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When Complex is as Simple as it Gets

Guide for Recasting Policy and Management in the Anthropocene

Emery Roe

June 2023

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Summary

Many readers recognise and understand that complex is about as simple as it gets for major policy and management. This guide is for those unwilling in the Anthropocene to shrink back into the older platitudes about 'keep it simple' and 'not to worry, we'll scale up the analysis later on'. This guide offers key concepts, methods, counternarratives, and analogies that recast major policy and management issues in ways that do not deny their complexity but help render them more tractable for action.

Keywords

Recasting; complexity; risk; uncertainty; policy and management; Anthropocene.

Author

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Executive Summary

This guide provides a framework and many examples for reanalysing and managing policy issues of high complexity, uncertainty, conflict, and unfinished agendas.

Policy and management have long been marshalled to face the unpredictable, but the Anthropocene underscores the intensifying social, economic, and environmental instabilities from human interventions, not least of which are in the form of policy and management.

The guide's ideal readers are those who understand that the Anthropocene requires different ways of thinking and analysing big policy and big management. No more chop-logics about starting with risks, determine the trade-offs, and establish priorities. No more about too-little/too-late, or there is no alternative but to [etcetera], or anyway, next is worse. Even where that might hold, they hold only so far, and they certainly do not go far enough. The Anthropocene is too complex for that.

The guide demonstrates that a complex policy or management issue said to be 'intractable' is all too often one that has yet to be recast more tractably without losing its complexity. Some policymakers, policy analysts, and public managers already know complexity is the enemy of the intractable, not its definition.

Fortunately, the more complex an issue, the more opportunities to recast the issue tractably. The guide provides many case examples to that end.

This means policy analysts and managers can usefully advise decision makers more frequently than might be supposed: 'Even if it's as stalemated or dead-ended as you say, here's how to push the analysis and response further...' None of this is easy or guaranteed. Fortunately, the more complex the issue, the greater chances in usefully differentiating between managing, controlling, and coping ahead with respect to its complexity.

The case examples are grouped under four principal optics for recasting: counternarratives, methods, key concepts and analogies. All cases are intended to be timely and have been drawn from across many locations to the present. The guide's optics and examples are best understood as softening up the way for your own recasting. The overarching context throughout the guide is the unstable Anthropocene: now, later, and indefinitely.

Part I lays out the guide's key concepts and terms. They are deployed to underscore how and in what ways 'complexity is enemy of intractability' opens up and pushes productive analysis and management further. Part II begins with **Counternarratives** and their application in and to: global climate change,

climate justice, labour-saving automation, short term versus long term, racism, artificial intelligence (AI) ethics, and new environmental counternarratives for the Anthropocene.

Methods covers topics related primarily to risk, uncertainty, and unknowns. These terms have become so naturalised in public policy and management that they are a matter of taken-for-granted knowledge. Novel methods to re-think risk, uncertainty and unknowns are one way to defamiliarise the terms and identify fresh options. Examples include new metrics and benchmarks for risk and uncertainty; a typology of difficulties that recast issues of inequality; other typologies for better defining what 'coordination' is to be in the Anthropocene; and replacing 'facilitating' with a more powerful notion of 'curating,' as exemplified by the case of pastoralist development.

Key concepts takes us back to Part I by fleshing out examples of the guide's definition of complexity, its methodological imperative 'First, differentiate!', and of the importance, given to the need to differentiate, in asking from the get-go: 'What am I missing that is right in front of me?' Applications include those related to earthquake scenarios, 'unintended consequences', and why adaptive learning falls short of the recasting needed.

Analogies, the last optic illustrated in the guide, centres on five analogies for recasting hard problems more usefully: policy palimpsest, clues, genre, 'we are at sea in the Anthropocene', and 'thinking infrastructurally' under Anthropocene conditions. The examples include failed states, carbon trading schemes, algorithmic decision-making, wicked policy problems, and catastrophic disasters.

The guide concludes with how the framework and examples substantially reposition notions of human agency and power within the Anthropocene.

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Introduction

This is a long Working Paper with many examples for reanalysing and managing policy issues of high complexity, uncertainty, conflict, and unfinished business in the Anthropocene.

I will have failed if the reader is not convinced that many hard issues can be recast anew and usefully, even under (especially under) conditions of today and ahead. Policy and management have long been marshalled to face the unpredictable, but the Anthropocene underscores the intensifying social, economic and environmental instabilities from human interventions, not least of which are in the form of policy and management. I have been told there is an optimism to this guide. Rather, it is realism for the indispensable push ahead.

The guide's readers are those who understand that the Anthropocene requires different ways of thinking through and analysing big policy and big management. No more chop-logic about starting with risks, determine the trade-offs, and establish priorities. No more about too-little/too-late, or there is no alternative but to [etcetera], or anyway, next is worse. Even where that might hold, it holds only so far, and those avowals certainly do not go far enough. The Anthropocene is too complex for that.

In fact, our epoch's complexity enables recasting so-called intractable problems. To telegraph ahead, a complex policy or management issue certified as 'intractable' is one that has yet to be recast more tractably without simplifying the complexity. Some policymakers, policy analysts and public managers already know complexity is the enemy of the intractable, not its definition or guarantor. More will understand so in the future, be they social critics, social scientists, policy and management academics, and even the pundits. The guide is for them.

I doubt anything like a formal manual is possible, let alone useful. Instead, this Working Paper is a guide–part primer with core ideas and part casebook with examples illustrating their application. There is no blueprint. The guide's framework has four pillars that differ from conventional analytical and management approaches:

1. The guide is for major policy and management issues that are complex. Nothing here about 'let's first simplify and then scale up'. Equally important, the complexity is on the rise because the number of components (elements) in major issues, the functions (roles) each element has, and the interconnections between elements and functions are increasing in ways that challenge further measurement, monitoring, and comprehension.

2. The increased complexity does not, however, mean intractability. The more complex, the more opportunities to recast the issue tractably, as case examples exemplify.
3. This means policy analysts and managers can usefully advise decision makers more frequently than might be supposed in a world of so-called wicked policy problems. ‘Even if what you say holds, you can go further. Here’s how and still be policy relevant...’ None of this is easy nor is success guaranteed.
4. Difficulties, inexperience and not-knowing are to be encountered in recasting and pushing further. Fortunately, the more complex the issue, the greater chances in distinguishing between managing, controlling, and coping ahead with respect to its complexity. Setbacks are expected but are also more likely to be positive setbacks.

These four pillars argue against thinking the Anthropocene can be reified or abstracted as it is already highly differentiated for the purposes of real-time policy and management. Here too many know this. For them, it has always been a complex, uncertain, interrupted, and conflicted Anthropocene. For them, it has always been a question of, ‘So what?’ ‘What is the upshot?’ The latter two questions figure prominently in this guide.

Part I defines and links the pillars’ key terms and concepts. I have kept the points brief, signposting along the way examples more fully expanded and sequenced together in Part II (the bulk of the guide). The guide concludes with a shorter section on differing notions of human agency and power that are more trustworthy, I argue, in Anthropocene policy and management.

To repeat, the audiences are those who already know that complex is about as simple as it gets for many policy and management issues but who also want to know more about how to make productive use of that knowledge. If along the way, the number and diversity of Part II recastings convince some advocates of ‘Keep It Simple’ to face up to complexity-as-the-starting point, all the better.

One last point before getting underway. A large section of any canvas for Anthropocene policy analysis and public management is missing in the guide: critiques of current approaches (including the disciplinary frames of economics, engineering, and systems modelling) and alternatives already proposed or existing for dealing with unpredictable conditions, including participatory approaches, long-term planning, and calls for structural change.

By not reviewing this literature I will seem immodest in promoting the guide’s framework while avoiding the others. Had I much more space I would have had a section undertaking the literature review and you would find much with which I agree. Most of the agreement, however, would be of a qualified, ‘and yet...’

The guide's rationale for an Anthropocene 'yes, but' or 'yes, and' is developed in Part I and Part II's sections. That said, I do not want to be taken as dismissive of the critiques and alternatives already on record.

Part I: Key concepts and terms[1]

I.1 Intractable

In ordinary language, policy and management are considered intractable when complex, uncertain, unfinished, and conflicted. For starters, a policy or management issue is uncertain when causal knowledge about it is found wanting by decision makers. Complex when the issue's components or elements are more numerous, varied, and interconnected. Incomplete, when efforts to address the issue are more and more interrupted and left unfinished. And conflicted, when individuals take very different (at times polarised) positions on the issue because of its uncertainty, complexity, and incompleteness. To stop there would, however, be to end in the exaggeration of wicked problems.

The argument here is that problems in analysis and management of these issues arise when those relying on ordinary language do not differentiate terms, like uncertainty or intractability, as contexts change or already differ. Let me state the implication formally.

When you qualify uncertain or complex or unfinished or conflicted by asking 'with respect to what', so-called risk ends up being differentiated from uncertainty, uncertainty with respect to consequences is not the same as uncertainty over the likelihoods of those consequences, and unknown-unknowns are another matter altogether. These differences are central to better policy and management.

In the same way, 'highly complex' and 'intractable', which are easily conflated in ordinary language, are different from the get-go. Complicated, let alone complex, does not mean intractable. In fact, the opposite holds when real people with real problems are operating in real time. Since some readers might take 'complexity is the enemy of intractable' to be counter-intuitive, let us be clear about the guide's definition of complexity going forward.

I.2 Policy and management complexity

The guide adopts what is arguably the best-known definition, that of political scientist, Todd R. La Porte ([1975] 2015) and his construct of organised system complexity: 'The degree of complexity of organised social systems (Q) is a function of the number of system components (Ci), the relative differentiation or variety of the components (Di), and the degree of interdependence among these components (Ik). Then, by definition, the greater Ci, Di, and Ik, the greater the complexity of the organised system (Q)'.

[1] Part I material and cases are drawn from earlier versions (with full citations) of Roe (2013, 2016a, 2019, 2020, 2021). The material and cases have been reframed, revised and/or updated for the guide.

This definition has the merit of highlighting four features of policy and management complexity often left ambiguous in ordinary language. Discussion of the key fourth feature – the increased affordances to recast a complex issue – is left to the section that follows.

The first feature ensues from the definition: Complex is a comparative property of systems; that is, a system is more-or-less complex than another system in terms of the respective number of components, the differentiation of said components, and their interrelatedness. While it is common enough to say, 'this or that is complex', such statements beg the question of more-or-less complex with respect to what.

Just what is the baseline used in this instance for establishing 'complex'? In other words, the methodological point is not that you 'scale up to complexity', but rather the system of interest becomes more (or less) complex by way of comparison. Although the guide's discussion of complexity has its ambiguities – just what is a 'system' that it is more complex? – the attempt throughout is to be less ambiguous than many ordinary language discussions.

Second, the definition illustrates how difficult it is to quantify complexity beyond numbers of components and functions of each component. For there is no broadly accepted quantitative measure of interconnectivity (which is a better term for our purposes, as some connections are unidirectional and not bidirectionally interdependent). The same could be said for identifying interrelated 'functions.' Nevertheless, some ordinary language, such as 'increasing resource scarcities', can capture a sense of the interconnectivity at the global scale.

Third, to distinguish a system's components from each other, the different functions, or roles, each component has, and the interconnections between and among the functions and components is its own methodological imperative: **First, differentiate!**

The more you differentiate the case at hand, the more unlikely you are to find reduced-form crisis narratives such as the Global Financial Crisis (the most salient feature of the 2008 financial crisis was that it was not global) or the Tragedy of the Commons (its premiss of a homogenous pasture open to like herders is what must not be assumed). Or: If path dependencies are your thing, then differentiate from the outset those dependencies: economic, commercial, bureaucratic, and so on. Part II sections and case material return again and again to the imperative for the guide's audience: First, differentiate!

I.3 Recasting the intractable

The fourth feature following from the guide's definition of policy and management complexity is by far the major one.

The chief feature of this complexity is surprise, as Demchak (1991) stated long ago, and surely the greatest surprise is how many recastings are possible for issues of many components, multiple differentiations, and high interconnectivity. The recastings of interest to this guide are those that keep the complexity for tractability purposes rather than reduce it in the name of Keep It Simple.

When an experienced county emergency manager tells us, 'Floods are complex events, they have many variables', it's hardly helpful to pipe up, 'Just remember: Whatever you do, keep it simple!' A more useful response to the emergency flood manager would be identifying other emergency response professionals who routinely manage more-or-less complex events and see how they do better than the rest in handling the inevitable surprises. Here surprises emerging from complexities are a solvent for producing better practices. To be clear, such recasting does not mean simplify; the former's synonyms are reframe, redescribe, recalibrate, revise, readjust, repurpose, and like cognates.

But what if you, the readers, are not an emergency manager? For you to see this kind of complexity and its import means, frankly, you can start almost anywhere. You see the forest; I see a mountain of poison against insects. You switch off the light at bedtime; I switch on the darkness. I witness the birth of the family's first child; you see the first child give birth to a family. I ask, when is biotechnology bestiality? You ask, are gardens zoos without the cruelty? Is burglary a kind of architectural criticism? Does burning down a lumber yard mean the forgone structures have been destroyed?

