DEVELOPING TOOLS AND EVIDENCE TO DELIVER PROSPERITY

OPTIMISING FOR PROSPERITY WITH A META-FRAMEWORK FOR CHANGE

John M. Stormonth-Darling

Institute for
Global Prosperity

About the IGP

The IGP's vision is to help build a prosperous, sustainable, global future, underpinned by the principles of fairness and justice, and allied to a realistic, long-term vision of humanity's place in the world. The IGP undertakes pioneering research that seeks to dramatically improve the quality of life for this and future generations. Its strength lies in the way it allies intellectual creativity to effective collaboration and policy development. Of particular importance to the IGP's approach is the way in which it integrates non-academic expertise into its knowledge generation by engaging with decision-makers, business, civil society, and local communities.

For further information please contact: **igp@ucl.ac.uk**

Abstract

Change is persistent, and provisioning for prosperity in this complex dynamic world is not a simple task. Sustaining the conditions which enable certain prosperities can come at the expense of others whilst undermining the biophysical foundations required for all. In this paper I explore the tension between this need for sustainment and the inevitability of change by examining several conceptualisations and formalised frameworks for change which range from the holistic to the mechanistic. I find that both prosperity and resilience in human systems are contingent on the skilful nurturing of the novelty emergent from the great diversity of knowledges at our collective disposal. With this assertion in hand, I attempt to design and assemble a meta-framework for change that can describe our dynamic world and gesture it towards a future of equitably co-existing prosperities through a craft of emergence. Following this and a hypothetical example of the meta-framework in action, I conclude that it can indeed be a useful tool provided it can bare the weight of further scrutiny and integration with other approaches.

Acknowledgements

Publication

1. INTRODUCTION

1.1 PROVISION OF PROSPERITY

The maintenance of peace and prosperity in human societies has always been a challenge for those who govern them. Different societies have had different definitions of prosperity and views about how its enabling resources and mechanisms should be distributed. Political systems throughout time have organised to deliver quality of life in distinct ways, some emphasising state provision and mutuality while others focussed on individual agency (Fackler, 2020; Kagitcibasi, 1997). These diverse approaches to the challenge of living together emerge through persistent, improvised negotiations and renegotiations, both producing and reproducing the suites of norms, values and institutions that characterise each system's momentary form (Green, 2016; Ingold, 2008; Köhler et al., 2019). Just as an organism must respond to changing internal and external conditions to maintain its homeostasis, so must a society undergo continuous minor and major transitions in order to persist (Damasio & Damasio, 2016), lest it 'collapse' into a new form, be that by sudden violence, slow decay or something in between.

Such disruption is not necessarily a bad thing. For example, most modern European nations would not have found their way to the relatively inclusive societies enjoyed today without the gradual or abrupt decline of the less inclusive societies which preceded them (Acemoglu & Robinson, 2013). However, change can move in more repressive directions too (ibid). Outcomes aside, societal disruption often comes at the expense of great suffering and good aspects of an old system may be reactionarily thrown out with the bad. While change will continue to be necessary and inevitable, it is beneficial to both short-term wellbeing and long-term stability (implying future people's wellbeing) if it can be choreographed in less disruptive ways.

Many frameworks have been proposed for understanding and choreographing change (Köhler et al., 2019; Sovacool & Hess, 2017). These range from experientially developed, holistic interpretations such as Sharpe et al.'s (2016) Three Horizons or Scharmer and colleague's (2018) Theory-U which seek opportunity in change, to the more engineered approaches of risk management (Patriarca et al., 2017; Rothstein et al., 2006) and resilience theory (Boin & van Eeten, 2013; Carlson et al., 2012; Linkov et al., 2013) which tend to view change as more of an of exogenous inconvenience to adapt to out of necessity (Heal et al., 2014; Sikula et al., 2015). To generalise, the latter are primarily concerned with the maintenance of system integrity, while the former place more emphasis on the nature of a system's purpose.

As with life in general, the systems which demand such frameworks tend to be complex and adaptive; characterised by configurations of countless moving parts exhibiting nonlinearities and emergent phenomena which "cannot be reduced to the behavior of [their] constituent components."(Centeno et al., 2015, p. 67). These can be sophisticated machines like a nuclear power station, sociotechnical entities like nations or international trade flows, or the entire Earth biosphere. This is the territory of nuance and degrees of unknowability, requiring a diversity of management approaches involving trade-offs between connectivity, redundancy, adaptability, and resilience to prevent them from sliding into chaos (Cumming, 2016; Folke et al., 2002; Perrow, 1994; Wiig & Fahlbruch, 2019b). For example, the competing concerns of efficiency (i.e. cost) and safety in the complex adaptive systems (CASs) of critical infrastructure (Boin & van Eeten,

2013) and cyber security (Cornish et al., 2011) can spill over into the CAS of wider society if a balance is not maintained. The precise conditions required to sustain such a balance, however, will often be unknowable (Shrivastava et al., 2009; Tanczer et al., 2018).

In this paper I am concerned with human sociotechnical systems (HSSs) and how they foster prosperity. In these complex adaptive realms, we rarely have robust debates about how we want to shape the future, with leaders at best making questionable inferences from ambiguous signals (Dryzek et al., 2011; Stoker, 2015) and citizens often deferring to coarse grained tribalism (Bächtiger et al., 2018) or apathy (Bottici, 2014). When change is required, gradually refined relative stasis and abrupt revolutionary transitions can both be cast as valid mechanisms for enhancing the prosperity which HSSs afford to their people (Coccia, 2018). I will contend, however, that with the right framework, or combinations thereof, we can orchestrate radical, widely beneficial, timely change without the need for painful disruption.

One major framework for change currently in play at the global level is the United Nations Sustainable Development Goals (UN SDGs) which typify the present global moment in which many national governments and multilateral institutions are notionally committed to affording a state of prosperity to all humans, many non-human animals and, increasingly, to nature itself. While the SDGs constitute an unprecedented triumph in the alignment of shared trajectories, they are underpinned by neoliberal capitalist ideas of development and progress which privilege a certain world view that can be identifiable as Western, Eurocentric or of-the-Global-North, and is cemented in economic and institutional structures, as well as through technology, scientific knowledge and cultural influence (Gabor, 2021; Gibson-Graham, 2008; Moore, 2015; Santos, 2014b). Such a singular vision for global prosperity, like many such frameworks before, threatens to nucleate and nurture systemic frailties whilst struggling to conceive solutions which do not reproduce the same problems (Gunderson et al., 2018); solutions which this dominance obscures

through its foreclosure of subaltern futures and other context-specific prosperities which might otherwise be allowed to flourish (A. Escobar, 2017a, 2017b; Moore, 2015; Moore & Mintchev, 2021; Scoones & Stirling, 2020). These frailties are already visible in the uneven distribution of the ingredients of prosperity (Atkinson, 2015; Stiglitz, 2013) and the effect of its primary tool – consumption fuelled economic growth – on the biosphere (Hickel, 2019a; Hickel & Kallis, 2020; Jackson, 2017; Klein, 2015). Thus, exploitation of both people and planet seems fundamental to prosperity-by-progress and frames prosperity as something of a limited resource itself; a sure indication that other approaches may be required.

While the tools of capitalist progress have many laudable successes (see e.g. Alexander and Rutherford, 2019)a fruitful consensus over the management of the commons cannot be generated from a cognitive monoculture (Green, 2016; Santos, 2014b), especially in the face of the scale and complex uncertainty of the challenges we face (Waddock et al., 2015). If "prosperity is an emergent feature of a whole ecology" (Moore & Mintchev, 2021, p. 18) then more sophisticated ways of combining and operationalising knowledges to consider and shape how the world changes are required. It is to this task that I dedicate the remainder of this paper.

I will argue that due to myopic notions of progress and short-termist incentives, we are poorly equipped to deal with many of our grand challenges and change in general, especially over the long term. Following this I introduce several existing frameworks for managing change and stability which approach the inherent complexity and uncertainty in different ways. These include the Multi-Level Perspective (Geels, 2002), Transition Management (Loorbach et al., 2015), Three Horizons (Sharpe et al., 2016), Resilience Theory (Sikula et al., 2015) and Planned Adaptation (Sowell, 2019); the latter of which I find to have particularly compelling potential to choreograph timely transitions with minimal disruption. Combining lessons of these with other insights I will attempt to answer the question: can an augmented version of Sowell's conceptual model of Planned Adaptation (ibid)

provide a viable, uncertainty-tolerant, future-proof, meta-framework for the maintenance of diverse, co-existing prosperities within the biophysical limits (see Raworth, 2017; Rockström et al., 2009) of the complex adaptive Earth system? My answer will come by way of the assembly of such a meta-framework with design criteria based on the components of this question. Following this I demonstrate the meta-framework in a hypothetical case before moving to a concluding self-assessment.

1.2 APPROACHES TO CHANGE

1.2.1 CHANGE AS A GRADUAL AND PERSISTENT (CGP)

I have alluded to two ends of a spectrum which I wish to explore more deeply: change as gradual and persistent (CGP) and change as unpredictable and chaotic (CUC). I approach this by painting a picture of each in their exaggerated forms to use as reference points as I go on to explore the space in between. Starting with CGP, I must first acknowledge that 'gradual and persistent' refers to a long-run average and does not in any way discount sudden punctuations such as technological and social revolutions. Without clearly denoting what exactly is changing, CGP is conceptually attuned to a largely Eurogenic mythology of development and progress[a] which marches in step with time as a monotonic, evolutionary process of constant improvement that permits naïve extrapolation of simple heuristics – like 'gross domestic product (GDP) equals prosperity' – into the future (Bowden, 2011; Jackson, 2017). Cultures which defy the nomenclature of "purposive movement" (Trevor-Roper, 1965 in Fuglestad, 1992, p. 311) have been considered of little value in this unfolding story, a sentiment that still underpins the dominance of post-Enlightenment progressivism and the hegemony of the places where it was first adopted (i.e. today's Global North). This, in turn, underpins the homogenising-civilising approach

of progress and development espoused by the UN SDGs (Moore, 2015) and so-called Wall Street Consensus (Gabor, 2021).
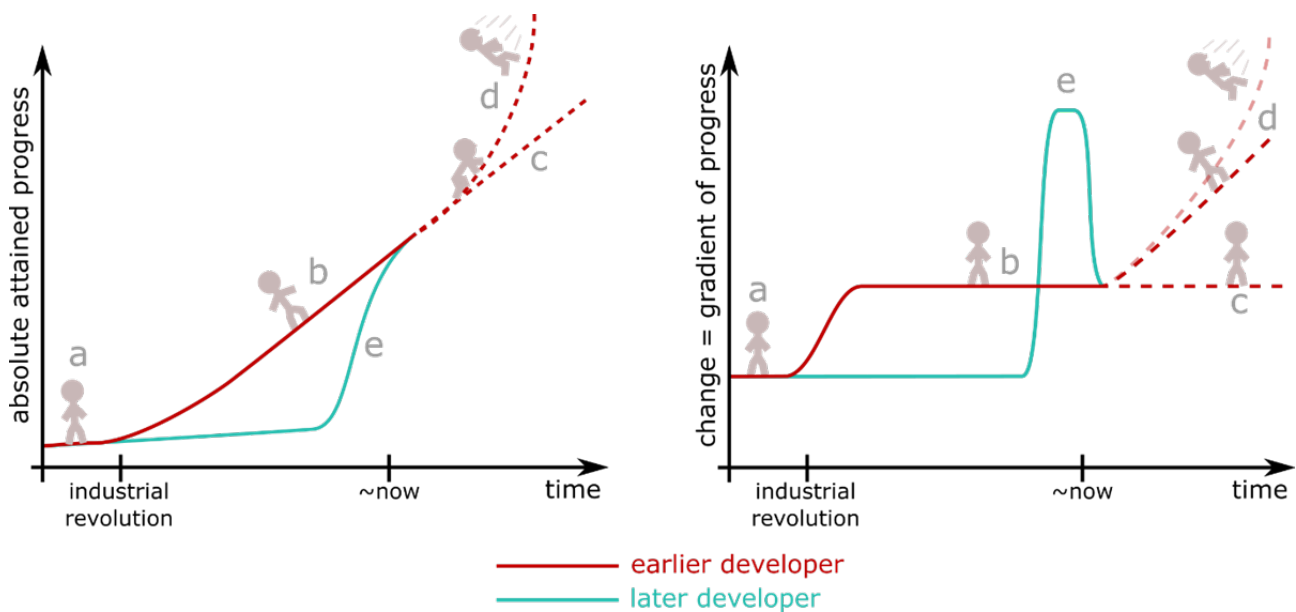
The language of 'development' falls over somewhat when those who are referred to as 'developed' remain committed to the path of 'progress' and so are very much still 'developing' themselves. Being more sympathetic, one might accept the definition that 'development' constitutes the gang plank onto the great ship of progress (Figure 1e), but that still says nothing about the disadvantages of all being on a single ship or which destination has been selected at the expense of which others.

The case of sustainable development has an oxymoronic component typical of CGP where the goal is really just a continuation of the process (Newman, 2005). For CGP in general, the tension between change and stasis stems from the juxtaposition of dynamic reinvention (i.e. innovation, progress) with the stable conditions that facilitate it. As a self-contained model, this can cohere if we frame our ethereally defined 'change' as the constant gradient on a graph of rising 'attained progress' (Figure 1b) as it merely requires that we maintain the system's parameters to keep the ground steady (Figure 1c). As the right hand plot shows, however, constant change itself represents a form of stasis, which may go some way towards explaining the notion of the hedonic treadmill (see Diener et al., 2009; Keely, 2005) – that "the vertigo of change frequently turns itself into a feeling of stagnation" (Santos, 2014a, p. 170) – and why regimes based on CGP are eternally motivated to increase the rate of change (Figure 1d).

Progress, however, is not the only form of change. Migration and climate change are also forms of (disruptive) change which have different metrics from but are intimately linked to progress, however it is measured. While CGP might almost make sense for an isolated system, it falls apart in practice when such phenomena reveal that no HSS is independent of the biosphere and any illusions of maintaining a simple equilibrium rate, character and direction of

---

a The contemporary political discourse in China shows how similar progress imperatives can be derived by harnessing elements of quite different history and traditions (see e.g. Hansen et al., 2018).

Figure 1. Caricature of CGP with development/progress as a loose example. Left: absolute obtained arbitrary progress throughout linear time. Right: corresponding graph of the rate of 'change' characterised as the gradient of 'progress'. For present day 'developed' nation, (a) preindustrial era with low CGP, (b) capitalist era of CGP, (c) future projection of CGP, (d) future projection of steadily increasing or accelerating change. (e) shows rapid 'catch-up' phase for 'developing' nations.

change will eventually be shattered by interactions with the complex adaptive environment. Indeed, "many economic effects that were treated as 'externalities' in twentieth-century theory have turned into defining social and ecological crises in the twenty-first century" (Raworth, 2017, loc. 2177). That CGP still underpins the global economy is testament to the depth of the hubris and is likely to continue for as long as "[t]he resolve to sustain what is widely regarded as unsustainable is the central characteristic of contemporary politics" (Moore, 2015, p. 805).

Further imperative to ween the economy off a reliance on the persistence of CGP (as consumption driven GDP), is evident from the ways it is undermining its equilibrium by virtue of its own success (Rosa, 2016). This is particularly noticeable in the disruption attributable to accelerated rates of technological (Alexander & Rutherford, 2019) and social (Rudel & Hooper, 2005) change. Furthermore, West and colleagues (2017) described an array of scaling laws observed in the sociotechnical metabolism

which require increasingly frequent innovations in resource use efficiency to 'reset' the curves of consumption-fuelled economic activity to within more sustainable bounds; a trend which we cannot guarantee will keep up with demand (Alexander & Rutherford, 2019; Hickel & Kallis, 2020). We may be comfortable standing on a gentle incline, but these insights suggest the drive for progress may find us scrambling up an ever-steeper gradient, whether by the hedonic treadmill effect or by some intrinsic characteristic as suggested by West's analysis. The consequences are, as ever, unpredictable, but the hermeneutic outlook we are afforded suggests they may be considerably dire (Bendell, 2016).

1.2.2 CHANGE AS UNPREDICTABLE AND CHAOTIC (CUC)

If CGP is deleteriously neglectful of the complex adaptive world around (and indeed within) it, content to push blindly towards an undefined, biophysically

improbable destiny, then the insights of a CUC perspective might offer a welcome alternative. Indeed, Mowles (2014, p. 172) argues that we should "assume that non-linearity in the social is the norm rather than the exception" which implies that CUC is not an opposite pole to CGP, but rather intimately embedded in any phenomenon that CGP seeks to describe.

But is CUC a useful concept as a dominant worldview? In simple terms I think not. If we characterise the world as entirely unpredictable, nonlinear and without direction then, not only does this contradict the many causal relationships we observe daily, but it also inclines us to neglect the necessary planning and societal coordination required for prosperity. This implies an unworkable world where nihilism would abound and the logical extreme of moral action would constitute the absurdity of doing as little as possible for fear of unknowable negative consequences (MacAskill & Mogensen, 2018). Furthermore, such wholehearted fatalism seems politically untenable given the present proclivity for apparently stable foundations.

