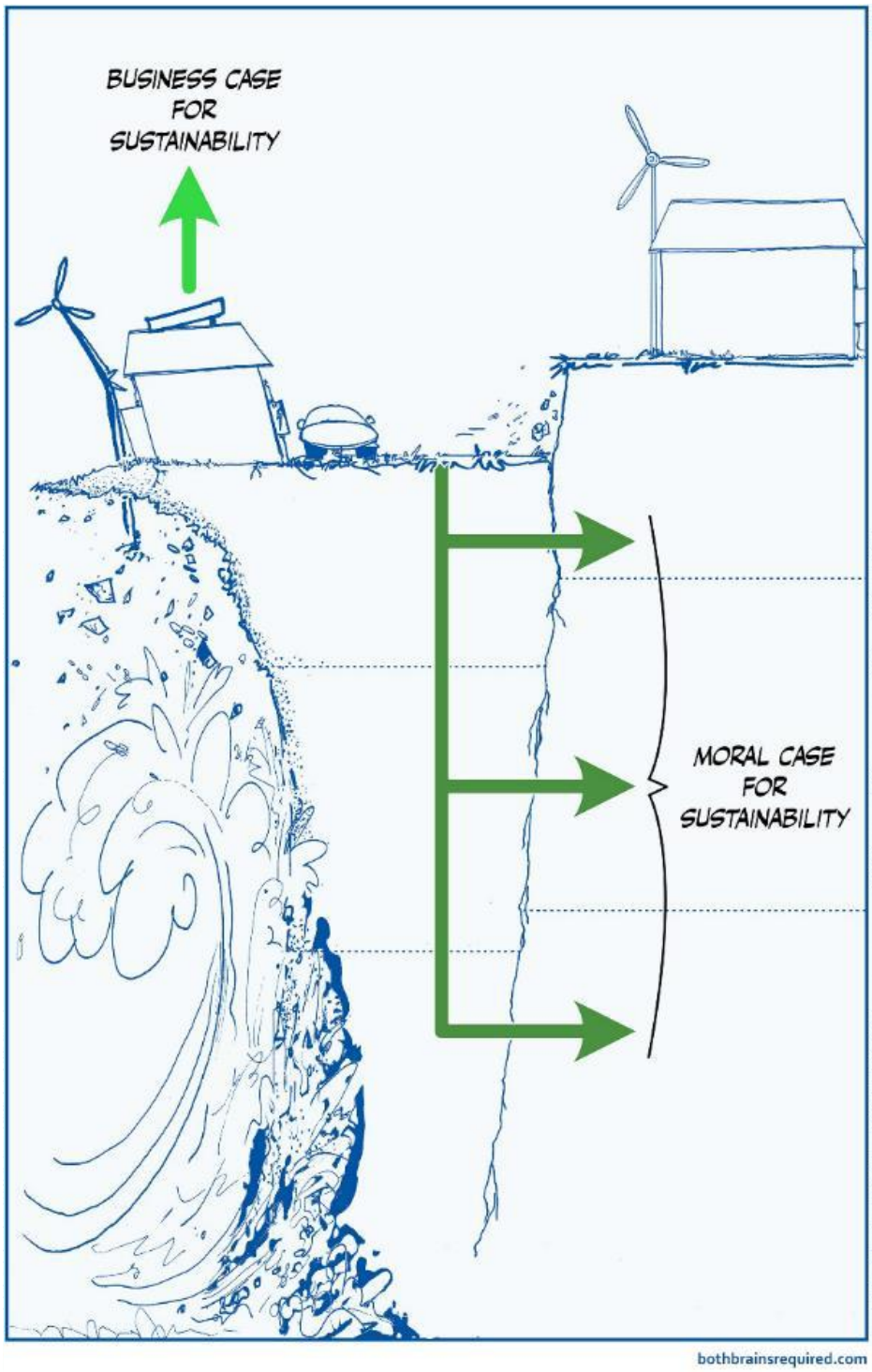
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