Doesn't our continuing inability to safely store nuclear weapons waste reveal the Cold War to be the first war in modern times where the continental US took direct hits from an enemy? What does the US look like when it is a country where more men might be raped than women? (Think: prison male populations). What if those lengthy and inconclusive studies to model and validate the lifecycles of threatened species end up being their weapons of mass destruction?

Or consider recastings already familiar at the time of writing: General Motors – a pension system producing cars. McDonalds – a real estate multinational selling hamburgers. Uber – the world's largest taxi company owning no vehicles and presumably having no cab drivers as employees. Facebook – the world's most popular media owner creating none of its content. Alibaba – the most valuable retailer with no inventory. Airbnb – the planet's largest provider of accommodation owning no real estate. The US government – a massive insurance conglomerate with an empire's army.

Consider less familiar recastings. Your bad policy mess (numbers should be treated as illustrative): It is said today some 790 million people remain without access to electricity and 2.6 billion people depend on polluting fuels for cooking. At one point, three to four billion people – up to two-thirds of the world's population – lived in regions without adequate water supplies or sanitation. More recently, it has been estimated that 2.2 billion people on Earth live without safe drinking water.

My good policy mess: Those are very, very large numbers, right? In fact, even today the distribution of people worldwide without adequate water supplies and energy is so large that many of them must be doing better than the others. That means there are tens of millions – hundreds of millions? – of people who do not see themselves as victims and who have helpful things to say about how to better survive without adequate water to those millions more do see themselves victimised by similar inadequacies. But where then are the campaigns, e.g., in the World Bank or the IMF or the Belt Road Initiative to do just that?

His bad policy mess: It has been said that one out of every two young African-American men in major US urban areas is enmeshed in the criminal justice system. But that too is a very large number. Her good policy mess: Why are we not interviewing the other 50 per cent of young urban African-American males outside the criminal justice system to find out what they are doing, and what the rest of us could learn from them?

Their bad policy mess: A reported 11 million people have been in the US illegally. Our good policy mess: If those numbers are anywhere close to accurate, then there must be thousands – hundreds of thousands? far more? – who are already acting as if they were good US citizens.

Or consider this: It is estimated that of 280 million-plus migrants worldwide, some 82 million have been forcibly displaced. If that is not bad enough, what happens next? We look first to international and national organisations – and if not them, philosophers, and ethicists – to come up with the answers.

Examples are easily extended, but the point remains: The world is not one way only because the world's complexity – repeat, its many components, each component with multiple functions (e.g., my simultaneous roles as husband, father, author… interacting with those of others), and the many interconnections between and among components and functions (towards what ordinary language calls 'the wider context') – enable all manner of seeing and parsing.

To summarise, a complex policy or management issue labelled 'intractable' is one that has yet to be recast more tractably without simplifying the complexity. (More below on the difficulty, inexperience, and not-knowing in all of this.) Whether or not the recasting is useful or productive is another matter, to which we now turn.

I.4 How to usefully recast complex policy and management

In addition to the key concepts developed in this section, the guide's Part II cases focus on three additional ways to recast complexity more productively: methods, analogies, and counternarratives. (Sometimes the only certain thing the policy analyst and manager have in a contested policy issue are the narratives about it.)

Recasting methods in new or different ways for the analysis and management of risk, uncertainty and with respect to ignorance is a major part of this guide. I also illustrate how different analogies – palimpsest, clues, genre and 'thinking infrastructurally' – reframe, in useful ways. complex policy and management at the issue or system level. In other cases, policy-relevant counternarratives are already available for recasting seemingly intractable features of issues like automation and global climate change. 'Policy optics', at times in the form of thought experiments, is a shorthand term for these different ways to recast.

But 'useful for whom?'

Answer: for those who already act in ways that demonstrate they take complexity seriously. (Yes, that is not everybody.) I will have failed if the guide's major recastings are not new or surprising to the reader. It is crucial you understand that the complexities of Anthropocene problems do not mean recasting ends up showing just how intractable things 'really' are for decision makers.

The guide's policy optics are twists in the kaleidoscope that is any complex issue, illustrating the same shards can take on more than one configuration, and that some configurations are more helpful. (Remember: Reframings, revisions, redescriptions or recalibrations are not *ipso facto* simplifications.) We appear to be at our cognitive limits when confronting the intractable – we just seem unable to go further in thinking – until a new analogy or method or counternarrative shifts the focus. This guide does not pretend to cover the many other optics for treating complexity seriously (e.g., methodological triangulation and middle-range theories, which have been discussed at length elsewhere [Roe 1998]).

I.5 'Even if what you say is true as far as it goes, it needs to go further...'

Since recastings of complex issues – including 'wickedly' intractable ones – are not only possible but to be expected, the most policy-relevant thing we can say to decisionmakers, analysts and managers is: 'yes, but' or 'yes, and'.

'Yes, it's complex; but you need to push the matter further…' The part that is 'yes' is affirmation that taking a decision does matter; the part that is 'but' or 'and'

is the insistence that the follow-on matters also. 'Yes, your recommendation holds, but it can be usefully amended in this way...'

To be able to say that you must first ask of yourselves: What am I missing that is right in front of me? How can the issue be recast without losing complexity's seriousness and timeliness? How do we move beyond jargon of the day? (What is jargon anyway, but concepts that prematurely cease to go far enough?) There are, of course, policy analysts, managers and decisionmakers doing so already.

Note the point of 'yes, but' or 'yes, and' is not to stalemate or paralyze action but to turn complexity to its singular advantage, that of recasting. Yes, Planet Earth is a very complex, approximately closed system, but equally closed with respect to everything? The mess we are in – and it is a set of affordances as Part II illustrates – is that the chronic climate crisis cannot be about the planet and science, all the way down.

Assertions of all-the-way-down take us quickly to all manner of 'yes, but...' So too for other major policy and management issues. The differences matter, now. For if we cannot manage better now in real time with all this complexity, why would we believe promises to manage them better later on in an ever more complex Anthropocene?

Here is how taking complexity seriously matters. We know that policy and management are contingent on all manner of factors – societal, political, economic, historical, cultural, legal, scientific, geographical, philosophical, governmental, psychological, neurological, technological, religious, and what-not. In fact, why close off analysis of policy and management complexity at 'what-not', when understanding and action are enriched with 'yes, but' or 'yes, and'? In contrast to those hobbled to the rhetoric about the right person with the right policy at the right time, complexity's barrel is so full of fish it is difficult to track anything like the one and only.

But what about the fact that policy analysis and management are socially constructed? Yes, core concepts of risk and uncertainty, like others, are historicised. (Not only is your risk not mine; uncertainty in earlier centuries was, it must be stressed, different from twenty-first century versions.) But to stop there is also to end in exaggeration. Acknowledging the historical, social, economic, and other roots of policy analysis and management has rarely been pushed far enough.

For there is a major corollary to this social construction: Humans know only that which they create. (Such is the insight of Augustine and Nietzsche for philosophy, Giambattista Vico for history, Roy Bhaskar for science…) Humans know mathematics in a way they do not know the universe, because the former is a human creation about which more and more can be made to know. Mathematic uncertainties are socially constructed in a way that, for lack of a

better word, ‘unknowledge’ about the universe is not. This corollary means that to accept that ‘risk and uncertainty are socially constructed concepts easily historicised’ is the start of analysis, not a conversation stopper foreclosing it.

What needs to be pushed further specifically are the details of the interconnections among risk, uncertainty, and cognates that we make and the meanings we draw out for the connections, often under conditions of case-by-case. How this happens or can happen is the illustrative task of the Part II case examples. Our creations are always surprising us and this guide takes to heart that humans seek to explain the surprises often by means of novel analogies, methods and counternarratives that extend the range of what they – we – call knowledge.

That which we have created and continue to create by way of risk, uncertainty, and more have become complex indeed. In fact: so complex as to continually provoke more differentiations in useful knowledge. (Useful for whom? Again: for those whose actions demonstrate they take complexity seriously. Again: We know that is not everybody.) One important set of human distinctions is that related to ‘control’ and in the Anthropocene.

I.6 Control, manage, or cope ahead

It is common to conflate ‘manage’ and ‘control’ in ordinary language. That will not do when treating policy and management complexity seriously. Here, we need a richer set of terms and definitions. For when it comes to that complexity, people manage because they cannot control, and they try to cope better when they cannot manage.

Initially and formally, think of a system in terms of inputs, outputs, and the processes to convert those inputs into outputs. These inputs, outputs, and processes are differently variable rather than uniformly alike. For this guide, control is when the system’s input variance, process variance and output variance are rendered low and stable.

Think of the nuclear reactor plant: guns, guards, and gates are used to ensure outside inputs are controlled; processes within the nuclear facility are highly regulated to ensure few or no mistakes are made (operations and procedures that have not been analysed beforehand are not permissible); and the output of the plant – its electricity – is kept constant, with regulated low variance (nuclear power is often considered ‘baseload’, on top of which are added other types of electricity generation).

The problem, again formally, is that the number of critical systems having low input variance/low process variance/low output variance are fewer and fewer because of increasing political, economic, environmental, and social unpredictabilities in the Anthropocene.

By way of example, electric generation sources – and very important ones – now face high and higher input variability. Think again of climate change, more war and unrest, regulatory failures, and other external impacts on the inputs to energy production (including that of solar and wind). Such pose the challenge of managing what can no longer be controlled. In response, operational processes inside a good number of power plants have had to become more varied (this reflecting the so-called law of requisite variety), with more options and strategies to process and produce what still must be low-variance output: electricity at the regulated frequency and voltage.

Coping in critical systems embraces cases where process variance can no longer be managed to match input variance and/or where output variance is no longer low and stable. That is what makes earthquakes and fires catastrophic. The best is to cope better, though attempts to command, control, or manage will continue. But this is not coping reactively. Not only are we expected to be resilient as regards better absorbing shocks, but we are also at the same time expected to try to better plan the next steps ahead. Coping here is coping ahead in the face of real-time unknown-unknowns and involves behaviour above-and-beyond the reactive.

These distinctions are elaborated in Part II case material and are very important to keep in mind throughout the guide. In particular, I discuss the policy and management relevance for the Anthropocene of control rooms of large critical systems in a number of Part II sections. ‘Control rooms’, however, is an ordinary language term. In fact, control room operators do not control but often manage in like ways as those in policymaking and politics. The latter have also learned that managing a mess (stopping a good mess from going bad or preventing a bad one from getting worse) is far better than trying to clean a complex mess up once and for all. Why? Because attempts at achieving ‘control’ over inputs, processes, and outputs can and often does make major policy and management messes more difficult to cope ahead for, let alone manage.

In the field of critical infrastructures, you see this recognition that ‘management is not control but must be more than coping reactively’ in the shift to more specialised terms like ‘operations centre’ and the more accurate job titles of ‘dispatchers’ and ‘schedulers’ rather than control operators, full stop. So as to avoid any confusion, my research colleague, Paul Schulman, and I term control operators and their real-time support staff as ‘reliability professionals.’

I.7 Centrality of inevitable difficulties, inexperience, not-knowing, and setbacks

Coping because we cannot manage, managing because we cannot control, and feigning control over that which proves uncontrollable or unmanageable signal a

policy and management world full of difficulty and setbacks, where inexperience and not-knowing move front and centre. Some people take this to be proof-positive of the intractable. Instead for this guide, difficulty, inexperience, and not-knowing are the persistent goad to recast – reframe, revise, redescribe, recalibrate, readjust – the issue complexity at hand.

To anticipate later points, the more experience we have with complexity, the more we must resist behaving as if our inexperience and its difficulties are also decreasing. 'Hardships getting easier' risks complacency in the Anthropocene. What matters most in pushing and pulling us to recast policy and management problems is the continual experience that inexperience is always centre in analysis and management and that, for wont of something better, inexperience is the best proxy we have for not-knowing.

I.7.1 So what?

Setbacks – unanticipated, unwanted, and often sudden interruptions and checks on performance – are commonly treated as negative in policymaking, implementation, and operations. What you hoped to be a temporary setback looks to become a permanent let-down. Less discussed are setbacks that prove to be positive. Long known is when a complex organisation transitions from one stage of its so-called life cycle to another by overcoming obstacles at the stage in which the organisation finds itself.

Other positive setbacks serve as a test bed for developing better practices (no guarantees, though). Different setbacks are better thought of as design probes for whether that organisation is 'on track', or if not, what track it could/should be on. In yet other circumstances, a common enough observation has been that setbacks serve to point operators and managers in the direction of things about which they had been unaware, but which do matter.

In these and hybrid ways, positive setbacks end up as optics for rethinking major points of departure. Our track record in doing so – that is, coming to understand we did not know what we thought we did as well as finding out we knew more than we initially thought – becomes the pivot point of focus in the Anthropocene. Track records of practitioners surmounting different setbacks look a good deal more useful when compared to, say, the irreproducibility of research findings in peer-reviewed publications for policy and management.