Fortunately, just as with the fallacy of stability, complete disorder is also a rarity. According to Young (1991, p. 292) and contrasting clichéd references to entropy, "nature does not tend toward disorder but tends toward transformations between states" while Centeno et al. (2015, p. 68) suggest that "emergent systems tend to evolve through adaptation to a critical zone that lies at the border between order and chaos." Thus, an appreciation of uncertainty is crucial both to the maintenance of stability-desiring systems and the transitions between them, as well as a vital counterbalance to the hubris of certainty (Elahi, 2011), but it is not sufficient as a sole explanator of change. CUC is inherently holistic, and welcome for it, but qualitative nuance at different scales of observation is also important (Young, 1991). Rather than looking for complexity only and 'all-the-way-down', teasing apart the interdependencies within CASs can reveal clues of a tangible agency

and leverage points (Meadows, 1999) that will serve us better in our pursuit of a praxis of uncertainty (Dougherty, 2017).

It is this notion of harnessing complexity and uncertainty as a craft which many authors espouse in their attempt to counteract the dominance of CGP (Dougherty, 2016, 2017; Elahi, 2011; Moore & Mintchev, 2021; Waddock et al., 2015; Walker et al., 2020; Young, 1991). In government policy, by contrast, the tendency in recent decades has been to distil the nuance of complex uncertainty "into a restrictive straight-jacket" (Scoones & Stirling, 2020, p. 12) of deterministic risk management practices; a suite of mechanisms generally more suited to machines and infrastructure than to broader HSSs (Jasanoff, 2003; Mythen, 2021; Scoones, 2019; Sikula et al., 2015). Risk is not a wholly inappropriate framing for complex challenges — indeed it forms the basis of useful frameworks I will explore shortly — but it has a way of engendering simplistic box ticking and questionable, probabilistic quantification of both knowns and unknowns (Douglas, 1986; Scoones & Stirling, 2020; Taebi et al., 2020). An emphasis on resilience and responsive (but not reactionary) adaptation would be more appropriate given a substrate of constant change whose character, direction and risk landscape we cannot take for granted (Centeno et al., 2015; Folke et al., 2002; Walker et al., 2020).

1.2.3 TEMPORALITY OF CHANGE

It seems then, that somewhere in between the extremes of CGP and CUC we can begin to reconcile, and even operationalise, the tension between certainty and uncertainty. Without the latter we do not learn from and adapt to the changing world, and without the former we have little to build upon or look forward to. Young's (1991) assertion that transitions between system states are fractally distributed across time[b] provides a neat way for CUC and CGP to coexist if we imagine a persistence of many small chaotic events as the drivers of

---

b Fractal distribution in this temporal context implies that the frequency and magnitude of transition events will scale in proportion to the timescale, so the pattern will look similar whether you zoom in to observe changes in the internal environment of a single cell over a few minutes, or zoom out to observe changes in the global environment over millennia.

seemingly continuous, even directional, change when measured more crudely. On longer temporal scales such as those of empires and geological epochs, conditions thought to be stable are revealed as mere moments during which conditions were maintained around a temporary homeostatic equilibrium. One of the failings of the progressivist, capitalist project is the ignorance and arrogance with which it remains blind to this temporal context as it continues to optimise itself into oblivion in order to satisfy inflexible system parameters.

Despite this inbuilt fragility, modern capitalist democracies are often held up as the state-of-the-art recipe for prosperity. Yet given the short-term incentives behind their foundational economic and political institutions they are precariously ill-equipped to anticipate change over the longue durée (Hovi et al., 2009; Jacobs, 2011; Montgomerie, 2008; Stoker, 2012). The conflation of prosperity with economic performance is demonstrably erroneous in anything but the very short-term (Easterlin et al., 2010), yet it still underpins capitalist CGP and curtails the resources governments are willing to commit to institute novel metrics (see e.g. Dasgupta, 2021; Moore, 2015, p. 802; Moore & Mintchev, 2021) and sociopolitical infrastructure (see e.g. Dougherty, 2016; John & MacAskill, 2021) which could more favourably recolour the likely short-term sacrifices required for long-term prosperity (Stoker, 2015). Recent attempts to institute representation for future generations in several countries (Davidson, 2020; Jones et al., 2018; G. Smith, 2020), show promise but more should be done, particularly if we consider the vast number of people who will exist in the future if we can keep the planet in a habitable condition (Greaves & Macaskill, 2021; Mogensen, 2020; Ord, 2020). Taking such an extreme long-termist perspective is laudable, although several authors in that field seem worryingly committed to a growth-normative, CGP mindset (Aschenbrenner, 2020; Cowen, 2018; Trammell, 2020) at odds with biophysical reality (Hickel, 2019b; Hickel & Kallis, 2020) and the profound responsibility we have as nascent ancestors to navigate the present moment, analogised by Ord (2020) as a 'precipice' on our path to the future.

On the subject of 'moments', my earlier calls for plurality necessitate a brief discussion on the interpretation of time. Kairos (event time) and chronos (clock time) may be suited to different types of change decisions (Dougherty, 2017), while the inclusion of diverse knowledges may require an appreciation of yet other temporal structures (Adam, 2002; A. Escobar, 2017b; Fuglestad, 1992; Santos, 2014a) and the capability to translate between them (Santos, 2014c). Ingold (1993) flirts with CGP in his fluid articulation of the 'moment', seeing change as intrinsic to life itself wherein individuals, societies and all of nature are in a constant state of 'becoming'. He articulates Radcliffe-Brown's likening of social life to a living organism where "form is continually emergent" (Ingold, 2008; p. 77) and states that human societies maintain "continuity through change" (ibid; p. 77). From this perspective we can see ourselves as at a conduit between past and future, simultaneously affording us a certain agency whilst acknowledging that we are both the product of history and the genesis of histories yet to be formed. It doesn't contradict a desire for any sense of 'progress' or lack thereof, but it does permit us to relax our need for such vigorous teleological compulsion without denying us a vision of the future and a hand in shaping it. While it errs towards the continuum of chronos, it still leaves us free to be more adaptive to the ebbs and flows of the unknowns ahead.

Santos (2014a), on the other hand, takes a dimmer view of life in the transient, arguing that the present moment needs to be actively 'expanded' to counteract the emphasis that the rationalist, Western CGP mentality places on the promise of an infinite future. He envisages the expansion of the present as a mechanism "to create the time-space needed to know and valorize the inexhaustible social experience under way in our world today" (ibid, p. 165). This is a call to epistemic plurality and 'multivocality' (Ferraro et al., 2015), to notice the subaltern and to "avoid the massive waste of experience we suffer" (Santos, 2014a, p. 165) in an "abbreviated version of the world" (ibid, p. 170). These sentiments are echoed by Escobar's (2017b) clarion call against 'defuturing' and for "a world where many worlds fit" (the Zapatista of Chiapas in ibid, p. 43),

as opposed to "fitting all worlds into one" (ibid, p. 47) as per the designs of a dominant CGP narrative. Finally, Scoones and Stirling (2020, p. 17) highlight the plight of those forced to live in a present where "time becomes compressed" due to their state of precarity. Such individuals are afforded neither an expanded present nor the mental bandwidth to contemplate any future(s), living as they are in an eternal-yet-transient quantum moment of CUC.

1.3 CHANGE FOR PROSPERITY

In CGP and CUC I have described two poles of an epistemological spectrum of change but, in reality, they are idealised caricatures which merely represent way-markers in a vast, multidimensional space of knowledges about change. The CGP approach of modern capitalist economics resembles a specialist machine, or simple model of an organism, which must maintain its system integrity, or homeostasis, through the stability of certain parameters and the careful management of quantified risk. CUC represents an unworkable extreme which nonetheless illustrates the ubiquity of emergence both within, around and constitutive of even the most tightly orchestrated systems. It simultaneously presents a need for humility in the face of the wild unknown alongside the opportunity harness a richness of knowledge and experience unachievable through mechanistic planning alone. Together these way-markers gesture to a space familiar to a self-regulating organism in harmony with the momentary near-equilibrium of its environment, yet one underappreciated by the juggernaut of human progress which only desires a constant supply of fuel and the next mile of road towards an ever-receding horizon.

To know this space and learn its craft is imperative to our interdependent prosperities, those of our descendants and the endurance of the human moment. This calls for systems imbued with adaptive resilience which calmly expect the unexpected and have the humility to see beyond their own self-optimisation. In the words of Walker et al. (2020, p. 1), "[w]hat is needed is a deliberate, fundamental cultivation of emergence to enable transformation toward better futures in order to avoid an inevitable deepening of a system that ultimately is worse for all." To this end I now introduce several existing frameworks which approach this deliberate cultivation of emergence and adaptive resilience in different ways, after which I attempt to assemble them into a coherent meta-framework that might illuminate the path to prosperous future worlds.

2. FRAMEWORKS FOR CHANGE AND RESILIENCE (FCR)

Having discussed how change is perceived, I now turn my attention to how change happens. In this effort I draw upon a range of frameworks for change and resilience (FCRs) which are variously equipped to describe, shape and orchestrate change in and of CASs for the purposes of transformation, maintenance of system integrity, and sometimes both. The selection is intended to represent a broad epistemological space from a manageable number of perspectives that together can offer an enriched perspective on change, as well as to gesture to something that can be operationalised and measured. For this reason, two of these FCRs (Resilience Theory and Planned Adaptation) are intentionally chosen for their integration of CGP-compatible risk management practices, not only for the actionable practicality which such approaches provide, but also as a bridge between the dominant contemporary narrative and the more plural, adaptive praxis we require. This technocratic leaning towards bounded models is tempered by the more holistic elements of the other FCRs so that together they present a palette that might be used to describe both the breadth and depth of HSSs.

2.1 THE MULTI-LEVEL PERSPECTIVE (MLP)

Over the past twenty years, the literature on change has been increasingly driven by theories of sociotechnical transitions, particularly in the area of sustainability (Köhler et al., 2019). Of these, a prominent framework is the Multi-Level Perspective (MLP), put forward by Geels (2002, 2004) to conceptualise how transitions are mediated via the dynamic interplay of process occurring on and between three distinct levels in a sociotechnical system: niche, regime and landscape (see Figure 2).
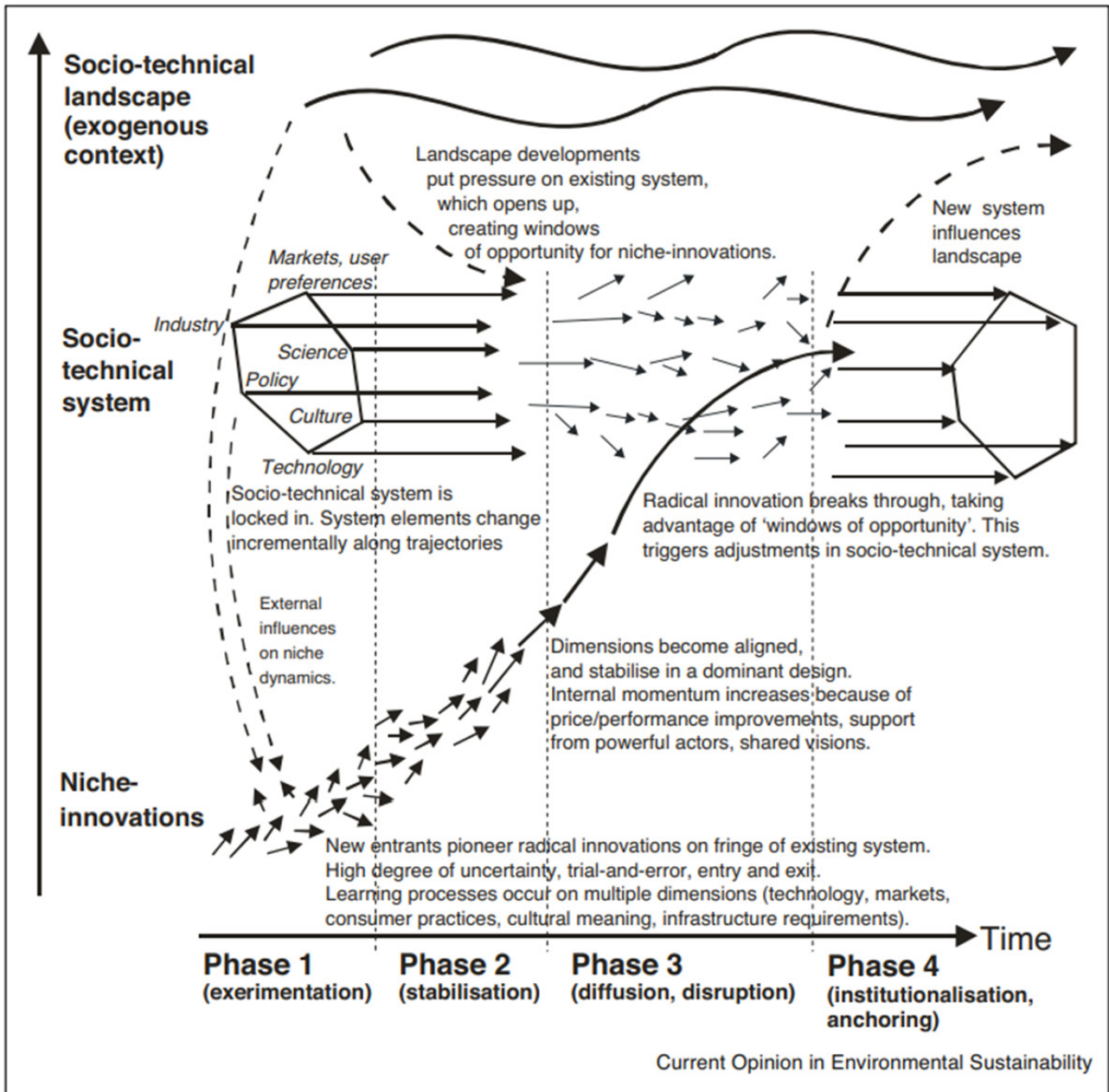
The regime represents the relatively stable domain of established institutions and sociocultural norms held together by their mutual alignment and the inertia of legacy. Here change is incremental and CGP-like as incumbent actors favour a relatively predictable, steady state upon which to reproduce their established behaviours. In isolation, the regime would constitute a relatively flat substrate where stability and system integrity are maintained by an assemblage of technical, economic, social, cognitive, institutional and political lock-in mechanisms (Geels, 2019). In the wild, these forces provide a strong, often hegemonic resistance to the external pressures which threaten to disrupt the status quo.

Conceptually 'beneath' the regime layer lies the realm of niches where the most radical innovations are spawned, nurtured (A. Smith & Raven, 2012) and, if they gain enough momentum, are propelled into the regime where they reshape it disruptively before being subsumed into its mass.

On the regime's other fringe sits the wider sociotechnical landscape. This layer represents both the longue durée of cultural, technological or environmental changes as well as short-term changes beyond the control of the regime, such as commodity price shocks. In extreme cases landscape changes may alter the homeostatic boundaries of the regime, thus threatening its integrity if it fails to adapt. Simultaneously, landscape pressure can open windows of opportunity which allow niche innovations to enter the regime. These might help it to course-correct appropriately to the new external conditions, change its nature fundamentally, or bring it crashing down altogether.

The MLP itself has demonstrated humble, adaptive resilience in the way its proponents respond

Figure 2. A mature incarnation of the multi-level perspective (from Geels, 2019, p. 191).

Socio-technical landscape (exogenous context)

Landscape developments put pressure on existing system, which opens up, creating windows of opportunity for niche-innovations.

New system influences landscape

Markets, user preferences

Industry

Socio-technical system

Science

Policy

Culture

Technology

Socio-technical system is locked in. System elements change incrementally along trajectories

Radical innovation breaks through, taking advantage of 'windows of opportunity'. This triggers adjustments in socio-technical system.

External influences on niche dynamics.

Dimensions become aligned, and stabilise in a dominant design. Internal momentum increases because of price/performance improvements, support from powerful actors, shared visions.

Niche-innovations

New entrants pioneer radical innovations on fringe of existing system. High degree of uncertainty, trial-and-error, entry and exit. Learning processes occur on multiple dimensions (technology, markets, consumer practices, cultural meaning, infrastructure requirements).