Notably missing from the above discussion is the often-professed alternative to this guide's call for recasting complex policy and management problems, namely: Learn and manage adaptively! Why recast if we can learn and manage our way through adaptively? Of course, micro-learning and adaptation are critical; without them, we'd be dead.

For the purposes of this guide, though, adaptive learning and management are often not the option, as I try to show in Part II sections and case material. In the first place, learning from failed operations versus from routine operations must be vastly different, if the large socio-technical system in failure differs so utterly from routine periods before or early in the Anthropocene.

Basically, one major Anthropocene problem is that learning from the past is difficult for the same reasons predicting the future is (both require stable objectives, institutional memory, positive redundancy, and low environmental uncertainty, among other factors). Recasting becomes a very necessary focus in these circumstances.

I.8 Where is the guide amidst all these concepts and terms

Am I, the guide's author, perched high above and seeing all this objectively?

The notion that 'everything is connected to everything else' is the fulcrum to better understanding and responding to the Anthropocene, as I understand it. The value added of the guide is in differentiating how tightly or loosely coupled and how interactively or not are those interconnections in pushing the upshots that follow.

This means that because things are interconnected, they are not thoroughly reducible to each other. Difference and the knowledge of difference matter. It means that I too do not fully know myself, because I cannot be everyone or everything else in relationship to me.

The guide, in other words, is my best take on what is going on around you, me and others. Its only validity, unsurprising for a practicing policy analyst trained in American-style pragmatism, is this: Can you use the recastings and optics in your own practice? Do the specific recastings stick better in your case?

Formally, do they help stabilise and underwrite decision-making there and afterwards? While I recommend each recasting in Part II for further use, I will also have failed if they in aggregate do not make you more confident in searching out your own.

Part II: Cases of recasting

II.1 Introduction

The case examples are grouped under four headings indicating the guide's principal means for recasting: counternarratives, methods, key concepts, and analogies. Each grouping has sections, each of which in turn is suggestive, not definitive. I have aimed for brevity, a minimum of citations and fewer footnotes, with a mix of formal and the informal in presentation.

All cases are intended to be timely and have been drawn from across many years to the present.[2] The tone has been kept brisk and conversational. Longer sections are meant to illustrate how much more could be said about all the recastings. No attempt has been made to survey the body of literature relevant to each topic, as the guide is long enough as it is.

It must be expected that readers in specific contexts will find other ways to reframe. To reiterate, the guide's four policy optics and examples are best understood as softening up your own search and recasting. The overarching context remains the unstable Anthropocene: now, later, and indefinitely.

II.2 Organisation and case material

Part II begins with counternarratives, as it is crucial readers understand that complex but better alternatives already exist for recasting policy and management thought to be intractable. Alternative presents and futures need not be invented; they are there for those who comprehend that a planet of 8-plus billion people must have a great many counternarratives in operation (and complex ones at that). For purposes here, counternarratives are their own stories or counterarguments; they are not point-by-point rebuttals of the dominant or hegemonic storylines.

Indeed, a major policy and management issue is clearcut only in the absence of major counternarrative(s) that in fact already exist. **Counternarratives** below devotes its six sections to recasting, respectively: global climate change, climate justice, labour-saving automation, short terms versus long terms, environmental counternarratives, and illustrations of other counternarratives for the Anthropocene, including racism and ethics.

Methods covers topics related primarily to risk, uncertainty, and unknowns. These three terms have become so naturalised in public policy and management

[2] Part II material and cases are drawn from earlier versions (with full citations) of Roe (1998, 2011a, 2011b, 2013, 2016a, 2016b, 2018, 2019, 2021, 2023), Roe and van Eeten (2002) and van Eeten and Roe (2002). The material and cases have also been amended for the guide.

that they are a matter of taken-for-granted knowledge. Novel methods to re-differentiate the terms are one way to defamiliarise the terms and see options anew or as if for the first time.

The first section identifies new metrics and benchmarks for risk and uncertainty where not-knowing happens all the time. The second adopts a rough typology of different kinds of difficulties to matters of uncertainty and inequality. The third looks to other typologies in use for better defining what 'coordination' is to be in the Anthropocene.

The fourth examines how 'wake-up calls' to looming emergencies usefully complicate many linear crisis scenarios. The fifth rethinks the chop-logic readers are familiar with, namely: priorities follow from risks and trade-offs. Last, the sixth section highlights methods of curating, as distinct from conventional facilitation practices, can be seen as opening policy relevance in one of the world's most widespread activity, that of herder, rangeland, and pastoralism development.

Key concepts takes us back to Part I by fleshing out examples of this guide's definition of complexity and of the importance, given to the need to differentiate, in asking from the get-go: 'What am I missing that is right in front of me?' Six cases are discussed. The first asks what is missing in the most important earthquake scenario for many in the United States. The second questions current understandings of 'unintended consequences' in light of Part I considerations. The third underscores why adaptive learning and management are not an alternative to recasting.

The fourth section of Key Concepts focuses on the construct of 'yes, but', especially important in bridging what for many practitioners has long been a major gap in policy analysis and management: What to do when the analysis you are reading is spot-on, but the recommendations said to follow are not? The example is the growing problem of corporate greenwashing and what to do about it.

The fifth section illustrates how the key concepts enable radical agendas to kick-start analysis and action in contrast to far too many discussions that only end by calling for such an agenda. The sixth and last section under Key Concepts relies on two financial crises to illustrate how very important it is to distinguish 'managing risk and uncertainty' from 'coping better ahead with inexperience.'

Analogies, the last grouping of sections, centres on a set of five different analogies for recasting hard problems more tractably: policy palimpsest, clues, genre, 'we are at sea in the Anthropocene', and 'thinking infrastructurally' under Anthropocene conditions. The examples include failed states, carbon trading schemes, algorithmic decision-making, wicked policy problems, catastrophic disasters. and the positive side of **Be careful what you wish for!** The reader will find by the end of Part II that policy optics are best used in combination.

I have pitched for a very wide diversity of cases in Part II to nail home the point that recastings of difficult policy and management issues are not just possible, they are likely. A downside is that to read these 23 case sections straight through can feel like being in a tumble-dryer, an early reader told me. To make this less a hammering, each chapter can be read as a standalone considering the reader's time and interest constraints. Also, a pause button has been introduced in the form of each of the four groupings ending with a short set of **Takeaways for Anthropocene analysis and management**.

Counternarratives

II.3 Recasting global climate change, locally

Assume the consensus is one of 'too little/too late' with respect to ameliorating global climate change globally. I undertake this thought experiment not to insist it is the case. Rather, assume this is the worst-case scenario and see if we can, nevertheless, recast it in ways that make it more tractable to useful intervention.

Take as our point of departure a major review of the published research on the impacts of climate change (Mora *et al.* 2018). Here is what the review article concludes in its main text:

> Our assessment of the literature yielded a small number of positive and neutral responses of human systems to climate hazard exposure (reviewed in Supplementary Note 2). We surmise that the reduced number of positive or neutral impacts may be real, but may also reflect a research bias towards the study of detrimental impacts (discussed under *Caveats* in the *Methods*). This small set of positive and neutral impacts, however, cannot counter-balance any of the many detrimental impacts that were uncovered in our literature search, particularly when many of these impacts are related to the loss of human lives, basic supplies such as food and water, and undesired states for human welfare such as access to jobs, revenue, and security.
> (*Ibid.*: 1067)

Now turn to the article's *Caveats* subsection for details:

> Although our survey of the literature yielded some case examples of adaptations, positive and differential impacts (Supplementary Note 2), these are unlikely to reflect the full scope of the adaptations, opportunities, and trade-offs associated with climate hazards. The large array of cases that we uncovered with a

> systematic literature search on only climatic impacts suggests that a better understanding of those issues (adaptations, positive, and differential impacts) will require their own comprehensive analyses. (*Ibid.*: 1073)

If the readers' curiosity is piqued, they turn to *Supplementary Note 2*, where the following passage is found. (As the passage is long, the temptation is to skim. However, the following recasting depends on close attention to the examples.)

> Although the majority of reported impacts were deleterious to humanity, some climate hazards led to beneficial impacts and in other cases no observable responses. Reduction in malaria transmission in Senegal and Niger was attributed to loss of mosquito breeding habitats brought about by drought and habitat loss. Drought and storms occasionally increased nutrient content in surviving crops, whereas drought in neighbouring countries increased availability of game animals in Namibia. Drought and natural land cover change were in some cases reported to improve water quality due to decreased nutrient runoff into streams. Warming reduced seasonal affective disorders, and mortality during winters, although the latter is controversial and unlikely to outnumber increases in heat-related mortality. Flood exposure increased social trust, and the likelihood of people to vote. Changes in ocean chemistry altered the distribution of marine organisms increasing availability in certain fisheries. Warmer temperatures have increased tourism flow toward colder destinations in the UK and the Alps. The Alaskan whale watching industry benefited from changes in ocean chemistry leading to changes in whale migration patterns, allowing for longer viewing seasons. Since the 1970s, there has been significant sea ice reduction in the Arctic providing increasingly navigable waters and shortening the shipping distances between ports. There were also cases where changes in climate hazards did not result in observable responses. For instance, societal impacts of floods and storms have not been found to contribute to the onset of civil conflict as changes in other hazards have.[3]

A close reading of all the quotes reveals a narrative discrepancy in the review – and we know from policy analysis that textual discrepancies can be the window through which we can re-see a problem differently. In my re-reading: how did the 'large array of cases that we uncovered' referenced in the *Caveat* and itemised in detail in *Supplementary Note 2* become in the main text '[t]he small set of

[3] For ease of reading, text footnotes to the findings have been deleted.

positive and neutral impacts' that 'cannot counter-balance **any** of the many detrimental impacts that were uncovered in our literature search'? [my emphasis].

The question brings into focus the local in ways occluded by the term global. The first time you read through the list in *Supplementary Note 2*, what is itemised might look more like classic coping strategies (e.g., drought-induced hunger leaving people no choice but to do something).

But now consider the list when seen through the lens of the more granular differentiation of operational strategies that are control, manage, and cope ahead introduced in the guide's Introduction. Many of the listed examples begin to look like opportunities or affordances for better coping-ahead (by way of next steps) and managing better (by way of available options and strategies) at the local levels at which the responses were observed.

II.3.1 Recasting

I would be the first to agree with the authors that more research is needed on the topic of **local** positive or neutral responses to **global** climate change. But therein lies the recasting.

An uncontrollable climate change globally exhibits a 'large array' of local coping and managing options currently under-researched or acknowledged, which admittedly would constitute a 'small set' of positive or neutral responses globally. In this recasting, what is 'too little, too late' at the global level remains open with respect to how late and how little this is across a large array of local sites.

Am I implying that global climate change turns out to be a 'good thing' locally? No. Am I saying that all recasting is transformative at the local level? No. What I am saying is that the truth of the matter can be pushed further precisely because global climate change is complex, locally. Further, that large array of local cases forms a distribution across which practices could emerge for local transformations, if not already for scaling up.

So what?

We are told: The climate emergency requires extreme measures, including but not limited to global governance for greenhouse gas (GHG) removal and remediation beyond anything the world has ever seen before. Only then can the long term and the green infrastructure get the priority they require.

It is one thing to call for radical resistance against major polluting nations. It is quite another thing to lay out how the next wave of environmental activism includes cadres of digital hackers ready to take on, say, Xi Jinping and the Chinese Communist Party. China is responsible for an estimated one-quarter of annual global GHG emissions, largely due to its massive fleet of coal-fired power stations. (Yes, we know others are to blame as well.) But where is the hacktivism

ready and able to disable these plants or elsewhere? Or disable the real-time operations of, say, the 'Big 3' credit rating agencies (S&P Global, Moody's and Fitch) for their positive ratings of the economies fuelling climate change?

In what world is unprecedented global governance of the consumption and production of the planet's billions more possible than, say, mobilising the Chinese proletariat of some 220 million or disrupting the operations of the Big 3 CRAs, both for the planet's survival? I start instead from the proposition that the radical action talked about is not radical enough.

II.3.2 Upshot

The radical action of interest is in the preceding: Climate change globally exhibits already a large array of local coping and managing responses. To repeat: We know that global climate change is complex, **because** local responses continue to be so heterogenous and diverse. We know the large array of local cases form a distribution across which practices could emerge for local transformations, if not already for scaling up.

The proposal here is that the agenda for addressing the climate emergency establish as its benchmark the really-existing diversity of climate responses and related practices (including militancy) already underway. Now, that would be radical. While more is needed by way of other-level policy and management, the 'more' would be evaluated against this benchmark and not some other far more imperfect ones.

II.4 What, though, about climate justice?

Three decades ago, Jon Elster, the political philosopher, wrote *Local Justice: How Institutions Allocate Scarce Goods and Necessary Burdens* (1992). It is of continued pertinence because one of its points is that not only can local justice systems lead to global injustice, but global justice systems can also lead to local injustices.

II.4.1 First, Elster's definitions

> Local justice can be contrasted with global justice. Roughly speaking, globally redistributive policies are characterised by three features. First, they are designed centrally, at the level of the national government. Second, they are intended to compensate people for various sorts of bad luck, resulting from the possession of 'morally arbitrary properties.' Third, they typically take the form of cash transfers [e.g., think reparations]. Principles of local justice differ on all three counts. They are designed by relatively autonomous

> institutions which, although they may be constrained by guidelines laid down by the centre, have some autonomy to design and implement their preferred scheme. Also, they are not compensatory, or only partially so. A scheme for allocating scarce medical resources may compensate patients for bad medical luck, but not for other kinds of bad luck (including the bad luck of being turned down for another scarce good). Finally, local justice concerns allocation in kind of goods (and burdens), not of money.
> (Elster 1992: 4)

The semi-autonomous institutions are local in three senses for Elster: arena, country, and locality (*ibid*.: 2–3). Different arenas, such as organ transplantation, college admissions, and job layoffs, follow different principles: 'Need is central in allocating organs for transplantation, merit in admitting students to college and seniority in selecting workers for layoffs' (*ibid*.: 2) in the US. Allocative principles vary by country as well: 'In many European countries, need (as measured by number of family dependents) can be a factor in deciding which workers to lay off' (*ibid*.: 3) Finally, allocative principles can also vary by locality within the same country or arena, as with the case of local transplantation centres in the US (*op. cit.*). (In case it requires saying, these systems have changed since Elster's writing!)

In short, complexity in local justice systems comes not just from the fact that the goods are scarce, heterogeneous and in kind and that the sites of allocation may well be locally contingent. Local justice systems vary also because principles are tied to complex arrays of criteria, mechanisms, procedures, and schemes.

II.4.2 Implications, including for climate justice

Not only are local justice systems not designed to compensate for global injustices, but they can also lead to those injustices:

> From childhood to old age, [the individual] encounters a succession of institutions, each of which has the power to give or deny him some scarce good. In some cases, the cumulative impact of these decisions may be grossly unfair. We can easily imagine an individual who through sheer bad luck is chosen for all the necessary burdens and denied all the scarce goods, because in each case he is just below the cut-off point of selection. To my knowledge this source of injustice has not been recognised so far... Those who are entrusted with the task of allocating a scarce good rarely if ever evaluate recipients in the light of their past successes or failures in receiving other goods. Local justice is largely non-compensatory. There is no mechanism of redress across allocative spheres...

> [B]y the nature of chance events, some individuals will miss every train: they are turned down for medical school, chosen by the draft lottery, laid off by the firm in a recession, and refused scarce medical resources; in addition, their spouse develops cancer, their stocks become worthless, and their neighbourhood is chosen for a toxic waste dump. It is neither desirable nor possible to create a mechanism of redress to compensate all forms of cumulative bad luck. For one thing, the problems of moral hazard would be immense [i.e., if people knew they were going to be compensated for whatever happened to them, they could take more risks and thereby incur more harm]. For another, the machinery of administering redress for bad luck would be hopelessly complex and costly.
> (*ibid*.: 133–4)

Where so, local justice clearly can lead to global injustice.

But just as patently from a local justice perspective, the global justice promised in, say, climate justice (e.g., via reparations), leads to local injustices, when the former is implemented uniformly over a far more differentiated landscape. One thinks immediately of how to define an 'extreme event' that triggers automatic debt relief.

To expand, the more uniform the application of climate justice policies, the greater the local pressure for suitably heterogeneous applications, if not alternatives. But the more differentiated on the ground, the greater the chance of global injustice when considered as universal principles uniformly applicable at the micro level.

In this way, just as it is not possible for local justice systems to compensate for the global injustices they create, so too it may well not be possible for global justice systems to compensate for the local injustices they create, at least in any timely way or by way of coverage.

II.4.3 So what?

For one thing, the continued insistence that global climate justice involves money transfers (as distinct from in-kind compensation typical of local justice systems) ends up further monetarising a global environment that local systems take to be quite otherwise.

In so doing, the insistence obscures the huge importance of in-kind compensations at the local level. Think here of the livestock sharing systems among herders (e.g., *khlata* in Tunisia and *mafisa* in Botswana). These are local justice systems irrespective of the livestock involved being methane producers. Indeed, I cannot think of a better example of global climate justice at odds with local justice systems, globally.

II.5 Recasting labour-substituting automation

Developments under the rubric of artificial intelligence (AI), including machine learning, big data, and algorithmic management/decision-making, are often deployed with respect to a long-standing policy narrative: Important forms of technological change, namely 'automation', are labour-substituting by displacing workers and their livelihoods.

Given the issue has always been complex, evidence continues to be provided in favour or against the narrative. In fact, articles on the impacts of automation habitually rehearse the same arguments for and against. What is less recognised is that useful specifics are frequently erased or effaced by maintaining versions of the generalised narrative. This matters when the specifics of earlier debates – particularly, options and insights offered up but not followed on – can, if resurfaced, question and usefully refresh the current debate.

Here is an illustration. Schlögl, Weiss and Prainsack (2021) reviewed relevant literature from 2013–18 on the topic, 'Future of Work', concluding in part:

> Our findings show the dominance of a specific narrative within the grey policy literature on [Future of Work]. It starts with the assumption of unprecedented, rapid technological advance that, embedded in demographic and ecological transformations as well as globalisation, creates opportunities and risks. The main opportunities are gains in productivity, new jobs and higher living standards. The risks are new inequalities, pressures on social security systems, and the costs of transition and disruption for various groups. The answer to these challenges lies in the re- or upskilling of the workforce and adjustments to social and labour market policies [according to their review]. (Schlögl *et al.* 2021: 320)

II.5.1 Recasting

Assume their storyline is correct as far as the authors take it. Importantly then, there is a narrative discrepancy, that being 'unprecedented', in the preceding quote. This technological change is not unprecedented.

The unprecedented is happening all the time when it comes to this narrative. The authors themselves point out that 'US president Lyndon B. Johnson even set up, in 1964, a "National Commission on Technology, Automation, and Economic Progress". Transformations and crises of work as a result of technological progress are a recurring theme throughout modernity.'

Therein, I submit, lies one clue to rethinking the policy narrative. If you go to their referenced report of that National Commission on Technology, Automation, and Economic Progress, *Technology and the American Economy*, you find the

labour-substituting narrative cast in terms that still resonate, e.g., 'technological change would in the near future not only cause increasing unemployment, but that eventually it would eliminate all but a few jobs, with the major portion of what we now call work being performed automatically by machine'. (If in doubt about the latter's continued salience, search for 'fully automated luxury communism'.)

Yet it is not the older report's resonances, but specifics that are useful for the recasting. Yes, the report is full of terms and references to no-longer existing programmes. On the upside – and this is the counternarrative I highlight – it offers up specific proposals that read more like 'lost modernities', i.e., pathways to addressing the narrative in ways we no longer think about today:

> We recommend that each Federal Reserve bank provide the leadership for economic development activities in its region. The development programme in each Federal Reserve District should include: (1) A regular programme of economic analysis; (2) an advisory council for economic growth composed of representatives from each of the major interested groups within the district; (3) a capital bank to provide venture capital and long-term financing for new and growing companies; (4) regional technical institutes to serve as centres for disseminating scientific and technical knowledge relevant to the region's development; and (5) a Federal executive in each district to provide regional coordination of the various Federal programmes related to economic development.
> (US National Commission on Technology, Automation, and Economic Progress 1966)

Nothing came of this recommendation as far as I can determine (a few commission members, from the then right and left, objected to it). But just think about the 'what if's'!

II.5.2 Upshot

What if the recommendation had been adopted and implemented then? What if it were enacted today, considering the Fed's now longstanding mandate for promoting price stability and maximum employment? (The Fed was legislated to promote maximum employment in 1977.) Even with inevitable caveats about politics, dollars, and jerks, the question still compels: What if, indeed!

The upshot is that one consequence of keeping the dominant policy narrative in general terms is to disconnect from it the already-existing specific counterexamples and counternarratives. Yet, the starting assumption must be: For any complex policy and management issue, counterexamples are to be expected. The duty of care is to read closely and find them – in fact, still in front

of you. ‘When the picture is not good enough, go closer’, said photographer Robert Capa.

II.6 Recasting long terms, short terms, and short-termism

Much of what we hear and read today sounds like short-termism. Why are not people taking the long term far more seriously? What is with all this wilfully ignoring of Anthropocene crises?

For me, short-termism is captured by: ‘Our inability to forecast the future is the mess we are in right now’. Long-termism in turn is captured by: ‘In the long-run there is just another short-run’. Both are consistent with much of this guide’s understanding of today and ahead.

You the reader, however, come to the Anthropocene having different preoccupations-with and your own counternarratives of the short term. Yours may be more akin to: ‘There is every reason to believe the present can’t continue this way indefinitely’. Or your longer term is more in line with: ‘It isn’t a question of if it will happen but when it happens later on’. Other orientations are of course possible, but the four just identified are sufficiently illustrative to make the following case.

For this guide, the crux is not ‘long term **versus** short term’, but rather complex policy and management crises are pegged to and/or differentiated by more than one orientation.

II.6.1 Illustration and first-pass implications

Start with ‘the present rise in health-care costs in the US cannot continue this way indefinitely’. Now, rescript the crisis through the other three orientations: ‘The current crisis in health care is that we can’t predict health-care requirements with the specificity we need for taking action now’; ‘Health care continues to be characterised by seriatim technology and digital upheavals, one after another’; and ‘It’s not if, but when the next worldwide pandemic will happen’.

In this reframing, ‘the health-care crisis’ reflects not only multiple but different orientations are at work, but their sequencing is a major way for differentiating and tracking time (i.e., ‘the Covid pandemic has emerged as its own health-care crisis’). In this recasting, different crises no longer unfold at different times. Rather, crises are the way we unfold time.

Now complicate that notion of time further. Assume for all four orientations that the future is a hypothesis yet to be finished with because the present is itself open to question.

A core urgency moves to the fore when we focus on the nature of the present in any long/short orientation: Where does 'not knowing the present' come into play in each orientation? It may turn out that even conventional short-termism – the present matters more than the future, period – requires more certainty and confidence than warrantable. That there are more orientations – and competing preoccupations – than my four serves to nail home this point further.

The virtue of centre-staging not-knowing is to remind those preoccupied with various short terms and long terms that predicting the future is difficult for the very same reasons learning from the past is difficult: Both, to repeat, require stability in objectives, institutional memory, fallback reserves in case something goes wrong, and low environmental uncertainty. But we are in the Anthropocene: These conditions do not prevail.

II.6.2 Upshot

For many, the absence of preconditions for predicting the future and learning from the past is the problem. For this guide, it is positive to start from the fact that not-knowing, inexperience, and difficulty are each variable. Why becomes clear when we move to the more granular case level.

Some regional climate change modelling is of such a high resolution today that climate model results can be and are disaggregated in ways of use to some critical infrastructures. It is now possible to project estimates for rising sea-levels, storm surges, and inland flooding in, say, 20-year increments to better reflect already existing near- and longer-term cycles for infrastructure depreciation and forward investments, among others. The latter can be updated in light of projections from the former.

Do such modelling results reduce uncertainties related to depreciation and investment cycles? No, not necessarily. Do modelling results increase confidence that action with respect to these cycles can be taken, nevertheless? Yes, possibly, in fact: entirely possible.

II.7 New environmental counternarratives

When it comes to the Anthropocene, the long term and the planetary are deployed to staple home the interconnectivity of it all. Nevertheless, we need to push that truth further.

We saw earlier that everything connected to everything else means nothing is reducible – completely or importantly – to anything else. We can no more ignore irreducible particularity than the interrelatedness. Fortunately, such differentiating promotes policy and management relevance in the face of high(er) complexity.

To put the point differently, specifics matter more because we are in the Anthropocene. The specifics that matter take us far from current priorities and practices for setting percentages and amounts for GHC reductions. The specifics entail more granular foci in environmental scenarios. Here the guide focuses on real-time operations of societies' key critical infrastructures within a regional context – infrastructures that drive, for bad and good, the Anthropocene:

- Granular because risk, uncertainty, and not-knowing are always with-respect-to specific failure or accident scenarios;
- Real-time operations because the measure of effectiveness is to manage effectively now in the Anthropocene;
- Operations of key infrastructures because the reliability and safety of these large sociotechnical systems – think large-scale energy and water supplies – are not only vital to society, but are often based in ecosystem services mandated for restoration or sustainability; and
- Within a regional context because global climate change modelling and other types of environmental simulation increasingly accept the region as the unit of analysis for near-term risk and uncertainty management.

II.7.1 Where are we to find new or under-acknowledged environmental scenarios

If the challenge is to identify specifics – that more granular focus on real-time operations of institutions within a regional context now that we are in the Anthropocene – it pays studying those whose current jobs are to do just that. To that end, four (4) groups are identified and sketched below who in actuality work on counternarratives.

1. One group is found in the control rooms and surrounding support staff of large critical infrastructures

These are admittedly the villains in many environmental crisis narratives. Because some infrastructures, particularly water and energy, are based in ecosystem processes and services, many of these systems operate under the dual mandate of maintaining service reliability while at the same time safeguarding, if not actually restoring, associated ecosystems.