Time

Phase 1 (exerimentation) **Phase 2** (stabilisation) **Phase 3** (diffusion, disruption) **Phase 4** (institutionalisation, anchoring)

Current Opinion in Environmental Sustainability

constructively to criticism and invite embellishment to expand its scope (Geels, 2019, 2011); a stark contrast to the resistive regimes it is used to describe. Despite its origins in technological transition theory, I find it to be a helpful tool for visualising how a society is sculpted on-the-fly through the reflexive orchestration of emergent phenomena by human hands and natural forces alike, operating from both the macroscale landscape and the microscale niche in small, large, fast and slow ways. Thus, while it "is not an ontological description of reality" (Geels, 2002, p. 1273), as "an analytical and heuristic framework" (ibid) it does offer a tangible appreciation of what a praxis of stability in uncertainty might look like.
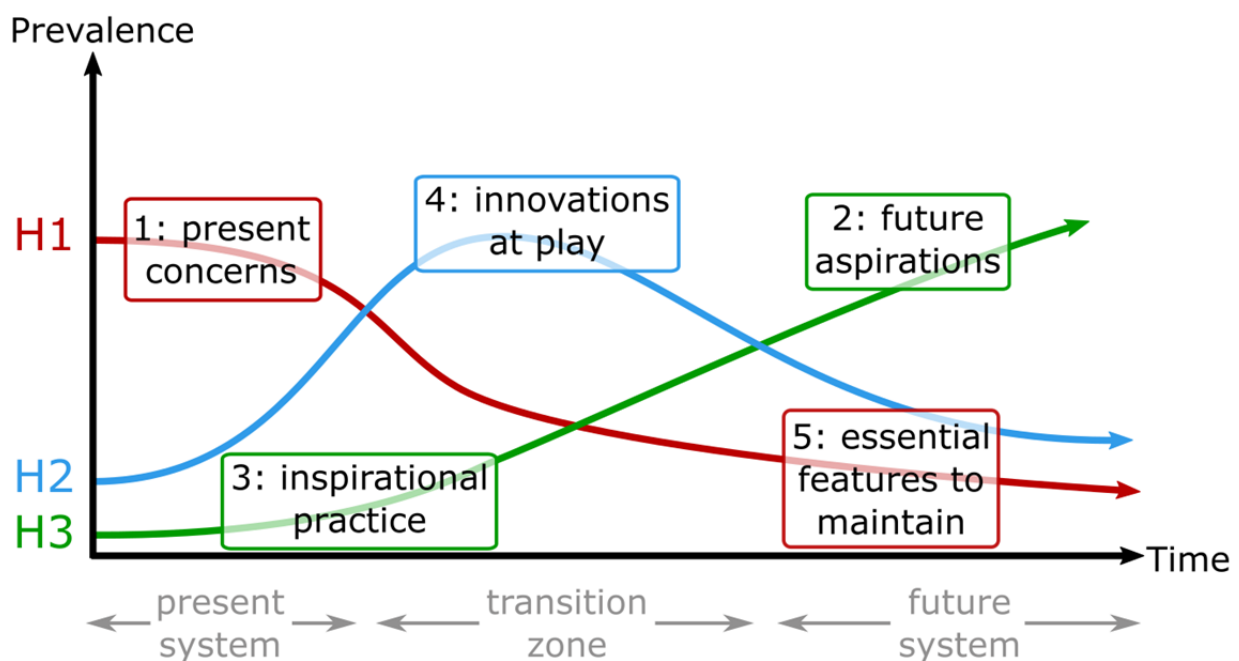
2.2 THREE HORIZONS (3H)

Taking a practical turn from the broad, conceptual leanings of the MLP, is the framework-practice hybrid known as Three Horizons (3H). 3H also centres on a visualisable, heuristic scaffold, albeit a simpler one, which is used to draw out complexity through facilitated, participatory deliberations among epistemically diverse stakeholders (Sharpe et al., 2016). The 3H diagram (see Figure 3) consists of three curves plotted on a horizontal time axis and a vertical axis representing the extent to which each curve dominates the sociotechnical system of interest. These curves, or horizons, are designated H1, H2 and H3.

H1 represents the present system which has been deemed as in need of change, H3 represents an envisaged future state, and H2 is the transition space in between. The low beginning of H3 and the tail of H1 respectively represent the encouraging, rumbles of what is already emerging and the elements of the incumbent system which are desirable or necessary to retain. This simple framework allows participants to assemble a rich appreciation of a system's complexity and a collective vision for change without any academic prerequisites. The practice of 3H is closely related to emerging forms of participatory governance which have been championed on academic (Bächtiger et al., 2018; Galende-Sánchez & Sorman, 2021) and non-academic (Climate Assembly UK, 2020; Giraudet et al., 2021) stages alike.

I would argue that 3H contributes to the expansion of the present as espoused by Santos (2014a) (Section 1.2.3). There is also resonance with Ingoldian perpetuity of change in the way that, in 3H, "Dilemmas are…not 'solved,' but constantly 're-solved' through experimentation, feedback, learning, and creative innovation" (Sharpe et al., 2016, p. 9). Indeed, one can imagine an eternal chain of horizons and sub horizons operating at different temporal scales, with each novel transition destined to become the inappropriate incumbent of the future. Well-enacted 3H can recast this seemingly fatalistic inevitability to engender a productive sense of humility rather than futile disempowerment.

Figure 3. Three Horizons framework (adapted from Sharpe et al., 2016).

2.3 TRANSITION MANAGEMENT (TM)

Where frameworks like the MLP and 3H can be applied to address issues of governance and policy, the theory-practice of Transition Management (TM) was conceived to do this from the outset, albeit motivated initially by an environmental agenda specifically (Köhler et al., 2019; Loorbach, 2010; Loorbach et al., 2015; Rotmans et al., 2001). TM is both the study of complex adaptive societal systems and the practice of coaxing such unwieldy systems in a desired direction when established policy and market-based approaches fail to deliver. Echoing the MLP's terminology of niches and regimes, TM is concerned with orchestrating the former to shift the latter to a new dynamic equilibrium through cumulative, aligned processes over the long term. This aim is nothing short of a praxis of emergence.

Loorbach et al. (2015) describe the need for actions to be aligned both with the incumbent system and each other whilst being directed towards high-leverage tipping-points to amplify the effect of their diminutive stature. They also convey the importance of coupling expertise in process execution with expert system knowledge and continuous monitoring of one's performance. From a long-termist perspective they encourage "long-term thinking…as a framework for shaping short-term policy" (ibid; p.52) and stress the need for plans to be readily adjustable such that it can shift with the adaptive nature of the system itself. They are strong proponents of deliberative, transdisciplinary collaboration, describing "transition arenas" (ibid; p. 54) which resemble innovation hubs (see e.g. Toivonen, 2016) and consensus building methods similar to those employed in participatory governance processes like citizens' assemblies (see e.g. Galende-Sánchez and Sorman, 2021; Vlerick, 2020). TM has also found resonances with other change frameworks (Veldhuizen, 2020), modelling techniques (Hoekstra et al., 2017) and can provide a hand in shaping the direction of scientific disciplines (Scholz, 2017). It has also been recognised as a tool to combat the watering-down of radical agendas that can arise from political inertia and vested interests

in the status quo (Upham et al., 2016).

If we consider a 3H horizon to represent a present-expanding quantum of change, then TM provides the mechanism to assemble these into a stream of Ingoldian constancy (as in Figure 7, further below). TM is the craft of coordinating what emerges from the chaotic niche into the regime-aligned ingredients of future-conscious transition. As such, it is well placed to form an integral component of any meta-framework for change.

2.4 RESILIENCE THEORY AND MIRA

As mentioned in the introduction, the lens of risk is often used to manage the activities of HSSs, be they companies, nation states or global economies (e.g. Cabinet Office, 2020). Risk-based approaches seek operational continuity both through readiness for predictable issues and, increasingly, through an emphasis on general resilience that might better address the unpredictable (Linkov et al., 2014). Resilience is a transdisciplinary concept associated with preparedness, robustness, vulnerability, and capacities for dynamism and adaptation (Martin-Breen & Anderies, 2011; Wiig & Fahlbruch, 2019a) which makes it a useful nexus point between different knowledge domains, even though it evades a universal definition (Brand & Jax, 2007; Kimber, 2019). Conceptual malleability notwithstanding, resilience is generally understood to describe the capacity of a system to return to its normal functions after a disturbance (Wiig & Fahlbruch, 2019a), often with an emphasis on adaptation (Bhamra et al., 2011; Briske et al., 2017), anticipation (Carlson et al., 2012) or recovery time (Martin-Breen & Anderies, 2011). Despite this emphasis on sustainment, however, resilient systems are dependent upon persistent novel reinvention (ibid); a contradiction which alerts us to the term's proclivity for misappropriation by supporters of insular, CGP-like systems.

Siluka et al. (2015) tackle the "hazard-specific… steady-state conceptualization of resilience" (ibid; p. 220) in their Military Installation Resilience Assessment model (MIRA) which I highlight to

illustrate a practical application in an unforgiving setting; US military installations in this case. They draw a distinction between 'engineering resilience' and 'socioecological resilience', promoting the latter's capacity to maintain existence of function as an augmentation of the former's prerogative towards efficiency of function. Socioecological resilience, they claim, is characterised as the "capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (ibid; p. 221). It also provides an important augmentation to purely ecological resilience which, while providing a useful framework to demonstrate a system's response to phase transition (i.e. a shift from one near equilibrium state to another, complete with a new set of homeostatic thresholds (Folke et al., 2004)), neglects the wellbeing of the individuals within, relating only "to the functioning of the system, rather than the stability of the component populations" (Adger & Hodbod, 2014, p. 100).

MIRA puts the 'socio' in 'socioecological' by placing stakeholders at the core of its methodology. It is an exercise in participatory co-production in which stakeholders evaluate a matrix of risk and resilience criteria developed during an initial consultation phase. Notwithstanding the difficulties encountered in quantifying these subjective assessments, the MIRA process can demonstrate substantial buy-in from stakeholders as they become able to identify previously overlooked interconnections and other dynamic system elements as important in themselves. These insights are of great value to system integrity but, regrettably, say nothing about negative externalities or what happens if the system's functional purpose is subject to change. Furthermore, the author's willingness to simplify their model down to only a few 'key' variables in order to stimulate participation resonates dangerously with the nuance deficit that has led to metrics like GDP obtaining their detrimentally privileged positions in economic governance (see Jackson, 2017; Klein, 2015; Stiglitz et al., 2010). Despite this, the unabridged methods of MIRA offer means to facilitate constructive dialogue between the most hard-line incumbents and the incubators of novelty in the niche.
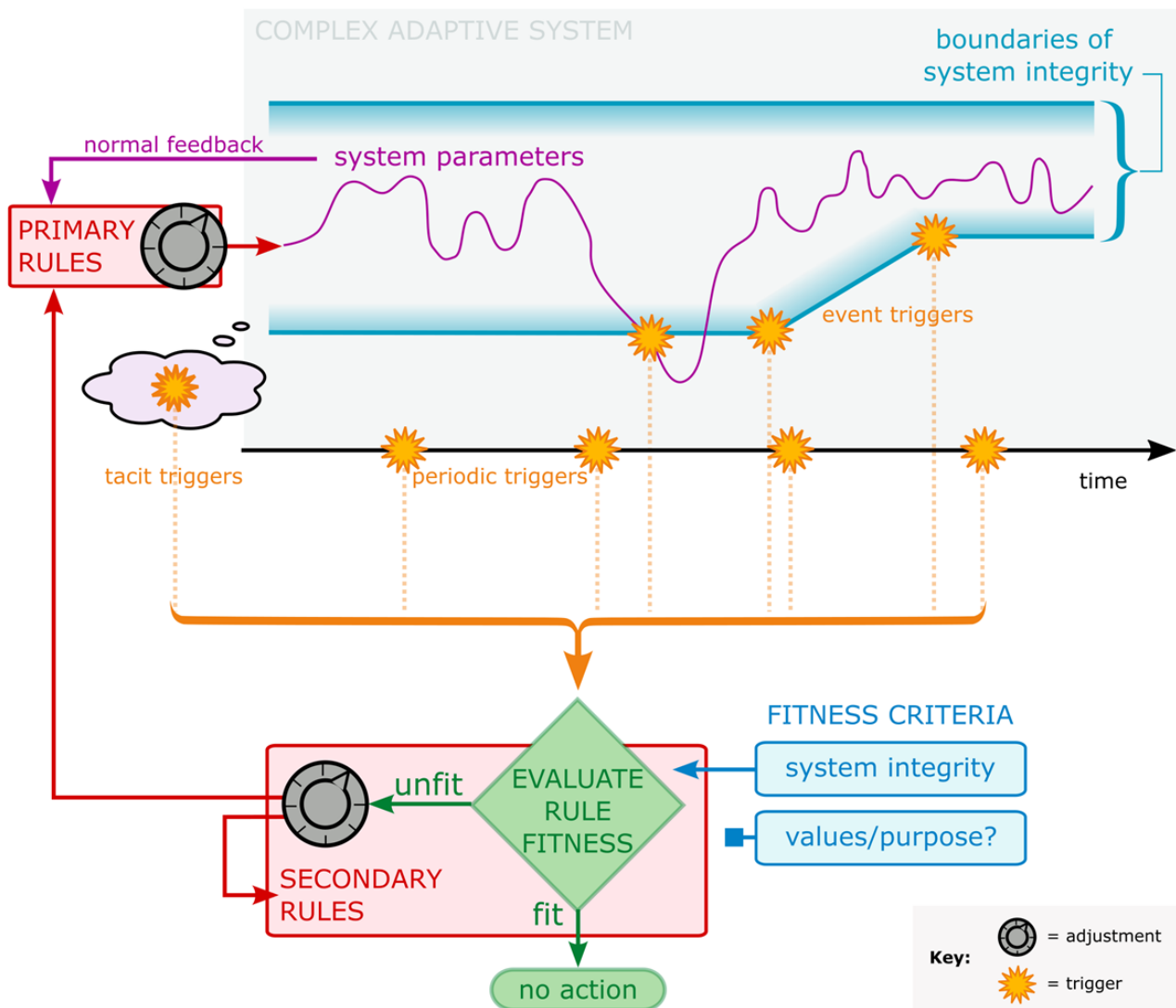
2.5 PLANNED ADAPTATION (PA)

Planned Adaptation (PA) is a decision-making framework closely entwined with risk management practices in which rulemaking systems are primed to integrate and produce new knowledge (McCray et al., 2010). Sowell (2019) elaborates on this to "explicitly characterize the apparatus necessary to systematically plan for adaptation" (ibid; p. 290; emphasis in original), arguing that historically ponderous rulemaking systems must become more adaptive to keep up with the rate of change of HSSs and the uncertain world in which they reside. PA aligns closely with other articulations of adaptive resilient systems which "will not experience environments passively" (Bhamra et al., 2011, p. 14).

The core attribute which characterises a system having the capacity for PA is the presence of secondary rules: the rules for changing rules. In PA, where primary rules attend to the regular chores of sustaining system function (e.g. enforcing laws), secondary rules are the mediators of adaptive capacity (e.g. making new laws and updating or removing old ones). Alongside these lies a suite of variables which are adept at describing diverse cases in the terms of a PA model. These include: 'triggers' which initiate adaptation opportunities, either through regular checks (i.e. clock time or chronos), responses to exogenous events (i.e. event time or kairos) or tacit consensus (arguably representing something of a 'knowledge event'); the loci of monitoring and evaluation which describe how observable the system is and by whom, as well as the relative distribution of observers and expertise; and the degree of coupling and overlap there is between these loci, stakeholders and rulemakers. See Figure 4 for my diagrammatic interpretation (Sowell, perhaps wisely, does not provide one).

PA emphasises that a system's primary rules should always be state-of-the-art and that the appropriate secondary rules and surrounding apparatus (expressed in terms of the model's variables) should be configured, and constantly reconfigured, in the appropriate way to allow for the smooth, timely

Figure 4. Simplified schematic of PA in action.

integration of new knowledge. In the words of Sowell, "Rules are ultimately evaluated in terms of their fit—how new knowledge of the system can be used to evaluate whether a set of rules continues to satisfy obligations to system integrity" (ibid; p. 302).

Sowell (ibid) draws on four vastly different cases to illustrate PA in action, each with their own context-specific mechanisms for creating, adapting and retiring rules. The example I find most compelling, is that of Internet number delegation. This case describes the Regional Internet Registry and broader

'Numbers' community: a transnational assembly of non-profit organisations and the processes by which they assign the limited supply of Internet Protocol (IP) addresses. It is a hopeful example of effective, collaborative management of a scarce common resource. In the Numbers community the majority of stakeholders are also expert practitioners, and their processes are highly distributed, bottom-up and consultative. Hass (1992) terms such stakeholder-experts as 'epistemic communities', corresponding to a tight coupling and high degree of overlap in the PA model. If this case is too specific to replicate, we

may look to methods which conspire to engineer analogous situations, such as localised prosperity studies (Woodcraft & Anderson, 2019) and the stakeholder engagements integral to the practices of 3H and MIRA.

PA contains the ingredients to describe and manage a responsive, uncertainty-ready, context-adaptable system which can speak systematically to nuances of governance, such as the trade-offs between efficiency and resilience, allocation of resources and questions around incentive structures and the legitimacy of authority. Arguably however, it too lacks an explicit mechanism to question the underlying purpose of the system whose integrity it is deployed to maintain. Fortunately, Sowell (2019) leaves his version of the framework in a nascent form, inviting scrutiny and embellishment by those who follow.

2.6 TOWARDS A META-FRAMEWORK

As noted throughout the descriptions of these FCRs, they share common and complementary features which offer synergies for the orchestration of minimally disruptive, timely change if they can be co-deployed harmoniously. Our present HSSs resemble MLP/TM regimes operating in a largely closed-minded CGP-like state, optimising for flawed measures like GDP growth (Jackson, 2017). Responses to the landscape (e.g. climate change) are conducted largely unquestioningly on the existing terms of the regime (e.g. through initiatives like 'green growth') and focus predominantly on techno-optimist promises rather than anything beyond incremental innovation at the social level (Gunderson et al., 2018; Hickel & Kallis, 2020). PA and MIRA provide instructive mechanisms to optimise the performance of this regime with provision for a more adaptive approach, but neither explicitly invite a reimagining of the system's fundamental purpose or metrics for success. The MLP, 3H and TM describe exciting hubs of diversity-fuelled emergent innovation with mechanisms to alter the regime's fateful course, but they can (understandably) feel somewhat adversarial despite their designs to

align with the regime's epistemological apparatus (A. Smith, 2007). Given the urgency of many global grand challenges, a reliance on unsanctioned innovations from the niche may be insufficient to steer the ship quickly enough, so a more fluid niche-regime relationship (see Diaz et al., 2013; Smink et al., 2015) and alignment with CGP-friendly, resilient system management may face less resistance and help to expedite necessary change.