The more I studied control room operators, the more I learned they are far from environment's enemy. Turn to four neglected storylines based on existing practices of reliability professionals in highly complex socio-technical systems:

Practice 1: Bring real-time ecologists, biologists, and renewable energy specialists directly onto the floor of the infrastructure control rooms.

This is already being done to varying extent. If environmental specialists cannot reliably advise on real-time ecosystem-based infrastructure operations now, why would we believe that those promising to do so later will actually know by then? Complex large systems are only reliable as the next failure ahead. Why then is preventing the next case of failure less important than those in the later future?

Not all ecologists are temperamentally suitable or trained for real-time advice. In March 1999, a colleague and I interviewed a well-known ecologist who insisted the Delta smelt would not 'go extinct even if we try to wipe them out'. Then came the articles with titles like 'the collapse of pelagic fishes in the upper San Francisco Bay-Delta'.

Practice 2: Redefine system boundaries.

Wetlands have been an iconic ecosystem in ecologists' stories. Yet wetlands are 'eco-infrastructures' in other large system definitions. Those that moderate the effects of wind and waves on the adjacent levee structures are part of the levee system definition just as the levees provide an ecosystem service by protecting these wetlands at other times.

In a storm, a single stretch of road may become an essential part of repair access for electricity lines as well as the means of access for levee flood-fighting crews. In this case, the stretch of roadway becomes part of the emergency response of two infrastructures. A roadway between wildlands on one side and the electricity lines on the other side can serve as a firebreak in the emergency response system for the approaching wildland fire.

From one perspective, it looks like three separate systems in competition with each other: a forest next to pasture next to arable fields, no one of which can expand without loss to the other. From a perspective that treats them as subsystems to a larger ecosystem, the grazing land serves as a firebreak between the forest and arable holdings.

So too the California Delta can be seen not just as its own system but also as a buffer against encroaching urbanisation from the east (Sacramento and Stockton) and west (Greater Bay Area), much as agriculture in South Florida and Western Netherlands had buffered against urbanisation moving into the regions' 'green' areas.

It follows that a core empirical issue is where that extra investment would produce the greatest positive impact on the ecosystem and landscape: adding trees and green-scapes in Sacramento or Stockton (urban ecosystems); reducing chemical agriculture on Delta islands (agricultural ecosystem); and/or constructing more wetlands around Delta islands (the environmental ecosystem).

Since contexts are so varied (politically, culturally, geographically, and more), the devil is in detailing the scenarios.

Practice 3: Act on the full implications of the infrastructure control room as a key institutional and organisational formation for ensuring the high reliability mandate of improved ecosystem services and processes.

Control rooms in large critical infrastructures are one of the few institutional formations that have evolved over time and across multiple contexts to promote high reliability repetitively in the management of complex socio-technical systems.

The implications are considerable.

We keep hearing that global problems must have global solutions. If true, those solutions will never be highly reliable at that scale. There is no global cadre of its real-time managers in the foreseeable future. All of which explains why the shift away from global climate change models to regional ones is so significant. It is far more plausible to imagine water and energy control rooms coordinating far better for ecosystem services at the regional level when collaborating.

Practice 4: A great deal of environmental anxiety is understandably directed to identifying better and more timely warnings for Big System Collapses.

To the extent that large socio-ecological systems (forestry, agro-ecosystems) depend upon critical infrastructures for their survival, it is important that environmentalists and other concerned groups recognise the early warning signals that indicate to control room staff and support staff they are operating at, or beyond, their performance edges:

- The infrastructure's control room is in prolonged just-for-now performance. This means operators find it more difficult to manoeuvre out of a corner in which they find themselves. ('Yes, yes, I know this is risky, but just keep that generator online for now!')
- Real-time control operators are working outside their official or unofficial bandwidths for performance – in effect having to work outside their unique domain of competence.
- Decision rules operators reliably followed before are turned inside out: 'Prove we can do that' becomes 'Prove we can't;' 'Ensure a capital cushion to protect against unexpected losses' becomes 'From now on, manage for expected losses'.
- Real-time operational redesigns ('workarounds') by control room operators of inevitably defective equipment, premature software, and incomplete procedures are not effective.

- Control room skills as professionals in identifying systemwide patterns and undertaking what-if scenario become attenuated or no longer register.
- Instead of being driven by societal dread of the next major large-system failure, control room professionals are told their track record up to now is to be benchmark for system reliability ahead.

Should it need saying, such under-recognised early warning signals and narratives must be expected to change over time and context, regardless of how rebarbative terms like ‘eco-infrastructure’ and ‘management-not-control’ seem.

Turn now to another group from whom to expect new environmental narratives.

2. If our models and narratives must become more granular with respect to time and scale for the systems, then we also have a way of recasting the debate in ecosystem management and restoration. In so doing, we identify a second group sourcing future environmental narratives – and one fitting with global and regional complexity

Two ideal types, the carvers and the moulders (see Stokes 1978), can be said to drive narratives about site-specific ecosystem restoration.

In idealised form, carvers see their task as one to release the true ecosystem from the surplusage around it. Chip away at all that population, chisel off the over-built environment, get rid of the non-native species and banish pollution – and only then does the ecosystem have a chance of being revealed. In the carving orientation, the ecosystem manager or restorer assumes the landscape has within its remit the good form and function created for it as nature, not by us.

The second ideal type is found in ecosystem managers and restorers who see themselves essentially as modelers of clay (literally). They mould the landscape by trying to press onto it contemporary versions of complexities it might once have had. Here, there is no prospect of repristinating nature. Ecosystems must be designed and maintained, albeit their resulting complexity may be little like the pre-disturbance or pre-settlement states. (Indeed, the grievance that ecosystems are continually degraded signals landscapes are mouldable.)

Unsurprisingly, actual ecosystem managers and restorers fall somewhere between the two ideal types, making do with what is at hand and with what is possible. What is clearer now than before is that this good-enough improviser is itself a third ideal type for ecosystem management and restoration.

Think of this third ideal as its own narrative. The newly credentialed environmental professional starts with the expectation that the ‘ecosystem’ or ‘risk’ or ‘trade-offs’ are out there to be identified, only to realise in the field that each must be specified in more detail, namely: Risks or uncertainties with respect to what failure scenario? Under what conditions does this hold? To what

end or ends? Just what is this a case of? What are you and I missing right in front of us?

As practice and field work unfold in light of addressing these questions, the professional working with others gradually recognises that his or her challenges arise because what is out there depends on how 'it' is defined or managed or improvised by real-time human beings in the real-time organisations and the real-time systems they find them in.

So what? This improvisation, it turns out, has its own idealised and practical benchmarks and practices.

You see this, prominently, in the social and physical construction of 'urban ecosystems'. Cities are highly differentiated systems with their own improvised sets of species and processes, which in some cases have considerably more biodiversity than commonly supposed. From this third perspective, not only will there be multiple benchmarks (which actual improvisation inevitably falls short of ideal improvisation), but the scenarios of success or failure will also be with respect to different real-time uncertainties than those that perplex carver and moulder. We should expect from this crucible of granularity will come new, more case-specific environmental narratives.

3. As for a third source, environmental policymakers and academics are a heterogenous group and they too source new environmental narratives

One example is offered here, this returning us to the importance of the region as the unit of environmental analysis and action.

An influential policy and management arena in the US and elsewhere has revolved around 'environmental governance'. Here I focus on an early formulation. Delmas and Young (2009) present a schematic for understanding environment governance in terms of multi-level interactions (local, regional, national, international) among three main actors (public sector, private sector, and civil society).

The premiss is that because the public sector cannot produce all the environmental improvements required, reliance on private sector markets and civil society communities is also needed. The three intersect. Delmas and Young draw on their volume's case studies to illustrate interventions in each overlap, with the case of 'eco-labelling' being where public, private, and civil spheres overlap together.

The volume chapter by Auld *et al.* (2009) gives considerable attention to eco-labelling interventions in terms of third-party certification schemes that ensure goods and services are sustainably sourced. We have programmes that certify produce is organically grown, coffee is fairtrade, and timber comes from forests sustainably managed. Such certification programmes work on two fronts

typically, first by incentivising consumers to buy certified products, while discouraging them from purchasing non-certified products or services.

Now, recast that eco-labelling by way of another example. A major, persisting problem in the California Delta is deep concern over the high reliability and safety of the levee system protecting island agricultural activities there.

Imagine a third-party programme (not, however, mythically 'neutral' or 'objective'). Along the lines of sustainability councils, this organisation would certify whether any given Delta agricultural land (broadly writ to include livestock, aquaculture, and non-traditional crops) was protected by levees that meet a standard of high reliability in design and maintenance.

Imagine consumers would be encouraged to buy 'levee-certified' goods and services and discouraged from buying those that were not so certified. Imagine, in short, the same element – the levee – but now having a different function than 'keeping water out' only.

The wider buying public in California and beyond would be encouraged to purchase only those goods and services from adjacent country entities that had supported levee certification in and around Delta water. In like fashion, the wider buying public would be discouraged in purchasing from those entities whose goods had been transported on the deep-water shipping channels passing through the Delta to Sacramento and Stockton, if those firms did not support levee improvements up to third-party certification standards along those shipping channels. In parallel, the wider buying public would be encouraged to buy agricultural products only from those Delta islands that had been levee certified and discouraged from buying levee uncertified.

4. The fourth group from whom to expect new environmental narratives (not just regional but 'big picture' ones) are practicing ecologists and environmentalists. This group is far more differentiated than some readers might suppose. Indeed, that differentiation has been there from the beginning, with an under-acknowledged counternarrative

The term, 'ecosystem', comes to us through A.G. Tansley's 1935 article, 'The Use and Abuse of Vegetational Concepts and Terms.' Tansley has been criticised for his role in colonial British ecology, but here he has salience for two different reasons.

First, ecosystems for Tansley make no sense without humans and their interactions with the landscape. 'We cannot confine ourselves to the so-called 'natural' entities and ignore the processes and expressions of vegetation now so abundantly provided us by the activities of man. Such a course is not scientifically sound, because scientific analysis must penetrate beneath the forms of the 'natural' entities, and it is not practically useful because ecology must be applied to conditions brought about by human activity', he wrote.

This might seem to be pushing at an open door today, but Tansley deployed a discourse quite different than his contemporaries in the US.

The latter offered just-so stories about 'climax communities' evolving on their own – only if free from human beings mucking things up. Two commentators on Tansley's work (Cameron and Forrester 2017) argue that his 'principal contributions, in contradistinction to American ecology, were to emphasise the systemic interrelations of human activity and botanical phenomena – he sees no real difference between those ecosystems which are natural and those which are 'anthropogenic' (nature 'produced by man', as he glossed in 1923).' 'A well-defined localised human community is the kernel of an ecosystem', Tansley reiterated in addressing the British Ecological Society in 1939 (Anker 2001).

But Tansley is important to this guide for a second reason. Not only was he a founder of the British Ecological Society (the precursor to such societies in other countries) and the Nature Conservancy, he was also well-known and respected member of the British Psycho-Analytic Society, having been analysed by Freud for nine months in 1922 and 1924. For Tansley, humans and their desires ('energy') were and are never far away from ecosystems.

Whatever the reader thinks of Tansley's dated terms, many ecologists today continue to see human desire as The Enemy. Such, I like to think, would have appalled Tansley who took desire and ecosystem to be inseparable. He would be the last person, I suspect, shocked by the fact that large infrastructures, created to satisfy desires and wants, have impacts, not just bad but good, for environments that have had to be improvised far longer than supposed.

II.7.2 There is also a fifth group to generate and modify new environmental counternarratives – you

Start with what many would consider unexceptional: 'Given the obvious contingency of much of our lives – we do not in any meaningful sense intend or choose our birth, our parents, our bodies, our language, our culture, our thoughts, our dreams… and so on – it might be worth considering not only our relationships to ourselves and our relationships to objects, but (as the third of the pair, so to speak) our relationship to accidents', writes the psychoanalyst Adam Phillips (1994).

We could say the same about our relations to environmental contingencies. Fair enough, were it not for others, including Agnes Heller, the philosopher, concluding the opposite about the same contingencies Phillips underscores:

> In choosing themselves, men and women choose exactly what they are, as they are. They choose their best talents as much as their physical handicaps, they choose their parents, their childhood, their

> country, their historical age. They choose their poverty if they happen to be born poor, and their riches if they happen to be born rich. They choose their accidental features. That which they are by accident they become by choice.
> (Heller 1993)

Put that radically, Heller's counternarrative stirs us to ask under what conditions is her point the case. I think those reading her passage can see what she is driving to: In the same way, we have yet to make what we can of the Anthropocene's risks, uncertainties, and unknowns.

We make of inevitable contingencies what our experience of inexperience will in circumstances we find ourselves. In trying to do better by positioning yourself somewhere between Phillips and Heller, you end up recasting these contingencies and events, and not just for the Anthropocene.

II.8 Illustrating complexity's counternarratives for racism, climate-change-from-below, and AI ethics

It is evident that the phrase, 'these are uncertain times', is used by elites to divert attention from the certainties of their exercising power.