That the nomenclatures of all these FCRs overlap, both with each other and many of the concerns expressed in the introduction, is promising and worthy of deeper investigation. To this end I now attempt to assemble a comprehensive meta-framework for change (MFC). I base the design criteria on the main components of the research question articulated at the end of Section 1.1 and use the MLP and PA as my primary scaffold for assembly. I entwine with this some temporal and institutional considerations, with an eye on factors which might help or hinder the acceptance and deployment of such a MFC. After this I provide a hypothetical example of how the MFC might perform in a real-world situation, before moving to a discursive conclusion.

3. DESIGN AND ASSEMBLY OF A META-FRAMEWORK FOR CHANGE (MFC)

3.1 DEVELOPMENT OF CRITERIA

At the end of Section 1.1, I posed a core question for this paper: can an augmented version of Sowell's conceptual model of Planned Adaptation provide a viable, uncertainty-tolerant, future-proof, meta-framework for the maintenance of diverse, co-existing prosperities within the biophysical limits of the complex adaptive Earth system? I will now break this down into four themes with which to parse the FCRs heretofore discussed into the constituents of a MFC: diverse and co-existing prosperities; uncertainty-tolerant and future-proof; within biophysical limits; and viability. In this section I elaborate these themes such that they can guide the assembly of a MFC in the section which follows.

3.1.1 DIVERSE AND CO-EXISTING PROSPERITIES

Prosperity means different things to different people in different places (Moore & Mintchev, 2021). I take the position that a prosperous world requires that the superposition of all activity in the biosphere, human or otherwise, produces a sociotechnical topology that enables the realisation of these diverse prosperities to the greatest and most equitable extent possible. This calls for 'heedful interrelating' (Dougherty, 2016) between actors with diverse knowledges such that they can converse on an equal footing to foster and leverage emergence (ibid; H. Farrell & Shalizi, 2021; Ferraro et al., 2015). In the language of MLP, the regime must embody characteristics of the niche, or the two must at least

be more collaborative than adversarial.

To achieve this requires inclusive co-production of knowledge and system rules, supported by 'logics' (van der Hel, 2016) and 'technologies'[c] (Jasanoff, 2003) of humility, as opposed to those of hubris (ibid) which maintain and are maintained by a narrow-minded view of resilience (Sharpe et al., 2016) and a suite of 'lazy reasons' (Santos, 2014a). Humble plurality requires a rejection of the fallacies of siloed, CGP-like control in favour of the panarchic dynamics of CASs and the corresponding heterarchies which support it (Cumming, 2016; Perz & Almeyda, 2009). The epistemic community of Internet Numbers (see Sowell, 2019; Section 2.5) is an exemplary heterarchy to aspire to where stakeholders and rulemakers are one and the same, but to replicate its specialised procedures may be untenable for more functionally varied systems, like economies or nations, where the scale of communication and 'translation' (see Santos, 2014c) could constitute a burdensome overhead (Bhamra et al., 2011; Cumming, 2016). That being said, archaeological evidence from large and seemingly prosperous societies in the Inland Niger Delta (S. McIntosh, 1999; R McIntosh, 2005), as well as multiple sites across Mesoamerica and Eurasia (Graeber and Wengrow, 2021), provides some pause to reconsider such an assumption.

In sum, the MFC must be sufficiently context agnostic to support the emergence of self-defined prosperities yet provide the nomenclature and 'participatory architecture' (Ferraro et al., 2015) which allows adjacent contexts to communicate equitably, irrespective of values or how they are measured, especially over matters of the commons.

---

c 'technologies' here refers to the notion of social technologies.

All this must be underpinned by the principles and mechanisms of epistemic humility, empowerment of the subaltern and the fair distribution of power.

3.1.2 UNCERTAINTY-TOLERANT AND FUTURE-PROOF

If diverse, co-existing prosperities, however they are (re)defined, are to be resilient over the long term in an uncertain world, the core capacity they will rely upon is adaptability (Briske et al., 2017; Folke et al., 2002; Lawrence et al., 2019; Meadows, 1999; Sikula et al., 2015). This need for adaptive capability provides a pragmatic compliment to the ethical case for plurality, for it is through the nurturing of novelty that both can be enabled (Bhamra et al., 2011). The primacy of adaptation necessitates that we deviate from the type of longevity envisaged in CGP framings, but in order to avoid the chaotic trappings of CUC we still require rules. Thankfully, the dual tier rule structure of PA provides an accountable mechanism for adaptation which, in the hands of pluralistic heterarchies with characteristics of MLP/TM's niche, should allow the necessary novelty to emerge and be sustained. Further, the rules of the MFC must allow this novelty to be gradually reshaped, perpetually, and reflexively, in service of prosperities as described by the previous criterion.

If life is to be more agile then, it seems imperative that such agility become more socially and politically acceptable than it is today (cf. Hartwell & McKee, 2021). Frequent policy adjustments might appear less unappetising if conventions to teleologically connect near-term actions to widely agreed-upon longer-term goals can be established such that near-term decisions can become more about pragmatic implementation rather than muddying the waters with ideology (Stoker, 2015). Assuming this, the MFC should make provision for the long-term outlook to be a matter of up-to-date societal consensus, even if uncertainty prevents it from being defined in anything other than heuristic terms. My contention here is that a mechanism to vote on long-term trajectories could help to shift in the political battleground towards a much more transparent societal vision. By institutionalising the continuous, iterative, public debate of fundamental

ideology, this could eventually result in a much clearer articulation of the collective values and identity that a society seeks to make resilient in the face of change.

Critically, societal tolerance for uncertainty may be meaningless or impossible without a similar tolerance at the individual level. Without wanting to presume too much about any system's form, it may be the case that certain institutional configurations and anti-precarity socioeconomic foundations are a prerequisite for uncertainty tolerance (Beauvais, 2018; Rosa, 2016; Scoones & Stirling, 2020; uncertain commons, 2013).

3.1.3 WITHIN BIOPHYSICAL LIMITS

Technically speaking, this criterion is an example of a value which a system's stakeholders may or may not chose to prioritise and, if so, may wish to define in a manner befitting their particular context. Indeed, by limiting ourselves to concepts of limits and scarcity — which may actually reproduce a proclivity for unsustainable accumulation (Kallis, 2019) — we risk masking and repressing other approaches which may be just as environmentally sustainable or more so (Metha and Harcourt, 2021). Even if we can capture the full pluriverse of environmentally sound ontologies under this criterion's umbrella, it would be presumptuous to embed biophysical limits into the MFC and may compromise its ability to describe unsustainable systems. Nonetheless, given our precarious relationship with the biosphere (IPCC, 2021; Steffen et al., 2018) and the fact that that we will likely remain earthbound for the foreseeable future, it is worth considering as fundamental component of the framework, provided it remains translatable from the scientific framing.

By this criterion, system "rules must 'fit' the biophysical context" (Ostrom, 1990 in Martin-Breen and Anderies, 2011, p. 19) as they do in a well-balanced ecosystem containing many individuals attending to the rules of their own homeostasis without threatening the system integrity of their environment. Biophysical limits deduced by Rockström et al. (2009), later combined with social thresholds by Raworth (2012),

provide broad homeostatic boundaries for human activity. Where these conflict with the parameters of other epistemologies, such as capitalist economics, are the places where 'hybrid forums' (Callon et al., 2011) are needed for more heedful interrelating between adjacent specialist groups and the citizen stakeholders whose worlds they overlap with. Such forums can enable the co-production of knowledge, rules, performance indicators, value-compromises and all manner of common agendas.

The biophysical criterion alludes to much more than itself, revealing that a focus on adaptive resilience can be deleterious or positive depending on whether a system has rid itself of the convenient fallacy of 'externalities' and explored the deepest foundations of its purpose.

3.1.4 VIABILITY

According to Scoones (2019, p. 29), "[a]lmost by definition, any all-embracing meta-theory will be elusive." Indeed, the very notion of universality is anti-plural (A. Escobar, 2017a). 'Pluriversality' (ibid), however, may be achievable if I do not overprescribe rigid frames or institutional structures to the MFC in the general case. After all, the sentiment that "[e]ncouraging variability and experimentation and diversity means 'losing control.'" (Meadows, 1999, para. 96) should be embodied by the designer as much as it is embedded in the model. However, without a frame there can be no framework. I must tread the line with care.

Fortunately, the role of a MFC is not to impose. Its aim should be to describe broadly and hang the hooks for a particular way to see a system in the hope that it engenders good outcomes. However, some specifics are inevitable, including those already mentioned in these criteria: heterarchies, participatory deliberation, parameterised resilience, enabling social foundations and the universality of biophysical limits, as well as the language of the MLP and PA.

Viability means making this transition framework easy to transition to. I could liken it to a well aligned TM niche or a 3rd horizon from 3H, but without

adhering to those processes this would be rather meaningless. To be minimally prescriptive, the MFC could be cast simply as a facilitator of unending 2nd horizons, although certain specific lubricants do seem prudent, such as the utilisation of existing institutions where possible. Furthermore, the MFC should not prohibit the inclusion of entities which run contrary to the ideals of pluralist prosperities; diversity, for better or worse, must be seen and heard. I must also be conscious of excessive bureaucracy, an overreliance on education or expertise, and the risk of it becoming too complicated, especially given PA as a scaffold. The idea of complexity is relatively simple, but the structures we use to engage with it may have to be complicated. I will balance these as best I can.

HSSs are not monoliths, and neither are prosperities. If both are emergent superpositions of context-specific constituents, and those composed of yet finer constituents, this implies that an approximately fractal structure can be used to engender simplicity in the model via self-similarity, provided this doesn't enforce homogenisation. The aim is to provide a space for everyone; after all, we have to fit a lot of worlds in here!

The most important thing is that the MFC can describe the world now and how it can change. What it chooses to change into is none of my business, even if I conspire to push it in a prosperous direction. Throughout what follows, I try to retain some distance from my Western habituation to particular norms, governance structures, temporal conventions and scientific language, but ultimately this is how I can best express myself. When I lean on these, I am willing to accept some burden of translation. Besides, given the disproportional role of the West in the nucleation and sustainment of global grand challenges it may be helpful to align with these conventions for the sake of minimally abrasive operationalisation.

3.2 ASSEMBLING A META-FRAMEWORK FOR CHANGE

My interest in this topic has stemmed from the intuition that PA offers a robust conceptual and organisational framework for resilient, change-friendly, uncertainty-ready governance of HSSs which can be optimised for prosperity. As an adaptable framework, it can take many forms of which I was most inspired by the example of the Internet Numbers community described by Sowell (2019, p. 298), mostly because of their tacit, heterarchical utilisation of distributed consensus which seems well aligned with the ideals of a high functioning 'pluriverse' (A. Escobar, 2017a), even if they constitute too homogenous a group to truly reflect that label. Additionally, PA aligns with the conceptualisation of a resilient system of any form trying to maintain homeostatic equilibrium on a temporal continuum (Figure 4) in a manner not entirely incompatible with the visual representation of the MLP's regime (Figure 2). I will thus combine the MLP and PA to represent the regime as an adaptive resilient system composed of nested heterarchies, each component of which constitutes a regime in itself. In this way I hope to represent a world which accommodates many worlds (see A. Escobar, 2017b), and, by extension, a plurality of prosperities (see Moore & Mintchev, 2021). This plural regime, or 'pluragime' will be the focal construct in this nascent MFC; a frame of reference which can represent any sociotechnical entity, irrespective of its location in the broader ecosystem.

3.2.1 REIMAGINING THE MLP

Figure 5c shows how the MLP regime can be reimagined as a heterarchical system (Figure 5a and alternative visualisation 5b) operating as a pluragime throughout time. If we extend this fractally (Figure 5d), it is possible to reimagine the MLP's 'landscape' as composed of an aggregate of adjacent pluragimes and the many pluragimes operating at broader
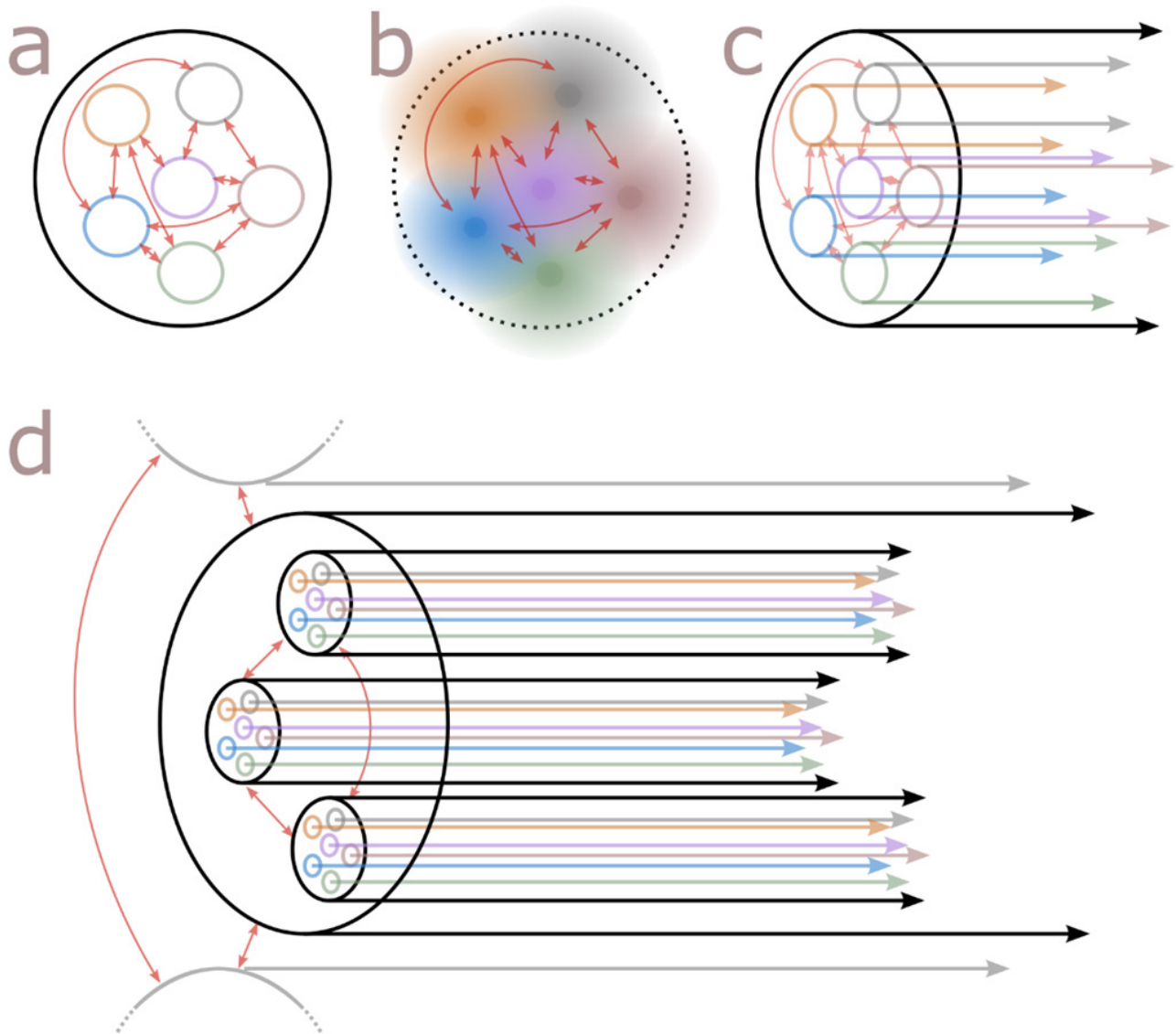
scales far beyond.[d] This landscape may also be considered analogous to 'the commons' to some extent. Although pluragimes are my stated ideal, this fractal ecosystem can accommodate regimes of any form. A pluragime can contain, constitute a part of, and converse with less plural regimes, and vice versa. I will continue to use both terms depending on the genericness of the context.

Despite the solid lines used for clarity in illustrations, the boundaries of regimes should be thought of as indistinct and overlapping as in Figure 5b. Furthermore, the implicit scale hierarchy cannot be assumed to be as rigid as depicted. This will, in most cases, be highly mismatched due to the qualitatively different classification systems provided by the many disciplines and knowledges at play (Perz & Almeyda, 2009). In a similarly hermeneutic vein, the fractal structure does not imply rigid self-similarity; anyone using the model can apply the structural aspects of their own context and define how they interact with neighbouring regimes. The hierarchical component should not be conflated with any sense of authority, but rather in terms of the relative speed and magnitude of broad landscape-like tides and smaller yet cumulatively powerful ripples which contribute to much of the unpredictability in emergence (see ibid; Martin-Breen & Anderies, 2011, fig. 5). In fact, the structure can be considered counter-hierarchical in the way that larger scales inherit the emergent characteristics of constitutive entities. There may also be an important notion of communication resolution between scales and lateral interconnections to consider, but I will not complicate the model with such a feature at this stage. As for individual people, as they can rarely be associated with only a single activity or location, they can be considered to occupy multiple locations throughout the ecosystem simultaneously.

The indistinct boundaries between regimes are the spaces of co-productive learning, translation and where I site the MFC's version of the MLP/TM niche. I call this the 'niche realm'; a somewhat aethereal space both in and between anything which could be

---

d This is not too far removed from the multi-actor networks and nested hierarchies in Geels' (2002) original conception of the MLP, but I take it in a slightly different direction.

Figure 5. Redrawing the MLP step by step, please refer to Figure 2 for comparison. Red arrows indicate heterarchical interactions, in (c) and (d) time flows from left to right. (a) shows cross section or 'moment' of MLP reimagined as a heterarchy. (b) provides an alternate conceptualisation of (a) with fuzzy boundaries. (c) situates the heterarchy from (a/b) within the regime/pluragime (arrows drawn straight for simplicity). (d) shows a small section of fractal pluragimes; the local landscape of one pluragime is the neighbour of others at the next scale up.

robustly described as part of a regime (see Figure 6). Depending on the frame of reference, however, it may be useful to model niches as regimes if they are to persist in a coherent way throughout time;[e] as with the landscape, it's all relative. Thus, we may consider the niche realm as a place occupied by relatively radical sub-regimes which tend towards the definition of a pluragime. Pluragimes, then, are inherently more niche-like than regimes and thus may be expected to have less 'need' for niches. I

e Ferraro et al.'s (2015, fig. 1) theoretical model of robust action strategies offers a useful way to conceptualise a niche persisting throughout time.

Figure 6. Potential paths of niches in, around and between pluragimes.
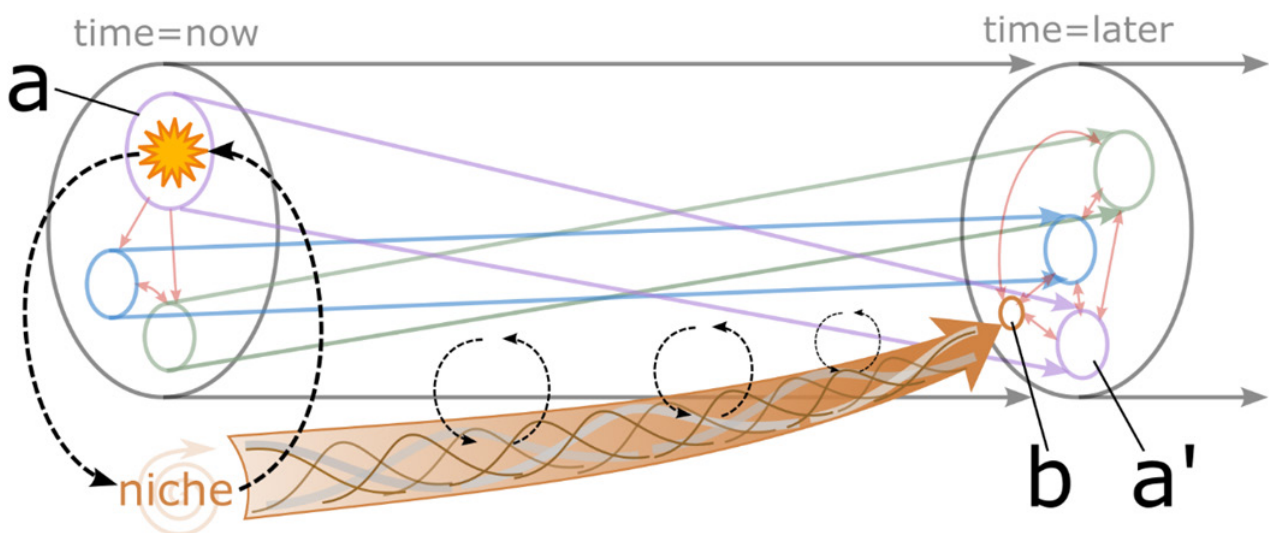

would contend, however, that any system employing logics of humility (van der Hel, 2016) which aspires to achieve resilience through novelty (Bhamra et al., 2011) and avoid the perils of optimising for a metric rather than a purpose (Jackson, 2017) would want to cultivate heterodox thinking to be called upon when required, and thus will devote some resources to

nurturing niches in parallel with their own evolution. This framing re-characterises the niche from MLP/TM's adversarial disruptor to more of a critical collaborator (a proposition also explored by others: Diaz et al., 2013; Kivimaa, 2014; Smink et al., 2015; A. Smith & Raven, 2012), but this does not preclude the adversarial form.

Figure 7 shows how a 'negotiation' between the pluragime and a niche might be initiated by a PA-style trigger in response to a salient event. Existing facilitation methods of niche-regime negotiations (Diaz et al., 2013; Smink et al., 2015) could be augmented by MIRA-like and 3H processes to ensure that the appropriate stakeholders have been afforded due influence and that they have expanded the present sufficiently to acquire the new knowledge necessary for a useful adaptation. In Figure 7, the purple sub-regime (a) is becoming too dominant so the niche is invited to provide the innovative orange entity (b) which enters the pluragime at a later time, effectively 'chaperoned' by 3H and TM practices. This adds some novel intentionality to naturally ongoing reconfigurations and influences the system's emergent character.

Figure 7. An oversized circle (a) in the pluragime triggers (starburst) a negotiation (dashed arrows) with a niche which innovates a new element (small orange circle, b) to be chaperoned gradually into the mainstream by TM/3H practices (large arrow).
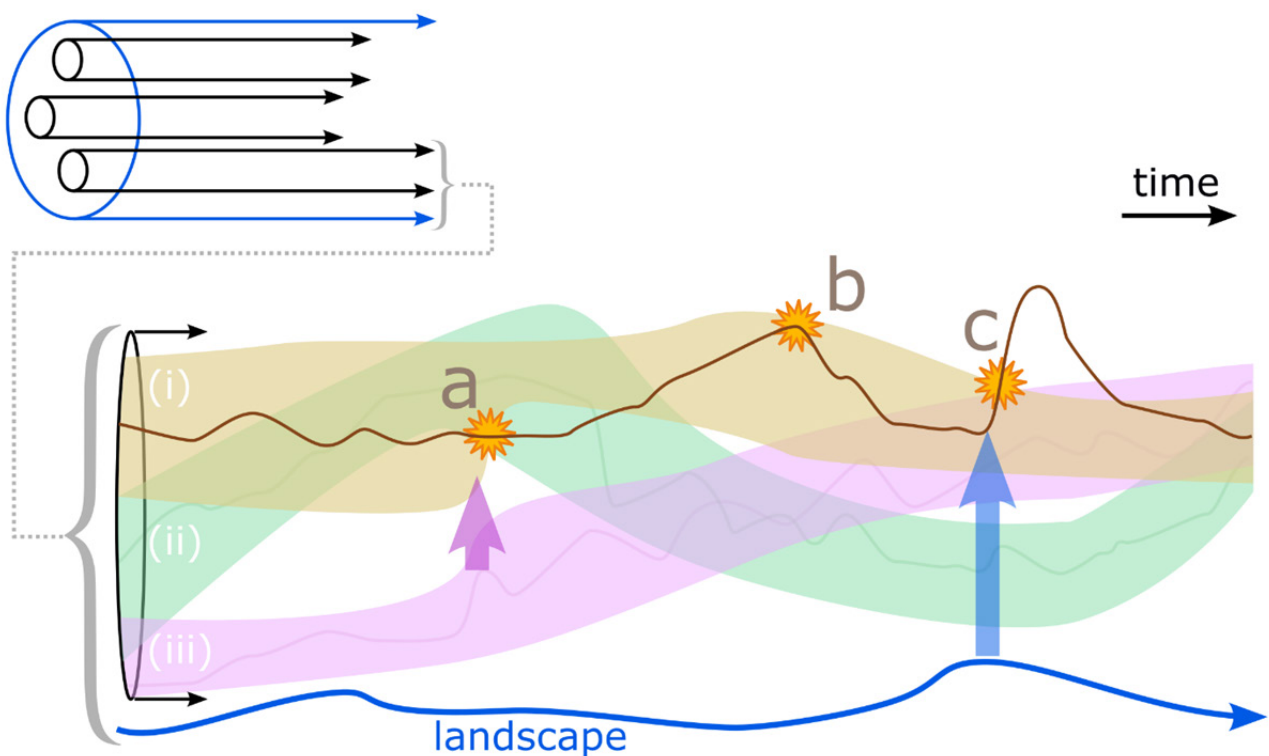
3.2.2 ENGAGING THE TOOLS OF PA

Hidden from Figure 7 are the evaluations which initiate the negotiation with the niche and subsequently test the resulting innovation for fitness before permitting entry to the pluragime. Evaluations are a core element of PA which are "characterized in terms of the timing of evaluation, the composition of the evaluating body, and how coupled that body is with the actors adversely affected by inefficient rules" (Sowell, 2019, p. 311). These details are crucial to the MFC's aspiration to support diverse and co-existing prosperities, ideally requiring strong, equitable representation and participation of citizens (Galende-Sánchez & Sorman, 2021) empowered by the appropriate expertise (Blais et al., 2008) in order to approximate the type of intrinsically anti-hegemonic overlap between decision makers and stakeholders enjoyed by the aforementioned Internet Numbers community (Sowell, 2019).

In PA, evaluations are initiated by triggers that respond to events meeting certain criteria such as critical system parameters transgressing (Figure 8a,c) or nearing (Figure 8b) homeostatic boundaries. Figure 8 shows how, within the fractal structure of the broader ecosystem, the "multiple dynamically changing states" (Sikula et al., 2015, p. 221) of an individual regime can still be operated in accordance with the conventions of adaptive resilience. Furthermore, the MFC's flexible structure means that the aggregated landscape event depicted at Figure 8c could equally represent a

Figure 8. Parametric anatomy of a regime/pluragime with three parameters shown (i,ii,iii). Shaded regions denote homeostatic bounds for each parameter, thin lines denote parameter values, wide arrows denote influence and starbursts denote triggers for evaluation process. Point (a) indicates an endogenous event related to parameter (iii) which abruptly narrows the homeostatic window of (i). At point (b), parameter (i) has moved dangerously close to its boundary. At point (c) an exogenous event has knocked (i) far from its safe operating conditions. Not shown: after each trigger an evaluation process is used to assess if rules should be changed to prevent future transgressions.

specific parameter of an adjacent regime if the focal regime had chosen to monitor it. Note that, as with the hard-edged circles drawn above, the framework does not demand precision here. Parameters can either be precise (e.g. inflation rate) or more tacit (e.g. 'is competition in this market generally healthy?').

PA's distinction between primary and secondary rules is what sets it apart from other adaptive resilience frameworks. When an evaluation is triggered, any associated rules, be they primary or secondary, are assessed in terms of their obligation to system integrity. An adaptive MFC must also scrutinise its rules in terms of their obligation to values or a fundamental purpose (e.g. equitable, long-termist global prosperity) rather than only a system integrity which might become corrupted by conflation with proxy metrics like GDP. After considering several ways to embed purpose into the MFC, I suggest two 'rules of purpose' as a starting point (subject to any pluragime's prerogative to adapt them):

> 1) Upon a triggered evaluation, in addition to assessing a rule's fitness for obligation to system integrity, the rule's fitness for obligation to self-defined system purpose is also assessed.

> 2) On a periodic basis, current stakeholder values are assembled in conjunction with the best available data to redefine the system purpose.

The first rule of purpose provides the standard housekeeping role of a secondary rule but has two potential weaknesses. Firstly, many rules may be so deep within a functional structure that they bear no clear valence towards purpose or integrity. To remedy this, I suggest something resembling a 'five whys' exercise (see Serrat, 2017) to elucidate the causal link to less ambiguous downstream effects. If this works, it will allow the underlying purpose to pervade the sociotechnical fabric. This however brings us to the second potential flaw, as it may result in outdated definitions of purpose becoming
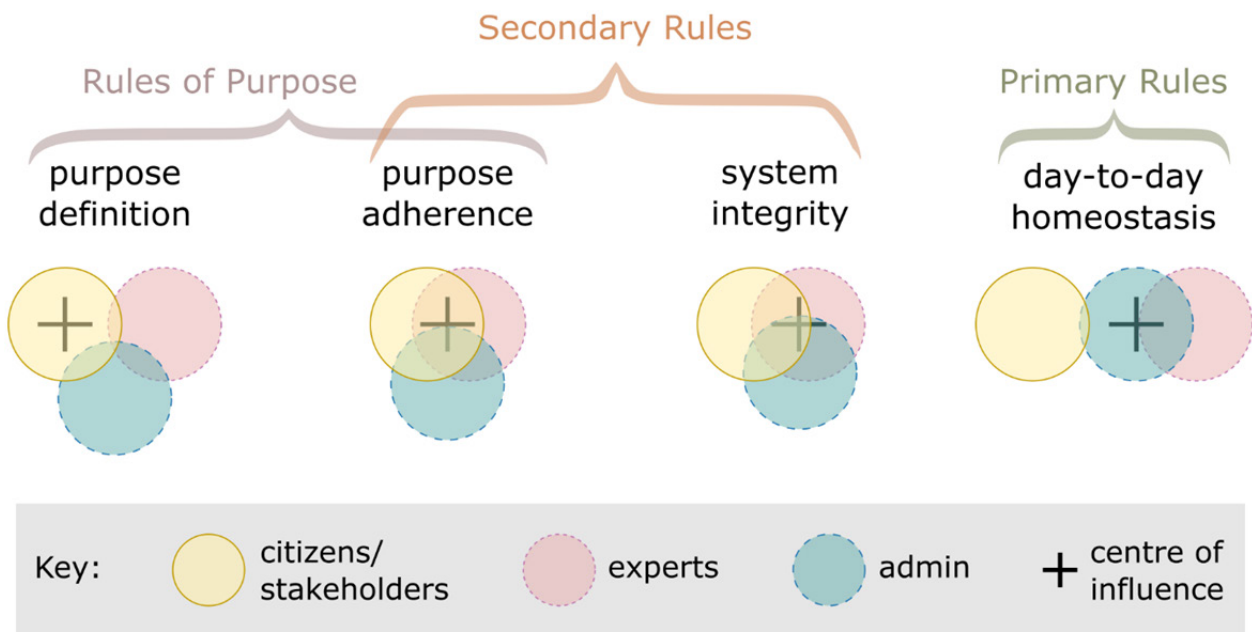
embedded, both compromising system agility and allowing the legacies of now abhorrent values to persist. Ultimately, these may both be features more than bugs, amenable to procedural tweaks, and forcing a beneficial graduality on transitions. They may also engender principles of transparency in system design by encouraging actors to keep suites of rules relatively shallow at each fractal level, and to permit those steering regimes at smaller scales to defer knowingly and willingly to rules and values of the broader landscape in their own assessment processes.

The second rule of purpose is activated by periodic triggers to initiate a survey of stakeholder values which paint a picture of the prosperity to be optimised for. An inclusive form for this might involve an initial deliberative phase to decide which options are on the table, followed by a vote on these to establish priorities. At larger scales, citizens' assemblies are an excellent tool for wrestling with complex societal issues (D. M. Farrell et al., 2019) and can be used to formulate questions to be voted on by a wider populace (Warren & Pearse, 2008). At smaller scales, more nuanced, citizen-led research-based processes may be more effective (see e.g. Woodcraft & Anderson, 2019).[f] Once the options have been decided, every voter within the pluragime could indicate their priorities among the suite of options using a mechanism such as quadratic preference voting which discourages concentration on single issues (Eguia et al., 2019). This rich definition of system purpose can then guide evaluations through the first rule of purpose and, if translatable to measurable parameters, can be used to monitor adherence to system purpose alongside more traditional system integrity metrics as described in Figure 8.

The participatory processes I have mentioned throughout will incur some bureaucratic burden and persistent socioeconomic overhead. While the increased prevalence of these practices is likely to help normalise them in the public consciousness, they could be seen as a drain on resources. The

---

f   The OECD Better Life Index (OECD, n.d.) provides an example of a multi-parameter preference system that might draw beneficial clarity from quadratic voting.

Figure 7. Suggested overlap at different levels of evaluation.

mitigation of this perception will rely partially on proficiency of practice, but there is also a question of efficiency. PA uses the concepts of 'loci of assessment' and 'coupling' to define how concentrated or distributed the evaluating entities are and how much they overlap with rulemakers and those affected by rules. A concentrated locus separate from stakeholders can lead to more efficient decision making but lacks the epistemic diversity and inclusiveness implicit in the concept of a pluragime. Ultimately, this tension must be resolved in a manner befitting each context but, as a rough template, I suggest that, for more fundamental judgements like system purpose, the power remains firmly in the hands of stakeholders with assistance from any necessary experts and administrative entities (the selection of whom, in terms of both timing and mechanism, deserves more detailed consideration than I can commit to herein, although I do like the idea of a form of limited-term national service for experienced professionals composed with epistemic diversity in mind). Inefficiencies generated here can be offset by giving the authorities more direct control of the

everyday tasks of system maintenance. Four points on this conceptual spectrum are illustrated in Figure 9.

3.2.3 TEMPORAL CONSIDERATIONS

If the MFC engenders a society with a greater sense of agency and more transparent purpose, then perhaps this can make us better at planning for the collective future. Recall from Section 1.2.3 the tension between constant becoming (Ingold, 1993) and underappreciated presents (Santos, 2014a), alongside the interpretation that the future could contain infinite underappreciated presents yet to come, to which we might logically ascribe more value given their cumulative population (Greaves & Macaskill, 2021). If so, and keeping in mind TM's commitment to base near-term action on long-term thinking (Loorbach et al., 2015), we could consider replacing the economic tradition of devaluing the future with 'discount rates' (Farber & Hemmersbaugh, 1993) with a flatter value space. To do this we might continue to acknowledge

the general correlation between uncertainty and temporal distance, but replace the sliding scale of value discounts with a sliding scale of precision in our targets and actions, from 'clear and precise' to the 'purely heuristic'. Long-run plans by their nature will have a degree of uncertainty (e.g. climate targets) but new knowledge about the far future (e.g. the advent of a climate tipping point), could still profoundly affect the direction of near-term policy. Changes in system purpose, or new policies for how best to serve it, could by similar means affect the projections of homeostatic boundaries and so require a near-term policy shift to correct the course of certain system parameters. Within the inclusive transparency of a pluragime, where governance is highly participatory and distributed, these changes could well be more tolerable than today and provide for clearer demarcations between ideology and methodology on the political battlefield.