This guide pushes that truth further: Complexities – again: societal, political, economic, historical, cultural, legal, geographical, governmental, psychological, neurological, technological, religious, and more – ensure that counternarratives are in the making or already exist with which to oppose, directly or indirectly, those dominant policy and management narratives. They do not have to be invented by a vanguard intelligentsia or the techno-managerial elite who claim to know better than the unwashed billions. Let us briefly examine counternarratives already there for three complex policy and management issues.

II.8.1 Racism

We must ask: What are still missing that are already there by way of counternarratives with respect to 'racism'? A great deal, this guide offers, and precisely because of the complexities.

Go back to the late 1990s to the mid-2000s. It is not so far past that some readers won't remember it, but far enough away for added perspective, as they say. Start with statistics reported then about African-Americans:

- Black Americans, 13 per cent of the population, constitute half of this country's prisoners. A tenth of all black men between ages 20 and 35 are in jail or prison... (dated 2007)

- Around one third of young African American men between 18 and 25 are connected to the juvenile justice system or the federal justice system. They're on probation in jail, under indictment or incarcerated... (dated 2002)
- What's striking thing is the high portion of black men with zero income reported – about 18 per cent of black men, compared to about 7 per cent for whites and Hispanics... (dated 2007)
- After declining throughout the 1980s, employment rates of young, less-educated white and Latino men remained constant over the 1990s. Among black men aged 16 through 24, employment rates dropped. Indeed, this group's employment declined more during the 1990s than during the preceding decade of lower economic growth... (dated 2004)
- The most disastrous outcome is the high rate of paternal abandonment of children: 60 per cent of African-American children are being brought up without the support of their fathers... (dated 2002)[4]

Even were the numbers illustrative only, you would have still had to ask then: Why ever were we not interviewing those nine-tenths of young black men who were not in prison, those two-thirds who were not enmeshed in the criminal justice system, those four-fifths who did not have zero income, that half who were employed, and those four out of ten who had not 'abandoned' their children – all in order to find out what they are doing right?

Racism, of course, was one systemic reason why the questions were not asked, or at least frequently and prominently. But that too falls short of the point. What were those then counternarratives, and for that matter, what are they now?

A well-meaning observer at that time said that, if a magic wand were available, he would have wave it so that every Black would have a master's degree, as degree holders were more likely to have higher incomes, better health, and more positive outcomes. Before I waved any such wand, then or now, I would want to know what different educations were to be rendered missing.

II.8.2 Climate-action-from-below as emergency response

It is striking how similar responses-from-below regarding climate change are to immediate emergency response witnessed in recent large-scale disasters. (The similarity would have been more obvious if climate change were called for what it is, the climate emergency.) For example, a Mozambican scholar-activist (Bruna 2022) has,

[4] Respectively, Patterson (2007), Barber (2002), Besharov (2007), Holzer and Offner (2004), and Patterson (2002).

> outlined three major differences between these climate actions 'from below' and top-down solutions: (i) participation of local actors from planning design and implementation of projects; (ii) horizontal relations and equal access to information; and (iii) non-extractivist initiatives that retain benefits within communities for local consumption, without extractions and expropriations.

Immediate emergency response to earthquakes, tsunamis, floods, large wildfires, and the like also feature collective action by people involved (and not just in search and rescue); so too are featured the importance and centrality of horizontal and lateral communications (the work of Louise Comfort [2019] on emergency response in major earthquakes is exemplary in this regard). More, the collective action and joint improvisations are geared to restoring rather than depleting key services any further during the emergencies.

The similarities – I argue, equivalencies – go further. The local site and communities are the pivot-point in emergency response as in climate action-from-below. Food sovereignty is mentioned as a priority in responses-from-below, and indeed localised food and water around the site also become a priority during emergency response and into initial recovery. Speaking of which, local forms of resistance to climate change responses directed from above look a great deal like conflict over longer-term disaster recovery: Both involve many different or changing stakeholders with conflicting agendas and interests.

So what? What is the added value to policy and management with seeing the immediate emergency response features of climate action-from-below?

Let me stay with the US setting and focus on one primary emergency response mechanism: namely, where a city or county activates its emergency operations centre (EOC) and/or incident management teams (IMT) at the department level to manage immediate response. Activation happens when high winds, ice storms, fires, flooding, and their combinations take down essential services, particularly backbone infrastructures of water, electricity, roads, and telecoms. It should go without saying many of these events are related to climate change.

Now the recasting:

> Activate the EOCs and IMTs, or at least the ones which know they are in the climate emergency. And just who exactly are the distressed peoples and sites? It is up to the EOCs and IMTs to decide with respect to where spaces are being made uninhabitable, jobs are being lost, and malnutrition is on the increase because of the climate emergency.

In thinking such impacts through, much of what outsiders recommend by way of emergency response clearly belongs more under longer-term recovery than

initial rapid response, e.g., timely construction of those altogether different, more resilient infrastructure systems.

Note also that admonitions of 'stop-this-and-that-immediately!' confront a major obstacle from the get-go.

In really-existing emergency response, fossil fuel is needed to evacuate people, ship goods and services to distressed areas, keep the generators running when electricity fails, and so on. Fuel subsidies in fact might be the order of day here, albeit not there.

Indeed, push the crux further: Decades and decades of R&D have gone into prototyping and distributing more sustainable alternatives to some of these goods and services. Should not we also then expect and want their increased use in immediate emergency response as well, especially when (not: 'even if') expediting them to the distressed sites and peoples means using more petroleum-based products?

II.8.3 AI ethics

A good friend was not trying to be provocative in saying a clear sign a field has lost its energy is when it was everywhere overtaken by discussions of ethics. If synergies you want, he added, look to the boundaries with other fields in competition with it. His example was Nobelist, Herbert Simon, and his move into AI.

That loss of energy is not a bad thing where much-touted innovations have far from benign consequences (consequences being a big thing in policy analysis). Still, as a thought experiment, let us ask in the spirit of my friend's remarks: With all this attention to AI ethics – especially transparency and fairness – is AI a moribund field in ways not commonly supposed?

As ethicists are also addressing sub-fields like machine learning (ML) and algorithmic decision-making (ADM), are these moribund in ways we – that is, those of us who become instant experts in AI by reading the secondary literature – do not (yet) comprehend?

For example, rapid obsolescence of software and equipment used in ML and ADM is a topic that, at least to this point in writing (I stand to be corrected), has not been given as much attention as readers might expect (Fortmann-Roe and Roe, forthcoming). To my mind, the topic is more important that transparency or fairness since obsolescence changes the 'with-respect-to-what's' of the latter.

So what? Just what analytic purchase do we get parsing AI ethics through the lens of obsolescence?

Well, one thing the reader gets is having to nail down a track record, if any. Here is W. Daniel Hillis (2010), computer scientist and inventor, writing in **2010**:

> In an Internet-connected world, it is almost impossible to keep track of how systems actually function. Your telephone conversation may be delivered over analogue lines one day and by the Internet the next. Your airplane route may be chosen by a computer or a human being, or (most likely) some combination of both. Don't bother asking, because any answer you get is likely to be wrong... Soon, no human will know the answer.

In short, the kind of not-knowing AI portends has been going on for years and years. What then is the record of all this, and other such software being replaced or upgraded? Is it that the software is no longer working or that something better has come along, or both or something else altogether? How would studying this track record **not** contribute to AI ethics?

These are even more important questions, given the Anthropocene will make obsolete many other things that matter now, including current understandings of not just AI ethics but also 'AI' and 'ethics'. Not just a track record, obsolescence is also better understood as its own policy palimpsest, in terms discussed more fully in later sections.

II.9 Counternarratives: Takeaways for Anthropocene analysis and management

But, you insist, what is happening today are global crises for which we do not have counternarratives grounded in deep knowledge, proven skills and potent remediation practices. Quite the opposite, you press: **Exceptional** circumstances give rise to **extraordinary** threats and thus to **emergency** measures which necessarily end up as **precedents** for **first-ever** policies and practices. We have no alternative but to stop... [fill in the blank].

This guide suggests the reader might want to think more about the bolded terms, as each puts you (and us) at the limits of human comprehension, infrastructure reliability and hazard management.

Why? Because any conclusion that these are unprecedented times in altogether uncharted waters is itself the artefact of having no default option when already at the limits of thinking and comprehending. That is why this guide spends a good deal of time on different methods and analogies that take 'limits' and recast them otherwise. (Again, no guarantees!)

A different response to the bolded terms reflects the under-acknowledged background condition for taking action when conventional analysis and

management are at current limits. Humans have always been many-sided, where that background condition of having many sides inherently frames the action we take.

Another way to put this is that human and social complexity ensures counternarratives are already there or in the making – and, to repeat: How could you think otherwise for this planet, our most complex ecosystem, with already 8 billion different persons?

This means it is not good enough to critique a dominant narrative and leave it at that. Nor is it good enough to treat a critique as if its point-by-point rebuttal has a 'therefore there', leading syllogistically to 'there is no alternative but to stop cutting down trees, stop using fossil fuels, stop inequalities...' Useful critiques are pushed further by the counternarratives that offer details (more formally, are granularised with respect to system elements, functions, and interconnections). This means it is scarcely ethical to insist your 'stop-this!' counternarrative is the best without canvassing the panoply of other really-existing ones.

Conventional risk analysts and crisis managers are quick, nevertheless, to counter: 'What do you mean we are one-sided and not on the look-out? Good managers and analysts always look at the many sides of an issue and we pride ourselves in seeking to bridge incompatible positions – and never more so than when the prospect of disaster raises the stakes.'

But there is no 'middle' to bridge or compromise over when we are at or beyond the limits of comprehension. You must default to something other than analysis or management as usually understood. In these cases, you default to the background condition or this guide's different policy optics. You do so to recast what are currently understood only as intractable limits in order to re-engage analysing and managing. And even if this fails, you are still on the look-out for other counternarratives, as bearing witness and permanent critique can only be a part of the duty of care.

Methods

II.10 New benchmark and metrics for risk and uncertainty

Methodologically, there is no such thing as risk or uncertainty on its own. It is risk or uncertainty **with respect to** something. Because that is such an important insight, this is a long section as the details are many.

There are, of course, many ways to think about risk and uncertainty (e.g., in terms of threats and vulnerabilities), but for the present assume risk of a failure is the product of the probability and the consequences of failure. For its part, uncertainty exists when you know probability or consequences but not both; not-knowing is when neither are known.

Why are the distinctions important? For reasons already mentioned, the language of risk and uncertainty has become so naturalised it is taken to the obvious point of departure, like filing alphabetically or chronologically.

So too in the Anthropocene. Recently I was told: 'The first thing we have to do is assess the risks of increased flooding here'. Actually, no. First, you differentiate. The first step is detailing the with-respect-to scenarios of concern.

You identify the boundaries of the flood system as it is actually managed and then the standards of reliability to which it is being managed (namely, what events must be precluded or avoided by way of reliable and safe flood management). The risks follow from the standard to be met for the system as bounded for real time for management.

II.10.1 An introductory example of 'How so?' and its implications

Focus on an island in the western California Delta – Sherman Island – and consider criteria that engineers rely on in establishing priorities for reducing levee fragility there (the island's levees are needed because its productive areas are considerably below the encircling water level):

- Criterion 1. Levee fragility priority can be set with respect to the weakest stretch of levee around the island, i.e., that which has the highest probability of failure (Pf). This has obvious implications for collocated elements from different infrastructures, e.g., a very high levee Pf counsels against plans to place, say, an agro-chemical tank facility next to it. (You'd assume common-sense would commend this as well.)
- Criterion 2. Levee fragility priority can be set with respect to the stretch having the highest expected loss of life (and/or other assets) arising from levee failure. If the levee breaches where most island residents live, then there is less time for evacuation. Consequences of failure (Cf) are important here, and this criterion is about the levee stretch that has the greatest risk of failure, not only probability of failure.

Sherman Island's weakest levee stretch was said to be on the southwest part; the stretch with the greatest loss of life appeared to be on the eastern and south-east side with more residences. From the perspective of Criterion 2 and other factors constant, it is good the weakest stretch of levee (according to Criterion 1) is on the other side of the island, so as to ensure more time for evacuation.

There is a third criterion. It reflects the extent to which the levee infrastructure of the island is itself part and parcel of a wider interconnected critical infrastructure system (ICIS):

– Criterion 3. Priority for addressing levee fragility is with respect to the levee stretch that has the greatest risk to the entailed ICIS. ICIS risk of failure is not the same as risk of levee failure only, as stretches of Sherman Island levees are in fact not just elements in the levee flood system there, but also elements in other critical infrastructures. For Sherman Island, there is the levee stretch with Hwy 160 on top; there are also other stretches serving as the waterside banks to adjacent deepwater shipping channels; another levee stretch serves to protect a large wetland berm (as fishing and bird habitat). If those stretches of levee fail, so too do elements fail in the deepwater shipping channel, Hwy 160, or the Delta's threatened habitat.