Ultimately, it does not fall to the MFC to impose an elevated valorisation of the future. It can only provide a loose frame to support the teleological bridge if desired and accommodate the manifold conceptualisations of moments and continuums through tacit, event based and periodic triggers (and leave open the possibility for other variants to be coined). The future will always inherit the purpose of the present, or rather it will inherit the legacy of the competence and intent with which we wield uncertainty and emergence in our present moment of agency.

3.2.4 INSTITUTIONAL CONSIDERATIONS

It would be presumptuous to suggest much in the way of new institutions or organisational structures that correspond to any general deployment of the MFC. The loose, fractal configuration has a space for every institution which exists today; essentially,

every organisation, community or locality can be framed as a regime with the potential to become more like a pluragime. Although it is likely that pluragime status will require 'participatory architecture' (Ferraro et al., 2015) in the form of new institutions and bureaucracies, it is also possible to adapt and repurpose those which exist for more equitable co-production than is common today (van der Hel, 2016). Universities and innovation labs (Tõnurist et al., 2017), or parts thereof, have obvious roles as niche entities, and the maturing pathways for technological (Owen et al., 2019; Webster & Gardner, 2019) and social (Buckland & Murillo, 2017) innovation in some constituencies show promise (Kivimaa, 2014). As for the long-term perspective, the emergence of institutions to represent future generations is already underway (Davidson, 2020; Jones et al., 2018; G. Smith, 2020) and these could be purposefully aligned with the teleological considerations mentioned above.

Many of the institutional reconfigurations implied by the MFC relate to its prescription for robust stakeholder involvement in the management of pluragimes through mini-publics and their ilk (see O. Escobar & Elstub, 2017). If these can be normalised in a manner akin to jury service they would form an essential bedrock, simultaneously produced by and re-produce-ing the heedful interrelating which sustains adaptive, pluralistic societies. The cost of this is that more of people's time and energy must be devoted to maintaining the fabric of society (Bhamra et al., 2011).[h] If this raises concerns about resources wrested from traditionally productive activities then perhaps it need not, for it addresses the question of human occupations under two rather polar visions of economic futures: degrowth and techno-optimism. The former makes explicit calls for a reduction of productive work on environmental grounds (Kallis, 2018) and the latter has its sights firmly set on widespread automation as a social good (Bassett

---

g There is a danger here of succumbing to what Dasgupta (2021, Box 10.3, p. 262) calls the "never ending potlatch": a situation in which successive generations deprive themselves to great detriment for the sake of those to come. To me, this highlights the need to regularly reappraise the future in order to distinguish between curtailments in the present that are necessary to prevent the restriction of capabilities we can be reasonably certain will be necessary, from those which unnecessarily restrict the present for the sake of unnecessary future surplus.

h This resonates nicely with the recent assertion that "most [activity in the universe] is basically just concerned with 'maintaining the structure of space'" (Wolfram, 2021, para. 55).

& Roberts, 2020; Friedman, 2020). Both scenarios could provide ample human resources for highly participatory governance should they materialise.

Finally, the assimilation of co-produced purposes and adaptive resilient management requires some maturation of the metrology and mereology of prosperities. The roll-out of localised metrics (e.g. see Moore & Mintchev, 2021; Woodcraft & Anderson, 2019) or partially universalised aggregation (e.g. OECD, n.d.) may both play a role depending on what resolution is practicable in any scale or context, but it is likely that a great diversity is inevitable and essential here, cementing the centrality of translation in the work of maintaining the social fabric.
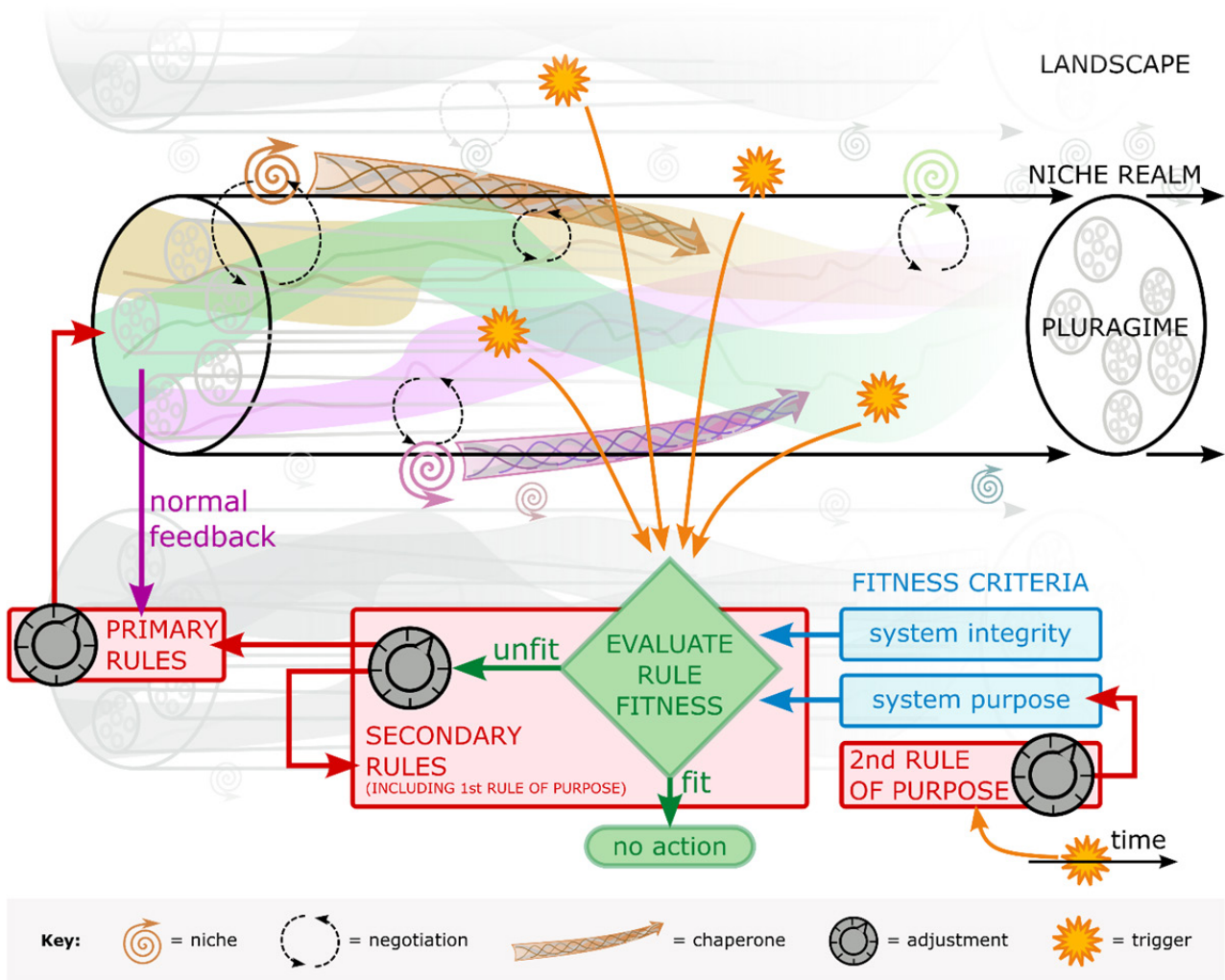
3.3 PRESENTING THE MFC

Table 1 provides a summary of how the design criteria are met by the proposed features of the MFC and Figure 10 is an attempt to capture its dynamics in visual form. To summarise, I have reinterpreted the heuristic structure of MLP into a fractal ecosystem of many regimes/pluragimes which provides a neutral backdrop upon which to apply the unique attributes of any HSS of interest alongside those of its conceptual neighbours. Within this, I have nestled a purpose-augmented incarnation of PA to imbue the model with the attributes of adaptive, resilient

Table 1. MFC features meeting design criteria.

Criterion	Structural Components	Institutional Components
Diverse and co-existing prosperities	Fractal heterarchy Rules of purpose Metric agnostic PA overlap/coupling	Participatory/deliberative practices Translation
Uncertainty-tolerant and future-proof	Adaptation tools of PA Niche partnerships chaperoned by 3H/TM	Participatory/deliberative practices Future generations representation
Within biophysical limits	Resilience practice coupled to uncertainty tolerance	Representation for nature is possible
Viability	Flexibility of framework	Minimal need for new institutions

system management. Around this construct I have sited a collaborative niche realm to be nurtured as a complimentary stream of 3H horizons by the forward-looking conventions of TM. This is my first pass at a meta-framework for change.

Figure 10. Visual representation of the MFC detailing one pluragime.

4. HYPOTHETICAL DEPLOYMENT OF THE MFC

To illustrate the MFC in action, I will consider a hypothetical case of a nation which has adopted the framework trying to reconcile economic and environmental objectives with prosperity. Assume this nation has accepted its share of the responsibility for emission reductions and sequestration, natural capital protection, responsible financial practice abroad, and the long-run consequences of environmental effects in distant countries. It has set global prosperity as its underlying purpose alongside prioritised subcategories and constantly monitors its own homeostasis in terms of biophysical limits, social thresholds and other parameters.

Now inject into this scenario a quickly established overwhelming scientific consensus that all of the methane trapped in permafrost will escape in the next five to fifteen years. This environmental tipping-point means that the global emissions budget (UNEP, 2020) – a key metric of biosphere system integrity – is massively reduced and, in turn, imposes more stringent homeostatic limits on human activity. This casts the viability of existing green growth plans (e.g. GNDE, 2019) into considerable doubt due to their reliance on new technologies which it now appears will not be ready in time.

For the nation in question, this tacit trigger activates a primary rule responsible for adjusting the permitted limits on carbon emissions per unit of social good for any product or service. Due to the severely altered prosperity projections resulting from this, an event trigger then initiates an evaluation of this rule which is upheld in the expert-supported mini-public assembled in accordance with procedure (as defined by secondary rules). It passes narrowly thanks to representation for future generations winning over the immediate curtailments to prosperity.

The trigger also initiates a negotiation with a local niche which, having operated in the spirit of the MFC for some time, resembles a high functioning pluragime replete with innovation labs, think tanks, universities, government representation and ongoing citizen led deliberations choreographed by MIRA-like processes with well-developed policy integration plans based on 3H and TM practice. The niche puts forward a multitude of potential technological, economic and social innovations to be assessed by several mini-publics for their efficacy and adherence to system purpose. These might, in turn, elect to expedite proposed shifts towards alternative economic measurements which support ecosystem regeneration (e.g. Dasgupta, 2021) or develop criteria for technological development priorities in a resource limited degrowth economy (cf. Gunderson, 2018). Industries threatened by such sudden rule changes can lobby for exemption, but these requests must also be assessed by citizen-inclusive deliberation against the criteria of system purpose.

In this example I have erred on the fantastical in order to amplify certain features of the MFC. I have also made liberal use of mini-publics and relied on a well-resourced niche realm without any stipulation as to the logistics of institutions and funding which support them. A more thorough analysis may render the scenario impracticable. What these demonstrate, however, is the necessity of forums for heedful interrelating between different entities within the niche, between the niche and nation regime, and at the international landscape level, the latter of which would have been instrumental in setting global prosperity as the nation's purpose in the first place. Indeed, it seems plausible that a nation obliged only to its own people's prosperity would be as unable

to mount an externality-neutral, adaptive response as nations of the real world would today. That said, transparency of purpose amongst the actors within an international pluragime could become a powerful pressure point to incentivise globally communitarian behaviour.

The scenario also demonstrates the importance of flourishing forums for emergence in the niche realm. It illustrates how a system operating in accordance with the MFC could significantly hasten urgent sociotechnical transitions that might ordinarily take decades to unfold, even if the extensive dashboard of metrics and rules may require a potentially unobtainable level of human capital and competence to manage and make sense of. Additionally, I paint a rosy picture of a rapid consensus response, but it could equally have incurred a reactionary misfire or become paralysed by indecision. Any deployment of the MFC will have to find the appropriate balance through the structure of its rules and administrative organisations.

5. CONCLUSION

I have argued for the need for a praxis of emergence, both to maintain resilience in uncertainty and to foster the conditions for diverse prosperities to co-exist: an enduring world in which many worlds fit (see A. Escobar, 2017a, 2017b). That diversity breeds novelty and novelty breeds resilience suggests a naturally virtuous reinforcement, but without some attentive choreography this is not a given. We cannot merely foster emergence and hope for the best because systems must adhere to safe operating conditions which themselves may be subject to change. In an effort to form an actionable description of this state of affairs, I have merged a heuristic transition framework (the MLP) with a conceptual model of adaptive resilience (PA), and primed it for equitable novelty generation and integration with the support of three tools of resilient innovation practice (3H, TM and Resilience Theory/MIRA) and an array of participatory practices (such as mini-publics and citizen-led prosperity studies). I have sought to show how strict adherence to the parametric limits of system integrity does not preclude – and may over the long term require – equitable cooperation between adjacent systems and a concern for the broader aggregate context. To this end, I have augmented PA with additional rules of purpose to ensure that systems operate in accordance with up-to-date, transparent values, persistently defined and redefined by all those within its sphere of influence. If change is always happening, then the MFC is a framework for changing how change changes.

Although untested, I would contend that the nomenclature of this meta-framework is loose enough to describe the world and its many scale-mismatched, qualitatively diverse constituents in their current state of perpetual transience. By design it does this only heuristically but can be mapped onto real-world structures to offer a fresh perspective to those who manage them. Beyond this it points to practices and institutions which

support a more uncertainty tolerant, long-termist and equitable craft of change, as well as offering a bridge between those inclined towards mechanistic control and those of more heuristic persuasions.

The MFC, however, has limitations. For one, it does not have the power to fundamentally render moot the potential for prosperity to be framed as a limited resource. Although it supplies forums for heedful interrelating, in order to approximate the truest possible model, actors within a regime or pluragime at any scale are free to behave as selfishly as they wish. Similarly, there is no guarantee that even a pluragime of heedfully interrelating nations would be sufficiently agile to combat the reticence towards the first mover disadvantage (see Bunzl & Duffel, 2017) which may be required for sustainable systems change. Indeed, my emphasis on making the MFC easy to transition to (see Section 3.1.4) places it at some risk of losing its vigour in the presence of a strong attachment to a business-as-usual approach, and thus unable to catalyse radical transitions that may be required. This risk highlights the importance of competent TM practice within the meta-framework and presents TM as an appropriate starting point to engage with this potential problem more deeply.

The MFC also demands a lot of expertise. Not only does the conceptual model require a firm grasp of the constituent FCRs and a certain tolerance for metaphor, but the practice it implies hinges on an abundant supply of subject matter specialists, expert deliberation facilitators and planners, transdisciplinary and transcultural translators, and highly numerate interdisciplinary analysts, all of whom must somehow be rendered immune from bias and special interest. Furthermore, despite having provision for various understandings of time, a linear conception is still rather fundamental and may not translate well across all ontologies. That

said, it is my pluriversal prerogative to conceive things in my own way and I have set the scaffold for humble interrelating as best I can. I invite, and would openly assist, any efforts to merge, augment or interface the MFC with other (meta-) frameworks.

This MFC is nascent and requires scrutiny to prove its usefulness both as a descriptive tool and a framework for action. This should take the form of deeper hypothetical cases across diverse contexts, theoretical analyses, and real-world transition studies. Such studies might also go some way towards revealing whether the MFC can render the embracing of uncertainty as a less intimidating prospect, for leaders and citizens alike. Furthermore, the framework could benefit from simplification to make it more accessible, yet it would also be worth combining it with other academic disciplines, such as scenario analysis (e.g. Cieplinski et al., 2021), backcasting (Ishida & Furukawa, 2013) and network theories (e.g. Cavaliere et al., 2012; Latour, 2005; Norbutas & Corten, 2018) in unfiltered detail to see what emerges from that interaction. Additionally, it would be valuable to explore the parameter of communication resolution between and within scales, as well as diving deeper into the optimisation of niche-regime interactions (cf. Diaz et al., 2013; Hess, 2016; Kivimaa, 2014; Smink et al., 2015; A. Smith, 2007; A. Smith & Raven, 2012).

Finally, I must return to the main question: can an augmented version of Sowell's conceptual model of Planned Adaptation provide a viable, uncertainty-tolerant, future-proof, meta-framework for the maintenance of diverse, co-existing prosperities within the biophysical limits of the complex adaptive Earth system? I think it can, but perhaps a co-augmentation with the MLP would constitute a more accurate description. Clearly it must bear a great deal more scrutiny before an answer could settle more definitively in the affirmative, and further augmentation is likely to be required. However, what has been developed herein represents a sound first step, from at least one of perhaps many necessary directions, towards a functional meta-framework which can describe change in human sociotechnical systems, and coax it towards the provision of resilient, humbly interrelating prosperities through a praxis of emergence.

REFERENCES

Acemoglu, D., & Robinson, J. A. (2013). Why Nations Fail. The Origins of Power, Prosperity and Poverty. Profile Books.

Adam, B. (2002). Perceptions of time. In: Companion encyclopedia of anthropology (pp. 537–560). Routledge.

Adger, W. N., & Hodbod, J. (2014). Ecological and social resilience. Handbook of Sustainable Development: Second Edition, 91–102.

Alexander, S., & Rutherford, J. (2019). A critique of techno-optimism : Efficiency without sufficiency is lost. In: Routledge Handbook of Global Sustainability Governance (1st ed., pp. 231–241). Routledge. https://doi.org/10.4324/9781315170237-19

Aschenbrenner, L. (2020). Existential Risk and Growth (GPI Working Paper Series No. 6-2020). https://globalprioritiesinstitute.org/leopold-aschenbrenner-existential-risk-and-growth/

Atkinson, A. B. (2015). Inequality: What Can Be Done? (1st ed.). Harvard University Press.

Bassett, C., & Roberts, B. (2020). Automation Now and Then: Automation Fevers, Anxieties and Utopias. New Formations, 98(98), 9–28. https://doi.org/10.3898/NEWF:98.02.2019

Beauvais, E. (2018). Deliberation and Equality. In: A. Bächtiger, J. S. Dryzek, J. Mansbridge, & M. Warren (Eds.), The Oxford Handbook of Deliberative Democracy (pp. 143–155). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198747369.013.32

Bendell, J. (2016). Deep Adaptation: a map for navigating climate tragedy. IFLAS Occasional Paper, 2, 36. www.iflas.info

Bhamra, R., Dani, S., & Burnard, K. (2011). Resilience: the concept, a literature review and future directions. International Journal of Production Research, 49(18), 5375–5393. https://doi.org/10.1080/00207543.2011.563826

Blais, A., Carty, R. K., & Fournier, P. (2008). Do citizens' assemblies make reasoned choices? In: M. E. Warren & H. Pearse (Eds.), Designing Deliberative Democracy (pp. 127–144). Cambridge University Press. https://doi.org/10.1017/CBO9780511491177.008

Boin, A., & van Eeten, M. J. G. (2013). The Resilient Organization. Public Management Review, 15(3), 429–445. https://doi.org/10.1080/14719037.2013.769856

Bottici, C. (2014). Imaginal Politics. Columbia University Press. https://doi.org/10.7312/bott15778

Bowden, B. (2011). Colonialism, anti-colonialism and the idea of progress. In: UNESCO-EOLSS Joint Committee (Ed.), History and Philosophy of Science and Technology, Encyclopedia of Life Support Systems (pp. 1-41). UNESCO-ELOS.

Brand, F. S., & Jax, K. (2007). Focusing the Meaning(s) of Resilience: Resilience as a Descriptive Concept and a Boundary Object. Ecology and Society, 12(1), 23. http://www.ecologyandsociety.org/vol12/iss1/art23/

Briske, D. D., Illius, A. W., & Anderies, J. M. (2017). Nonequilibrium ecology and resilience theory. In: Rangeland systems (pp. 197–227). Springer, Cham.

Buckland, H., & Murillo, D. (2017). Antenna for social innovation pathways to systemic change: inspiring stories and a new set of variables for understanding social innovation. Routledge. https://doi.org/https://doi.org/10.4324/9781351287920

Bunzl, J., & Duffel, N. (2017). The Simpol Solution: Solving Global Problems Could Be Easier Than We Think. Peter Owen Publishers.

Bächtiger, A., Dryzek, J. S., Mansbridge, J., & Warren, M. (2018). Deliberative Democracy: An Introduction. In: A. Bächtiger, J. S. Dryzek, J. Mansbridge, & M. Warren (Eds.), The Oxford Handbook of Deliberative Democracy (pp. xxii–32). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198747369.013.50

Cabinet Office. (2020). National Risk Register 2020. https://www.gov.uk/government/publications/national-risk-register-2020

Callon, M., Lascoumes, P., Barthe, Y., & Burchell, G. (2011). Acting in an Uncertain World: An Essay on Technical Democracy. MIT Press.

Carlson, J. L., Haffenden, R. A., Bassett, G. W., Buehring, W. A., Collins III, M. J., Folga, S. M., Petit, F. D., Phillips, J. A., Verner, D. R., & Whitfield, R. G. (2012). Resilience: Theory and Application. Argonne National Lab.(ANL), Argonne, IL (United States).

Cavaliere, M., Sedwards, S., Tarnita, C. E., Nowak, M. A., & Csikász-Nagy, A. (2012). Prosperity is associated with instability in dynamical networks. Journal of Theoretical Biology, 299, 126–138. https://doi.org/10.1016/J.JTBI.2011.09.005

Centeno, M. A., Nag, M., Patterson, T. S., Shaver, A., & Windawi, A. J. (2015). The Emergence of Global Systemic Risk. Annual Review of Sociology, 41(1), 65–85. https://doi.org/10.1146/annurev-soc-073014-112317

Cieplinski, A., D'Alessandro, S., Distefano, T., & Guarnieri, P. (2021). Coupling environmental transition and social prosperity: a scenario-analysis of the Italian case. Structural Change and Economic Dynamics, 57, 265–278. https://doi.org/10.1016/J.STRUECO.2021.03.007

Climate Assembly UK. (2020). The path to net zero. London, https://www.climateassembly.uk/report/read/final-report.pdf.

Coccia, M. (2018). What Are the Characteristics of Revolution and Evolution? Journal of Economic and Social Thought, 5(4). https://doi.org/10.2139/SSRN.3315985

Cornish, P., Livingstone, D., Clemente, D., & Yorke, C. (2011). Cyber Security and the UK's Critical National Infrastructure.

Cowen, T. (2018). Stubborn Attachments: A Vision for a Society of Free, Prosperous, and Responsible Individuals. Stripe Press.

Cumming, G. S. (2016). Heterarchies: Reconciling Networks and Hierarchies. Trends in Ecology & Evolution, 31(8), 622–632. https://doi.org/10.1016/j.tree.2016.04.009

Damasio, A., & Damasio, H. (2016). Exploring the concept of homeostasis and considering its implications for economics. Journal of Economic Behavior and Organization, 126, 125–129. https://doi.org/10.1016/j.jebo.2015.12.003

Dasgupta, P. (2021). The Economics of Biodiversity: The Dasgupta Review.

Davidson, J. (2020). #futuregen: Lessons from a Small Country. Chelsea Green Publishing.

Diaz, M., Darnhofer, I., Darrot, C., & Beuret, J. E. (2013). Green tides in Brittany: What can we learn about niche–regime interactions? Environmental Innovation and Societal Transitions, 8, 62–75. https://doi.org/10.1016/J.EIST.2013.04.002

Diener, E., Lucas, R. E., & Scollon, C. N. (2009). Beyond the Hedonic Treadmill: Revising the Adaptation Theory of Well-Being BT - The Science of Well-Being: The Collected Works of Ed Diener (E. Diener, Ed.; pp. 103–118). Springer Netherlands. https://doi.org/10.1007/978-90-481-2350-6_5

Dougherty, D. (2016). Taking Advantage of Emergence. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198725299.001.0001

Dougherty, D. (2017). Taking advantage of emergence for complex innovation eco-systems. Journal of Open Innovation: Technology, Market, and Complexity 2017, Vol. 3, Page 14, 3(3), 14. https://doi.org/10.1186/S40852-017-0067-Y

Douglas, M. (1986). Risk Acceptability According to the Social Sciences. Russell Sage Foundation. http://www.jstor.org/stable/10.7758/9781610441582

Dryzek, J. S., Bächtiger, A., & Milewicz, K. (2011). Toward a Deliberative Global Citizens' Assembly. Global Policy, 2(1), 33–42. https://doi.org/10.1111/j.1758-5899.2010.00052.x

Easterlin, R. A., McVey, L. A., Switek, M., Sawangfa, O., & Zweig, J. S. (2010). The happiness–income paradox revisited. Proceedings of the National Academy of Sciences, 107(52), 22463–22468. https://doi.org/10.1073/PNAS.1015962107

Eguia, J. X., Immorlica, N., Ligett, K., Weyl, E. G., & Xefteris, D. (2019). A New Consensus Protocol: Quadratic Voting With Multiple Alternatives. SSRN Electronic Journal. https://doi.org/10.2139/SSRN.3319508

Elahi, S. (2011). Here be dragons... exploring the "unknown unknowns." Futures, 43(2), 196–201. https://doi.org/10.1016/j.futures.2010.10.008

Escobar, A. (2017a). Designs for the Pluriverse. Duke University Press.

Escobar, A. (2017b). Response: Design for/by [and from] the 'global South.' Design Philosophy Papers, 15(1), 39–49. https://doi.org/10.1080/14487136.2017.1301016

Escobar, O., & Elstub, S. (2017). Forms of Mini-Publics. https://www.newdemocracy.com.au/2017/05/08/forms-of-mini-publics/

Fackler, M. (2020). Communitarianism. In: The Routledge Handbook of Mass Media Ethics (1st Edition, pp. 418–432). Routledge. https://doi.org/10.4324/9781315545929-28

Farber, D. A., & Hemmersbaugh, P. A. (1993). Shadow of the Future: Discount Rates, Later Generations, and the Environment, The. Vand. L. Rev., 46, 267.

Farrell, D. M., Suiter, J., & Harris, C. (2019). 'Systematizing' constitutional deliberation: the 2016–18 citizens' assembly in Ireland. Irish Political Studies, 34(1), 113–123. https://doi.org/10.1080/07907184.2018.1534832

Farrell, H., & Shalizi, C. R. (2021). 9 Pursuing Cognitive Democracy. In: D. Allen & J. S. Light (Eds.), From Voice to Influence: Understanding Citizenship in a Digital Age (pp. 209–231). University of Chicago Press. https://doi.org/https://doi.org/10.7208/9780226262437-011

Ferraro, F., Etzion, D., & Gehman, J. (2015). Tackling Grand Challenges Pragmatically: Robust Action Revisited. Organization Studies, 36(3), 363–390. https://doi.org/10.1177/0170840614563742

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2002). Resilience and sustainable development: Building adaptive capacity in a world of transformations. Ambio, 31(5), 437–440. https://doi.org/10.1579/0044-7447-31.5.437

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L., & Holling, C. S. (2004). Regime Shifts, Resilience, and Biodiversity in Ecosystem Management. 35, pp. 557–581.

Friedman, H. P. (2020). What Does Automation Really Mean for the Future of Work? Business and Public Administration Studies, 14(2), 26–28.

Fuglestad, F. (1992). The Trevor-Roper Trap or the Imperialism of History. An Essay. History in Africa, 19, 309–326. https://doi.org/10.2307/3172003

Gabor, D. (2021). The Wall Street Consensus. Development and Change, 52(3), 429–459. https://doi.org/10.1111/dech.12645

Galende-Sánchez, E., & Sorman, A. H. (2021). From consultation toward co-production in science and policy: A critical systematic review of participatory climate and energy initiatives. Energy Research & Social Science, 73, 101907. https://doi.org/10.1016/j.erss.2020.101907

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Research Policy, 31(8–9), 1257–1274. https://doi.org/10.1016/S0048-7333(02)00062-8

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. Research Policy, 33(6–7), 897–920. https://doi.org/10.1016/j.respol.2004.01.015

Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. In: Current Opinion in Environmental Sustainability (Vol. 39, pp. 187–201). Elsevier B.V. https://doi.org/10.1016/j.cosust.2019.06.009

Gibson-Graham, J. K. (2008). Diverse economies: Performative practices for "other worlds." Progress in Human Geography, 32(5), 613–632. https://doi.org/10.1177/0309132508090821

Giraudet, L.-G., Apouey, B., Arab, H., Baeckelandt, S., Begout, P., Berghmans, N., Blanc, N., Boulin, J.-Y., Buge, E., Courant, D., Dahan, A., Fabre, A., Fourniau, J.-M., Gaborit, M., Granchamp, L., Guillemot, H., Jeanpierre, L., Landemore, H., Laslier, J.-F., … Tournus, S. (2021). Deliberating on Climate Action: Insights from the French Citizens' Convention for Climate. https://hal-enpc.archives-ouvertes.fr/hal-03119539

GNDE. (2019). A Blueprint for Europe's Just Transition. https://report.gndforeurope.com/cms/wp-content/uploads/2020/01/Blueprint-for-Europes-Just-Transition-2nd-Ed.pdf

Greaves, H., & Macaskill, W. (2021). The case for strong longtermism (GPI Working Paper No. 5-2021). https://globalprioritiesinstitute.org/hilary-greaves-william-macaskill-the-case-for-strong-longtermism-2/

Green, D. (2016). How Change Happens. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198785392.001.0001

Graeber, D., & Wengrow, D. (2021). Chapter 8: Imaginary Cities, In: The Dawn of Everything: A New History of Humanity. Allen Lane.

Gunderson, R. (2018). Degrowth and other quiescent futures: Pioneering proponents of an idler society. Journal of Cleaner Production, 198, 1574–1582. https://doi.org/10.1016/j.jclepro.2018.07.039

Gunderson, R., Stuart, D., & Petersen, B. (2018). Ideological obstacles to effective climate policy: The greening of markets, technology, and growth. Capital & Class, 42(1), 133–160. https://doi.org/10.1177/0309816817692127

Hansen, M., Li, H., & Svarverud, R. (2018). Ecological civilization: Interpreting the Chinese past, projecting the global future. Global Environmental Change, 53, 195-203.

Hartwell, G., & McKee, M. (2021). U-turns or no turns? Charting a safer course in health policy. Journal of the Royal Society of Medicine, 114(5), 237–239. https://doi.org/10.1177/01410768211000735

Heal, M. G., Dubeux, C., Hallegatte, S., Leclerc, L., Markandya, A., McCarl, B. A., Mechler, R., & Neumann, J. E. (2014). Economics of Adaptation. In: C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L. White (Eds.), Climate Change 2014 Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 945–978). Cambridge University Press. https://doi.org/10.1017/CBO9781107415379.022

Henfrey, T. (2018). Resilience and Complex Adaptive Systems. The International Encyclopedia of Anthropology, Wiley. pp. 1–5.

Hess, D. J. (2016). The politics of niche-regime conflicts: Distributed solar energy in the United States. Environmental Innovation and Societal Transitions, 19, 42–50. https://doi.org/10.1016/J.EIST.2015.09.002

Hickel, J. (2019a). The contradiction of the sustainable development goals: Growth versus ecology on a finite planet. Sustainable Development, 27(5), 873–884. https://doi.org/10.1002/sd.1947

Hickel, J. (2019b). Is it possible to achieve a good life for all within planetary boundaries? Third World Quarterly, 40(1), 18–35. https://doi.org/10.1080/01436597.2018.1535895

Hickel, J., & Kallis, G. (2020). Is Green Growth Possible? New Political Economy, 25(4), 469–486. https://doi.org/10.1080/13563467.2019.1598964

Hoekstra, A., Steinbuch, M., & Verbong, G. (2017). Creating agent-based energy transition management models that can uncover profitable pathways to climate change mitigation. In: Complexity (Vol. 2017). Hindawi Limited. https://doi.org/10.1155/2017/1967645

Hovi, J., Sprinz, D. F., & Underdal, A. (2009). Implementing Long-Term Climate Policy: Time Inconsistency, Domestic Politics, International Anarchy. Global Environmental Politics, 9(3), 20–39. https://doi.org/10.1162/GLEP.2009.9.3.20

Haas, P. M. (1992). Introduction: Epistemic Communities and International Policy Coordination on JSTOR. International Organisation. https://www.jstor.org/stable/2706951

Ingold, T. (1993). The temporality of the landscape. World Archaeology, 25(2), 152–174. https://doi.org/10.1080/00438243.1993.9980235

Ingold, T. (2008). Ethnography is not Anthropology. Proceedings of the British Academy, 154, 69–92.

IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, & B. Zhou, Eds.). Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/#FullReport

Ishida, E. H., & Furukawa, R. (2013). Forecasting and Backcasting. In: E. H. Ishida & R. Furukawa (Eds.), Nature Technology (pp. 41–56). Springer Japan. https://doi.org/10.1007/978-4-431-54613-9_5

Jackson, T. (2017). Prosperity Without Growth: Foundations for the Economy of Tomorrow (2nd ed.). Routledge.

Jacobs, A. M. (2011). Governing for the Long Term: Democracy and the Politics of Investment. Cambridge University Press.

Jasanoff, S. (2003). Technologies of humility: Citizen participation in governing science. Minerva, 41(3), 223–244. https://doi.org/10.1023/A:1025557512320

John, T., & MacAskill, W. (2021). Longtermist Institutional Reform. In: N. Cargill & T. M. John (Eds.), The Long View (forthcoming). FIRST. https://philpapers.org/rec/JOHLIR

Jones, N., O'Brien, M., & Ryan, T. (2018). Representation of future generations in United Kingdom policy-making. Futures, 102, 153–163. https://doi.org/10.1016/J.FUTURES.2018.01.007

Kagitcibasi, C. (1997). Individualism and collectivism. Handbook of cross-cultural psychology, 3, 1–49.

Kallis, G. (2018). Chapter 5: The Utopia of Growth. In: Degrowth. Agenda Publishing.

Kallis, G. (2019). Limits: why Malthus was wrong and why environmentalists should care. Stanford University Press.