Criterion 3 asks: What is the effect on the road system or shipping system or wetlands ecosystem, when that shared ICIS element on Sherman Island fails? If a stretch of Hwy 160 fails, road traffic in the Delta would be detoured; if a stretch of the deepwater shipping channel fails, shipping traffic would be rerouted to other ports; and so on. In some cases, the service cannot continue because default options are no way clear or assured, e.g., the Sherman Island wetlands berm in terms of its habitat and fish cannot be 'rerouted' in the same way, were its protective levee to fail.

The follow-on question then is: What infrastructure system sharing one or more ICIS elements on Sherman Island would be affected the most in terms of increasing the probability and consequences of its failing as a system, were Sherman Island levee stretches to fail?

Answer: A levee breach anywhere on Sherman Island would increase the probability of having to close the major pumps for the State Water Project, with huge consequences.

That is, the Pf of the state and federal water projects would increase were Sherman Island to flood, because saltwater would be pulled further up from the San Francisco Bay into the freshwater Delta. Indeed, the standard of reliability and safety being managed to by the owner of Sherman Island (the California Department of Water Resources) is that levee failure anywhere there must be prevented from happening.

To summarise so far, the three with-respect-to levee assessment criteria – hybrids and others are possible – differ appreciably as to where risk analysts focus attention in terms of levee fragility: the weakest stretch (Pf) may not be the same stretch whose failure would have the greatest loss of life and property (Cf), while any stretch that failed would pose the greatest ICIS risk (namely, the probability that an ICIS element failing has the consequential effect of increasing

the probability of failure of one or more systems sharing that element). (For more on this case, see Roe and Schulman 2016.)

You would expect that calls for more and more 'inter-organisational coordination' would have to be prioritised in light of these criteria. You would be wrong. At the time of research, the third criterion was altogether outside remit for conventional risk assessment and management at the time of the research. (Major problems with the ritualised calling for 'more coordination' are discussed later in the guide, which offers a very different recasting of coordination.)

II.10.2 Broader methodological implications of with-respect-to scenarios

Before proceeding to benchmarks and metrics for Anthropocene risk and uncertainty, it is important to tease out what is meant and entailed by 'with respect to':

1. If risk of failure is defined as the product of the probability of failure (Pf) times the consequences of failure (Cf), then Pf and Cf are NOT independent of each other, as conventional risk analysis would have it.

In this guide, we are talking about Pf and Cf with-respect-to the same failure scenario. Both are connected indirectly by the intervening variable of that shared failure scenario. Even more, the failure scenario details the operative:

– reliability standard (are you seeking to preclude specific events or avoid them if possible? are some events inevitable or compensable after the fact?);

– evaluative criteria (are you managing just Pf or both Pf and Cf [risk]?); and

– system being managed (are you managing, e.g., the within or across different infrastructures?)

Yes, it is true that the more detailed a beforehand failure scenario, the more likely actual on-the-ground failure events will deviate from that scenario. But that illustrates the point being made here: The more granular the failure scenario (the greater the details about the standard, criteria, and system), the more likely that Pfs and Cfs are interconnected and dynamic.

In the most obvious – but as we shall see at times misleading – case of interinfrastructural cascades, one consequence of Infrastructure1 failing (Cf_1) may be to increase Infrastructure2's probability of failure (Pf_2).

This is why a risk estimate must not be confused with being a prediction, as in: 'If risk is left unattended, failure is only a matter of time.' That cannot be assumed.

Even were Pf and Cf not interconnected, the function of the failure scenario is to identify and detail conditions for cause and effect upon which prediction is or is not possible. Many 'large system failure scenarios', a.k.a. today's crisis

narratives, are devoid of just such detail when it comes to the operative reliability standards, evaluative criteria, and (sub)systems to be managed or for which coping-ahead is directed.

2. Identifying risk(s) in the absence of first defining the operational system and the reliability standard(s) being managed to ends up in having no stopping rule for possible failure scenarios and types of risks/uncertainties.

By not defining initial conditions, all manner of factors end up purportedly posing risks and uncertainties, to wit:

> different assets; multiple lines of business; system capacity, and marketing factors; in terms of the risks' time-dependence versus independence; in terms of the risks associated with emergency work as distinct from planned work; investment risks versus operational ones; risks with respect not only to system safety and reliability, but also organisationally in terms of financial risk and in terms of risks of regulatory non-compliance… *ad infinitum*

After a point in this regress, it becomes an open question as to how managing all these (and so much more) contributes to the infrastructure system operating reliably in real time. It is then not surprising that conventional root cause analysis of infrastructure failure is highly vexed in the absence of one or more beforehand-specified failure scenarios.

The lack of a stopping rule for failure scenarios to be worried about represents its own failure scenario when it discourages thinking through and acting on failure scenarios about which more is already known and can be managed.

When we asked infrastructure interviewees what were the 'nightmares that keep them awake at night', they identified not only measurable risks and non-measurable uncertainties with respect to specific failure scenarios, but also the fact that scenarios for what could go hazardously wrong seemed limitless.

In other words, the probabilities and consequences of large system failure are misleadingly estimated not only because (1) the measured estimates of Pf do not adequately address key non-measurable uncertainties (e.g., where either Pf or Cf cannot be measured in the time required), but also because (2) there are so many more failure modes than the conventional scenarios (e.g., earthquake or flooding) assume.

Or to put the point positively, the level of granularity in a failure scenario becomes more useful when it entails and validates a stopping rule.

3. Misleading estimation of probabilities and consequences also occurs because the failure scenarios themselves have not been specific enough with respect to the boundaries of the system being managed and the reliability

standard(s) that govern what is taken to be relevant risks and uncertainties to be managed or otherwise avoided.

This means that the infrastructure's already-existing risk mitigation programmes and controls, if any, become a priority source of indicators and metrics reflecting how seriously catastrophic failure scenarios are treated by managers.

The existing controls and mitigations may provide the only evidence, outside the real-time management of the infrastructure control room (if present), of what works well in real time with respect to improving systemwide reliability and safety when pegged to major or catastrophic system failure. Such mitigations may also confirm the usefulness of the stopping rule or need for its change as new failure. modes emerge.

To put it another way, the fact that risk is not calculated through formal risk analysis and management protocols must not be taken to mean risk is not formally appraised and evaluated by other means, most prominently (1) through the skills in systemwide pattern recognition and localised scenario formulation of real-time control room operators and support staff, and (2) via evaluation of existing risk mitigation programmes and their 'risk controls.'

What do #1–#3 add up to for the purposes of identifying new, more appropriate benchmarks or metrics for today's large system risk and uncertainty, and ahead? The guide considers three to be especially important for policy analysis and management in the Anthropocene.

II.10.3 A new set of benchmark questions

When control operators and their managers in large critical infrastructures know that some events must never happen – the nuclear reactor must not lose containment, the urban supply must not be contaminated by cryptosporidium, the electricity grid must not separate and island, then better practices emerge for ensuring that. (Again, this is why we look to evaluating existing risk mitigation programmes and measures.)

Mandates to reliably preclude certain events put enormous pressure to focus on and modify actual practices that work to meet the mandates (including evaluative criteria for measuring how effectively the mandates are met). Where better practices have emerged across a variety of different cases, you know that others too face political, economic, and social constraints – basically, that trinity of politics, money, and egos – and still have jumped a bar higher than we yourselves are currently facing under like conditions.

Where so, conventional risk analysis gets its questions only halfway by stopping short of the other questions to be asked beforehand. The conventional risk analysis questions – 'What could go wrong?', 'How likely is that?', and 'What are

the consequences if that were to happen?' – are to be preceded by: 'What's working?', 'What's even better?', and 'How can we get there?'. Only then do we ask: 'What could go wrong in trying to get there?', 'How likely is that?', and 'What are the consequences if that were to happen?'. In case it needs saying, some professionals already follow and advocate this sequence.

Many things follow from this benchmark of revised risk questions. The most important for our purposes is the implication for implementing the recommendations of any such expanded risk analysis. The first issue to be addressed is not, 'Who's going to adopt the recommendations and, if so, with what modifications?' but rather more specifically: 'Who would implement the final recommendations and what are their scenarios for not failing in doing so?'

II.10.4 A new metric for ranking crisis scenarios

Start with a somewhat familiar prediction of Martin Rees (2007), former British science advisor, who assigned no better than a 50/50 chance that humanity survives the current century because of catastrophes of our making. Think Anthropocene, in other words.

How might we evaluate and rank his prediction in terms of risk and uncertainty as understood in this guide?

By way of answer, turn to another prediction, that of US President, Woodrow Wilson (in his time expert in public administration), who predicted with 'absolute certainty' in September 1919 that there would be another world war if the US did not join the League of Nations (Schlesinger 2005).

Assume a unit of measurement called the Wilson. It is equal to the confidence today's experts have that Woodrow Wilson foresaw the start of the Second World War.

Obviously, 'the start of the Second World War' is inexact. Wilson did not predict Hitler, the Shoah, or carnage on the Eastern Front. But scenarios for financial cascades, global cyberattacks, climate apocalypse, and fast-spreading pandemics of as-yet unknown viruses lack comparable specificity by way of their details.

The question is this: How confident are experts in their crisis scenarios when that confidence is measured out in Wilsons? When it comes to nuclear terrorism, are the experts, say, 30 times more confident that such terrorism will happen than they are that Woodrow Wilson foresaw the Second World War? For that matter, what would be the consensus view of specialists when it comes to denominating other catastrophe scenarios into fractions or multiples of Wilsons?

The temptation is to dismiss outright that Woodrow Wilson did foresee the future. Were that dismissal scientific consensus, it would be quite significant, would it

not? Here at least is one scenario that is Just.Not.Plausible. To render such means, however, the criteria used for concluding so apply to the other scenarios.

In short, we are back to baseline confidence measures and the hard work of developing multiple ways, if any, for triangulating on and estimating specialist confidence, scenario by scenario, in the face of difficulties and inexperience over what and about which we know and do not know.

Although daunting, several key points become clear in this way. To ask how confident specialists are specifically about nuclear terrorism quickly becomes just what is meant by 'an act of nuclear terrorism'. What are the pertinent with-respect-to scenarios?

This devil-in-the-details leads to a second half of this thought experiment. Assume now we face a specific crisis scenario. It could be that act of nuclear terrorism, or that computer glitch sending global markets into free-fall, or that bioengineered pathogen destroying Anthropocene life near and far.

Assume a visualisation of the widening scenario is simulated and presented so as to pressure decision makers to prevent that scenario from unfolding, once they see how the catastrophic it could be. Also assume a running tally in the visualisation shows the estimated monetary value of the disaster's costs – lives, property, whatever – burgeoning into the millions, then billions, now trillions. The tally reinforces how imperative it is to take urgent preventive action.

But hold on. Assume the visualisation and tally remain as described, but the simulation's goal is recast to estimate the cost of a catastrophe that cannot or will not be prevented.

The tally then becomes an unofficial price tag of the emergency prevention and management system put into place after this disaster, so that a like one 'will never happen again' (the precluded event standard of reliability).

The commonplace is that, sadly, it takes a disaster to bring about better disaster prevention and management afterward.

The temptation with this part of the thought experiment is to assert that, absent outright prevention, a world won't be left from which to mount an effective crisis management infrastructure later. That, though, surely depends on the specific scenario and the extenuations of implementing an emergency response infrastructure that its losses trigger. Again: The devil is in the details of the with-respect-to scenarios.

Note just how difficult it is for anyone, subject matter experts let alone others, to come up with plausible details about the crisis response structure, if any, to be in place after the losses incurred. To do that requires deep knowledge and realism – far more than a much-touted 'imagination'. Determination of whether the

literature on ‘expert judgment under uncertainty’ differentiates anything like ‘effective imagination’ must be left to the reader.

In brief, we are asked to treat possible crisis scenarios seriously until proven otherwise, when those offering the scenarios are unable to specify what it takes to disprove the scenarios or prevent their actual recurrence.

Or to put the point positively, what deserves ranking are those crises whose details have already been triangulated upon.

II.10.5 A new metric for estimating societal risk acceptance

It is generally understood that ‘acceptable risk’ standards, based on past failure frequencies and commitments of ‘never again’, can be fleeting and ephemeral. On top of which, the Anthropocene promises never-seen-before calamities. There are limits, in other words, to any retrospective orientation to failure, as in: ‘Well, it hasn’t happened before, so what’s the problem now…’

It is worth asking then, what can be offered by way of a prospective orientation – ‘we are no more reliable than the next failure ahead’ – to identifying standards of (un)acceptable societal risk. What does ‘societal risk acceptance’ look like if, instead of based in past (in)frequencies, it is grounded in the expectation that major system accidents and failure lie ahead unless actively managed against (manage as defined in Part I)?

Consider the following thought experiment, the aim of which identifies a proxy for ‘acceptable societal risk’. To telegraph ahead – what follows is also at some length – the proxy is the aggregate curve of the major real-time control room risks of society’s key critical infrastructures.

Preliminaries

Assume that society has identified critical infrastructures indispensable to its survival; that the infrastructures have central control rooms for operating their systems in real time; and that the respective control operators and support staff have a set of chief risks that they must manage in order to maintain that real-time systemwide reliability. (Here, high reliability is the safe and continuous provision of the critical service, even during periods of high turbulence.)