Keely, L. C. (2005). Why isn't growth making us happier? Utility on the hedonic treadmill. Journal of Economic Behavior & Organization, 57(3), 333–355. https://doi.org/10.1016/J.JEBO.2003.10.009

Kimber, L. R. (2019). Resilience from the United Nations Standpoint: The Challenges of "Vagueness." In: S. Wiig & B. Fahlbruch (Eds.), Exploring resilience: a scientific journey from practice to theory (pp. 89–95). Springer International Publishing. https://doi.org/10.1007/978-3-030-03189-3

Kivimaa, P. (2014). Government-affiliated intermediary organisations as actors in system-level transitions. Research Policy, 43(8), 1370–1380. https://doi.org/10.1016/J.RESPOL.2014.02.007

Klein, N. (2015). This Changes Everything: Capitalism vs. the Climate. Penguin.

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., … Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. Environmental Innovation and Societal Transitions, 31, 1–32. https://doi.org/10.1016/j.eist.2019.01.004

Latour, B. (2005). Reassembling the social: An introduction to actor-network-theory. Oxford university press.

Lawrence, J., Haasnoot, M., McKim, L., Atapattu, D., Campbell, G., & Stroombergen, A. (2019). Dynamic Adaptive Policy Pathways (DAPP): From Theory to Practice BT - Decision Making under Deep Uncertainty: From Theory to Practice (V. A. W. J. Marchau, W. E. Walker, P. J. T. M. Bloemen, & S. W. Popper, Eds.; pp. 187–199). Springer International Publishing. https://doi.org/10.1007/978-3-030-05252-2_9

Linkov, I., Bridges, T., Creutzig, F., Decker, J., Fox-Lent, C., Kröger, W., Lambert, J. H., Levermann, A., Montreuil, B., Nathwani, J., Nyer, R., Renn, O., Scharte, B., Scheffler, A., Schreurs, M., & Thiel-Clemen, T. (2014). Changing the resilience paradigm.

Nature Climate Change, 4(6), 407–409. https://doi.org/10.1038/nclimate2227

Linkov, I., Eisenberg, D. A., Plourde, K., Seager, T. P., Allen, J., & Kott, A. (2013). Resilience metrics for cyber systems. Environment Systems and Decisions, 33(4), 471–476. https://doi.org/10.1007/s10669-013-9485-y

Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. Governance, 23(1), 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

Loorbach, D., Frantzeskaki, N., & Lijnis Huffenreuter, R. (2015). Transition Management: Taking Stock from Governance Experimentation. Journal of Corporate Citizenship, 2015(58), 48–66. https://doi.org/10.9774/GLEAF.4700.2015.ju.00008

MacAskill, W., & Mogensen, A. (2018). The paralysis argument (GPI Working Paper No. 6-2019). https://globalprioritiesinstitute.org/william-macaskill-andreas-mogensen-the-paralysis-argument/

Martin-Breen, P., & Anderies, J. M. (2011). Resilience: A Literature Review. www.bellagioinitiative.org

McCray, L. E., Oye, K. A., & Petersen, A. C. (2010). Planned adaptation in risk regulation: An initial survey of US environmental, health, and safety regulation. Technological Forecasting and Social Change, 77(6), 951–959. https://doi.org/10.1016/j.techfore.2009.12.001

McIntosh, R. J. (2005). Ancient Middle Niger: Urbanism and the Self-organizing Landscape. Cambridge University Press.

McIntosh, S.K. (Ed.) (1999). Beyond Chiefdoms: Pathways to Complexity in Africa. Cambridge University Press.

Meadows, D. (1999). Leverage Points: Places to Intervene in a System. https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/

Mogensen, A. L. (2020). Moral demands and the far future*. Philosophy and Phenomenological Research, 00, 1-19. https://doi.org/10.1111/PHPR.12729

Montgomerie, J. (2008). Bridging the critical divide: global finance, financialisation and contemporary capitalism. Contemporary Politics, 14(3), 233–252. https://doi.org/10.1080/13569770802396303

Moore, H. L. (2015). Global Prosperity and Sustainable Development Goals. Journal of International Development, 27(6), 801–815. https://doi.org/10.1002/jid.3114

Moore, H. L., & Mintchev, N. (2021). What is prosperity? UCL Institute for Global Prosperity: London, UK. https://doi.org/10.14324/000.wp.10126424

Mowles, C. (2014). Complex, but not quite complex enough: The turn to the complexity sciences in evaluation scholarship. Evaluation, 20(2), 160–175. https://doi.org/10.1177/1356389014527885

Mythen, G. (2021). The Critical Theory of World Risk Society: A Retrospective Analysis. Risk Analysis, 41(3), 533–543. https://doi.org/10.1111/risa.13159

Newman, L. (2005). Uncertainty, innovation, and dynamic sustainable development. Sustainability: Science, Practice and Policy, 1(2), 25–31. https://doi.org/10.1080/15487733.2005.11907970

Norbutas, L., & Corten, R. (2018). Network structure and economic prosperity in municipalities: A large-scale test of social capital theory using social media data. Social Networks, 52, 120–134. https://doi.org/10.1016/J.SOCNET.2017.06.002

OECD. (n.d.). OECD Better Life Index. Retrieved August 14, 2021, from https://www.oecdbetterlifeindex.org/

Ord, T. (2020). The Precipice: Existential Risk and the Future of Humanity. Bloomsbury Publishing.

Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action. Cambridge university press.

Owen, R., Deakins, D., & Savic, M. (2019). Finance pathways for young innovative small- and medium-size enterprises: A demand-side examination of finance gaps and policy implications for the post-global financial crisis finance escalator. Strategic Change, 28(1), 19–36. https://doi.org/10.1002/JSC.2243

Patriarca, R., di Gravio, G., & Costantino, F. (2017). A Monte Carlo evolution of the Functional Resonance Analysis Method (FRAM) to assess performance variability in complex systems. Safety Science, 91, 49–60. https://doi.org/10.1016/J.SSCI.2016.07.016

Perrow, C. (1994). The limits of safety: the enhancement of a theory of accidents. Journal of contingencies and crisis management, 2(4), 212–220.

Perz, S. G., & Almeyda, A. M. (2009). A Tri-Partite Framework of Forest Dynamics: Hierarchy, Panarchy, and Heterarchy in the Study of Secondary Growth. In: H. Nagendra & J. Southworth (Eds.), Reforesting Landscapes. Landscape Series, vol 10. (pp. 59–84). Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-9656-3_4

Pinker, S. (2018). Enlightenment now : the case for reason, science, humanism, and progress. New York, New York : Viking, an imprint of Penguin Random House LLC.

Raworth, K. (2012). A Safe and Just Space for Humanity: Can We Live within the Doughnut. Oxfam Policy and Practice: Climate Change and Resilience, 8(1), 1–26. https://www-cdn.oxfam.org/s3fs-public/file_attachments/dp-a-safe-and-just-space-for-humanity-130212-en_5.pdf

Raworth, K. (2017). Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist (Kindle Edi). Random House.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., … Foley, J. A. (2009). A safe operating space for humanity. Nature, 461(7263), 472–475. https://doi.org/10.1038/461472a

Rosa, H., Dörre, K., & Lessenich, S. (2016). Appropriation, Activation and Acceleration: The Escalatory Logics of Capitalist Modernity and the Crises of Dynamic Stabilization. Theory, Culture & Society, 34(1), 53-73.

Rothstein, H., Irving, P., Walden, T., & Yearsley, R. (2006). The risks of risk-based regulation: Insights from the environmental policy domain. Environment International, 32(8), 1056–1065. https://doi.org/10.1016/J.ENVINT.2006.06.008

Rotmans, J., Kemp, R., & van Asselt, M. (2001). More evolution than revolution: transition management in public policy. Foresight, 3(1), 15–31. https://doi.org/10.1108/14636680110803003Rudel, T. K., & Hooper, L. (2005). Is the Pace of Social Change Accelerating? International Journal of Comparative Sociology, 46(4), 275–296. https://doi.org/10.1177/0020715205059204

Santos, B. de S. (2014a). A Critique of Lazy Reason. Against the Waste of Experience and Toward the Sociology of Absences and the Sociology of Emergences. In: Epistemologies of the South : Justice Against Epistemicide (ProQuest E). Taylor & Francis Group.

Santos, B. de S. (2014b). Epistemologies of the South : Justice Against Epistemicide. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/ucl/detail.action?docID=3384630

Santos, B. de S. (2014c). Intercultural Translation: Differing and Sharing con Passionalità. In: Epistemologies of the South : Justice Against Epistemicide (ProQuest E). Taylor & Francis Group.

Scharmer, O. (2018). The Essentials of Theory U: Core Principles and Applications (Kindle Edi). Berrett-Koehler Publishers.

Scholz, R. (2017). The Normative Dimension in Transdisciplinarity, Transition Management, and Transformation Sciences: New Roles of Science and Universities in Sustainable Transitioning. Sustainability, 9(6), 991. https://doi.org/10.3390/su9060991

Scoones, I. (2019). What is Uncertainty and Why Does it Matter? (STEPS Working Paper 105).

Scoones, I., & Stirling, A. (2020). Uncertainty and the politics of transformation. In: I. Scoones & A. Stirling (Eds.), The Politics of Uncertainty: Challenges of Transformation (1st ed., pp. 1–31). Routledge. https://doi.org/10.4324/9781003023845

Serrat, O. (2017). The Five Whys Technique. In: O. Serrat (Ed.), Knowledge Solutions (pp. 307–310). Springer Singapore. https://doi.org/10.1007/978-981-10-0983-9_32

Sharpe, B., Hodgson, A., Leicester, G., Lyon, A., & Fazey, I. (2016). Three horizons: A pathways practice for transformation. Ecology and Society, 21(2). https://doi.org/10.5751/ES-08388-210247

Shrivastava, S., Sonpar, K., & Pazzaglia, F. (2009). Normal Accident Theory versus High Reliability Theory: A resolution and call for an open systems view of accidents. Human Relations, 62(9), 1357–1390. https://doi.org/10.1177/0018726709339117

Sikula, N. R., Mancillas, J. W., Linkov, I., & McDonagh, J. A. (2015). Risk management is not enough: a conceptual model for resilience and adaptation-based vulnerability assessments. Environment Systems and Decisions, 35(2), 219–228. https://doi.org/10.1007/s10669-015-9552-7

Smink, M., Negro, S. O., Niesten, E., & Hekkert, M. P. (2015). How mismatching institutional logics hinder niche–regime interaction and how boundary spanners intervene. Technological Forecasting and Social Change, 100, 225–237. https://doi.org/10.1016/J.TECHFORE.2015.07.004

Smith, A. (2007). Translating Sustainabilities between Green Niches and Socio-Technical Regimes. Technology Analysis & Strategic Management, 19(4), 427–450. https://doi.org/10.1080/09537320701403334

Smith, A., & Raven, R. (2012). What is protective space? Reconsidering niches in transitions to sustainability. Research Policy, 41(6), 1025–1036. https://doi.org/10.1016/J.RESPOL.2011.12.012

Smith, G. (2020). Enhancing the Legitimacy of Offices for Future Generations: The Case for Public Participation. Political Studies, 68(4), 996–1013. https://doi.org/10.1177/0032321719885100

Sovacool, B. K., & Hess, D. J. (2017). Ordering theories: Typologies and conceptual frameworks for sociotechnical change. Social Studies of Science, 47(5), 703–750. https://doi.org/10.1177/0306312717709363

Sowell, J. (2019). A Conceptual Model of Planned Adaptation (PA). In: V. Marchau, W. Walker, P. Bloemen, & P. S (Eds.), Decision Making under Deep Uncertainty (pp. 289–320). Springer International Publishing. https://doi.org/10.1007/978-3-030-05252-2_13

Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., Summerhayes, C. P., Barnosky, A. D., Cornell, S. E., Crucifix, M., Donges, J. F., Fetzer, I., Lade, S. J., Scheffer, M., Winkelmann, R., & Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. Proceedings of the National Academy of Sciences, 115(33), 8252–8259. https://doi.org/10.1073/pnas.1810141115

Stiglitz, J. E. (2013). The Price of Inequality: How Today's Divided Society Endangers Our Future. W.W. Norton & Co.

Stiglitz, J. E., Sen, A., & Fitoussi, J.-P. (2010). Mismeasuring our lives : why GDP doesn't add up. New Press.

Stoker, G. (2015). Economic Recovery and Governance for the Long-Term. In: The British Growth Crisis (pp. 105–125). Palgrave Macmillan UK. https://doi.org/10.1057/9781137441522_5

Stoker, G. (2012). Economic recovery and the politics of the long-term. SPERI Inau figural Conference: The British Growth Crisis—The Search for a New Model, Sheffield University, 16–18.

Taebi, B., Kwakkel, J. H., & Kermisch, C. (2020). Governing climate risks in the face of normative uncertainties. WIREs Climate Change, 11(5), e666. https://doi.org/10.1002/wcc.666

Tanczer, L. M., Steenmans, I., Brass, I., & Carr, M. (2018). Networked world Risks and opportunities in the Internet of Things.

Toivonen, T. (2016). What is the Social Innovation Community? Conceptualizing an Emergent Collaborative Organization. Journal of Social Entrepreneurship, 7(1), 49–73. https://doi.org/10.1080/19420676.2014.997779

Tõnurist, P., Kattel, R., & Lember, V. (2017). Innovation labs in the public sector: what they are and what they do? Public Management Review, 19(10), 1455–1479. https://doi.org/10.1080/14719037.2017.1287939

Trammell, P. (2020). Existential Risk and Exogenous Growth. https://www.semanticscholar.org/paper/Existential-Risk-and-Exogenous-Growth-Trammell/edebe533b7bcc2a2d07fde5e351967baef0f05eb

Trevor-Roper, H. R. (1965). The Rise of Christian Europe. Harcourt, Brace & World.

uncertain commons. (2013). Speculate This! Duke University Press. https://doi.org/10.1215/9780822376934

UNEP. (2020). Emissions Gap Report 2020. https://www.unep.org/emissions-gap-report-2020

Upham, P., Klitkou, A., & Olsen, D. S. (2016). Using transition management concepts for the evaluation of intersecting policy domains ('grand challenges'): the case of Swedish, Norwegian and UK biofuel policy. International Journal of Foresight and Innovation Policy, 11(1), 73-95.

van der Hel, S. (2016). New science for global sustainability? The institutionalisation of knowledge co-production in Future Earth. Environmental Science & Policy, 61, 165–175. https://doi.org/10.1016/J.ENVSCI.2016.03.012

Veldhuizen, C. (2020). Smart Specialisation as a transition management framework: Driving sustainability-focused regional innovation policy? Research Policy, 49(6), 103982. https://doi.org/10.1016/j.respol.2020.103982

Vlerick, M. (2020). Towards Global Cooperation: The Case for a Deliberative Global Citizens' Assembly. Global Policy, 11(3), 305–314. https://doi.org/10.1111/1758-5899.12785

Waddock, S., Meszoely, G. M., Waddell, S., & Dentoni, D. (2015). The complexity of wicked problems in large scale change. Journal of Organizational Change Management, 28(6), 993–1012. https://doi.org/10.1108/JOCM-08-2014-0146

Walker, B., Carpenter, S. R., Folke, C., Gunderson, L., Peterson, G. D., Scheffer, M., Schoon, M., & Westley, F. R. (2020). Navigating the chaos of an unfolding global cycle. Ecology and Society, 25(4), art23. https://doi.org/10.5751/ES-12072-250423

Warren, M. E., & Pearse, H. (2008). Designing Deliberative Democracy. In: M. E. Warren & H. Pearse (Eds.), Designing Deliberative Democracy: The British Columbia Citizens Assembly. Cambridge University Press. https://doi.org/10.1017/CBO9780511491177

Webster, A., & Gardner, J. (2019). Aligning technology and institutional readiness: the adoption of innovation. Technology Analysis & Strategic Management, 31(10), 1229–1241. https://doi.org/10.1080/09537325.2019.1601694

West, G. B. (2017). Scale: The Universal Laws of Life and Death in Organisms, Cities and Companies. Weidenfeld & Nicolson.

Wiig, S., & Fahlbruch, B. (2019a). Exploring Resilience - An Introduction. In: S. Wiig & B. Fahlbruch (Eds.), Exploring resilience: a scientific journey from practice to theory (pp. 1–5). Springer International Publishing. https://doi.org/10.1007/978-3-030-03189-3

Wiig, S., & Fahlbruch, B. (2019b). Exploring resilience: a scientific journey from practice to theory. Springer Nature.

Wolfram, S. (2021, 14. April). The Wolfram Physics Project: A One-Year Update. Stephen Wolfram Writings. https://writings.stephenwolfram.com/2021/04/the-wolfram-physics-project-a-one-year-update/

Woodcraft, S., & Anderson, B. (2019). Rethinking Prosperity for London: When Citizens Lead Transformation. Institute for Global Prosperity, Bartlett, UCL. https://www.ucl.ac.uk/bartlett/igp/research/publications

Young, T. R. (1991). Chaos and social change: Metaphysics of the postmodern. The Social Science Journal, 28(3), 289–305. https://doi.org/10.1016/0362-3319(91)90015-V

Research at the UCL Institute for Global Prosperity aims to generate new insights about sustainable and inclusive prosperity and provide new models for developing and interpreting evidence.

Underlying our research is a rethinking of what we mean by prosperity. Prosperity must mean enabling people to flourish in ways beyond financial growth –and doing so equitably and sustainably, for humankind and the planet. We work with businesses, NGOs and citizens to produce interdisciplinary methodologies and problem-focused research.

For more information about our wide range of current projects and our innovative Masters and PhD programmes please see: https://www.ucl.ac.uk/bartlett/igp/

Institute for Global Prosperity

Institute for
Global Prosperity