While major assumptions, their virtue is in seeking to operationalise more granularly what current retrospective risk approaches do not. Notably, the ALARP (‘as low as reasonably practicable’) method assumes ‘society sets acceptable and unacceptable risks’, often leaving the implied somehow-this-happens devoid of any of specifics.

There have, however, been few alternatives to (versions of) ALARP. What’s wrong with it? Imagine a typical ALARP box graphic, the vertical left side demarcating the probabilities of system failure, the horizontal lower side marking

out the consequences of failure in terms costs incurred and/or estimated lives lost. Now look inside the box for the plotted probabilities and consequences estimated from past frequencies (if any) for specific systems, technologies, or industries. Also imagine a line bisecting the box, sloping downward from higher left to lower right. This is to be taken as society's risk curve. Above the line are those technologies and industries with acceptable risks; below are those whose risks are unacceptable.

The proposed alternative

In contrast, the prospective approach proposed here starts with the precluded-event standard of reliability (i.e., the event or a set of conditions to be prevented must never happen, given the society-wide dread associated with system failure). Research (Roe and Schulman 2008, 2016) found that infrastructure control operators need to be able to manoeuvre across four performance modes so as to maintain normal operations. Most important, each performance mode was found to have its own chief risk.

The four modes range from anticipatory exploration of options (just in case) when infrastructure operations are routine and many management strategies and options are available, to a real-time improvisation of options and strategies (just in time) when task conditions are more volatile. Control room professionals and their support staff may have to operate temporarily in a high-hazard mode (just for now) when system volatility is high but options few. They may also be able, in circumstances when options have dwindled, to impose onto their service users a single action scenario (just this way) in order to keep the service provision as stable as possible.

The chief risk in just-in-case performance is that professionals are not paying attention and become complacent – reliability professionals have let their guard down and are no longer vigilant to sudden changes in system volatility (think of system volatility as the degree to which the task environment is unpredictable and/or uncontrollable). As for just-in-time performance, the risk is misjudgement by control operators with so many balls in the air to think about at one time. The great risk in just-this-way performance is that not everyone who must comply does so.

Last, just-for-now performance is the mode managers want most to avoid or exit as soon as they can. Here the risk of 'just keep doing that right now!' is tunnelling into a course of action without escape options. What you feel compelled to do now may well increase the risks in the next step or steps ahead (in effect, options, and volatility are no longer independent).

Note that the commonplace admonitions for being reliable – don't get complacent; avoid overconfidence; once you've backed yourself into a corner, quick fixes may well work only just for now, if that; and don't expect everyone to

comply with command and control – all recognise these chief performance mode risks on time-critical, highly-consequential occupations. Contemporary examples abound, e.g., these performance modes and risks were evident in the public health infrastructures over the Covid-19 pandemic surges.

The thought experiment

Assume then that estimates have been computed by control room operators in consultation with subject matter experts for the risks of complacency, misjudgement, non-compliance, and closing off alternatives for the infrastructure system. Such is then done for (a stratified sample of) society's key infrastructures with control rooms.

There is no reason to believe the estimates of any one of the four key risks are the same for the same performance mode across all sampled infrastructures during their respective normal operations. Different precluded events standards are operationalised differently in terms of the thresholds or transitions under which they are not to operate. Complacency or misjudgement could empirically be more a problem in some infrastructure control rooms than others.

Assume the performance-mode risk estimates (a stratified/weighted sample of them) have been rank ordered, highest to lowest, for these infrastructures operating to their precluded-event standard by the respective control rooms. A plot of points measured in terms of their respective Pf and Cf coordinates is generated in the form of a downward sloping function (i.e., logarithmic or regression). Imagine it to be an empirically estimated version of the downward 'acceptable risk' line in the preceding ALARP figure. This time, though, the descending line would reflect the revealed allocation of acceptable infrastructure risks at the time of calculation for societally critical services in real-time normal operations to prevent their respective precluded events from happening.

So what?

The downward sloping function would, by construction, be a prospectively oriented standard of acceptable risk for society's (sampled) critical infrastructures. It is prospective because the unit of analysis is not the risk of system failure – again, typically calculated retrospectively on the basis of the past record, if any – but rather the current risks of real-time control operators failing in systemwide management during normal operations, now and in the next operations ahead. Note the two-dimensionality prospective 'next steps ahead': It refers not only to the near future but also the future that has to be made – prefigured – by the control operators for the present.

The prospective rather than retrospective is majorly important for stress-testing infrastructures under dynamic Anthropocene conditions. Considerable work has been done already with respect to stress-testing financial institutions under a variety of scenarios, including those related to increased climate risks. However,

a major complaint is that 'although testing of this type is forward-looking in nature, the parameters upon which the stress scenarios are based are derived from historical experience' (Cullen 2023). Prospective measures of risk, such as proposed here, are very much needed for future infrastructure stress-tests.

II.11 A typology for policy and management difficulties and implications for income inequality

II.11.1 The typology

If inexperience is a proxy for not-knowing (see the guide's Part I), so then is difficulty. There may be more bulletproof typologies for difficulty than that of late literary critic, George Steiner (1978), but it is sufficient here.

At a quick trot, four types of difficulty stand out in making sense of a text ('text' now construed broadly to include narrativised selves and situations): contingent, tactical, modal, and ontological. Our example throughout is income inequality.

Contingent difficulties

Here the text or situation poses obscure terms or notions that you must 'go and look up'. With a little work – you read more or talk to those in the know – you figure out what the term or notion means for the case at hand.

As contingent difficulties, 'Just what does uncertainty and its assessment or management really mean?' has answers that can be found in handbooks, manuals, or statutes. What does this or that regulation say about the term in question? The same too for what qualifies legally or officially as 'inequality', income or otherwise.

Tactical difficulties

Here the text or situation poses obscurities that are deliberately difficult and not meant to be settled by looking up an answer. Legal ambiguities may be intentionally introduced to make it difficult for any decision maker to engineer or cookie-cutter a single answer across cases.

Purposive ambiguity ensures that no single answer exists for 'What is risk?' or 'What is inequality?' Just what 'market prices' are being talked about when figuring incomes or risks core to inequality: transaction prices, offered prices, prices thought to prevail if there were a trade, prices modelled on the prices of inputs in that model, or with respect to something else?

Modal difficulties

Here 'mode' refers not to numerical average or middle value but to 'modes of experience'. The text or situation poses difficulties because of the differing experiences of those reading or interpreting it. 'Today I am less experienced,

less able to adapt to this harsh selfish environment than the average twenty-year-old', writes essayist Phillip Lopate (2015), 'who has grown up without my New Deal/Great Society set of expectations'.

As modal difficulties, both uncertainty and inequality centre on the experience of being unequal or in different chancy circumstances, and how that experience changes relationally. 'To grow up is to discover what it is one is unequal to', writes psychoanalyst, Adam Phillips (2002). As modal difficulties, being unequal or 'at risk' does not and cannot equate to official classifications of material inequality or legally designated 'risky behaviour'.

Ontological difficulties

Situations are posed so *in extremis* that they cannot be comprehended whatever one's experience. These difficulties have no 'answer' because no question is being asked that is answerable.

Few examples remain in media ready to domesticate every fresh obscenity. Sometimes, though, we glimpse the scorches. Leslie Hardman, Jewish military chaplain with the British during the Second World War, tried to describe what he saw when entering the concentration camp at Belsen: 'If all the trees in the world turned into pens, all the waters in the oceans turned into ink and the heavens turned into paper, it would still be insufficient material to describe the horrors those people suffered under the SS.' As ontological difficulties, inequality and uncertainty radically alter our humanity. They make us indescribable and beyond the limits of cognition, knowledge, and feeling.

First-order implication

While the four types of difficulty come brewed together in policy and management, initial differences are evident. One, most of the inequality and uncertainty difficulties are contingent, tactical, and modal, i.e., they can be addressed, if only over time or at times provisionally only.

Two, those who handle these difficulties are often to be found in teams, groups, and networks rather than individually, since the difficulties are so knowledge-intensive they require varied experiences with heterodox contingencies in heterodox contexts. We should expect the same for the Anthropocene.

Three, what are taken to be significant inequality or risk and uncertainty difficulties are more likely to be modal than ontological. Modal difficulties recognise complexity, but insist on the importance of different types of (in)experience in addressing them; ontological difficulties are not differentiated, at least by definition and in those ways.

The upshot is profound

There are costs in addressing one type of difficulty to the exclusion of others. It is scarcely sufficient to insist the opposite of complexity is simplicity, when the

costs of dealing with ontological difficulties are set by not dealing with contingent, tactical, and modal ones instead. It is very difficult, indeed, to be simple about complexity. ('A maximum of simplicity goes with a maximum of difficulty... Being simple is not simple; it is attempting the impossible', wrote French author, Georges Perros [2015].)

By way of example, the difficulty with 'a more equal or less risky society' is not that society is idealised or reified. Rather the ideal of a more equal and less risky society is not as variably difficult as are inequalities and risks in practice. It is too easy to say 'no one should starve when there is food, no one should die of thirst when there is water, no one should bleed to death when there is medical aid' and leave it at that. Where is the actionable granularity?

There also is that broader caveat: The more experience with complexity and not-knowing, the more we must resist behaving as if our inexperience and its difficulties are also decreasing. Accumulating modal experiences under the impression that events are getting less difficult is to be tempered by a countervailing sense that we are as artless and craftless as ever in our inexperience with unknowns.

Where, though, in all this is the politics? Now turn by way of an answer to the typology's implications for income inequality.

II.11.2 Major implications for income inequality

Here, I take the central implication of the preceding typology to be this: Income inequality is not just difficult; inequality is and has always been the result of difficulties, inexperience, and not-knowing.

Yes, income inequality is 'political' – though again why stop there and not add cultural, historical, economic, geographical, demographic, and the many more? But here too such adjectives are insufficiently differentiated to be helpful in grappling with the many and diverse complications in income inequality.

At least ten complications come to my mind immediately. To be clear, each is patently contestable, no single one is dispositive, a good many are correlated while the underlying numbers keep changing.

Yet together these difficulties (and others that come immediately to the reader) remind us that in the Anthropocene… Well, let me save the positive upshot for recasting income inequality to the end of this section.

Ten immediate reservations

In no order of priority and at a quick trot. First, as we are to worry about wealth inequality, why then is it not more common than it already is to point out that consumption inequality has been less skewed than income inequality in a good number of places? Many Western households have long had refrigerators,

ovens, cell phones, and the TV, whatever differences in income. (And yes, consumption is also complicated.)

Second, even as the top fraction of 1 per cent has vastly more income than the lowest 20 per cent, that still must mean, numerically, far more happy poor people than happy ultra-rich. Of course, the percentages matter. But the absolute number of people who are by and large happy must also matter in any felicity calculus for public policy and management. (If 'happiness' seems a stretch here, go to the literature on happiness economics.)

Third, it is patently true income inequality has increased in the US, but such has happened in other economies over roughly the same period, albeit arguably not to the extent in the US. (Or consider the issue in another way: At what point is rising income inequality accelerating so fast that we might want to talk about economies being decoupled – internally differentiated – contrary to the narrative of a coupling and coupled globalisation?)

Fourth, who can be sure inequality would have been less had we done otherwise? Here what you take to be the counterfactual is indicative. If John Kerry had been elected instead of George W. Bush, do you really believe inequality would have been less, with most other things remaining equal?

Fifth, return to the 1960s when income inequality was less skewed in parts of the West. Now, contrast the 1960s injunction to drop out of the middle-class rat-race to the more recent preoccupation on income inequality (the 99 per cent versus the 1 per cent). As if now it really is **all** about moneyed interests. (For that matter, today's shrinking of the middle class diminishes the deadweight of bourgeois values from a 1960s perspective, right?)

Sixth, if we were to redistribute income, what does this mean for redistributing income generation? It is often said that, say, cattle-holdings in Africa are highly skewed and unequal, as if that were an argument for a more equal distribution of livestock. But to imagine the latter is to imagine quite other production systems in place. So too in the West. If, as critics point out, we are in a massive experiment with the radical skewing of incomes, substantial de-skewing would have to be implemented in ways far less experimental, correct?

Seventh, discussions about income inequality pivot frequently on a syllogism: There is not enough money for the poor, there is more than enough money for the rich, therefore more people could be comfortably off if incomes were more equalised. But what about where there is too much money, unequal or not? As seen in that 2008 financial crisis, credit default swaps along with sovereign and corporate debt exceeded by many multiples the total estimated annual global GDP, an imbalance of bad money blasting away the good.

Eighth, we have all seen graphics showing how the cost of one military super-plane cashes out into many more classrooms or social services. But the opportunity cost of that mega-plane is not set by forgone social and health services. Money saved by not building that plane would in the US – would, not could or might – be set by post-tax wages and income no longer forgone, not by a better-funded discretionary government budget.

Ninth, an anomalous feature of income inequality discussions has been their narrow view on what a more equal distribution of income would achieve. We hear about better health and dental care among the poor, were incomes less skewed. What we do not hear enough are arguments that more income for the poor means that they too can buy more media, take more trips, get an iPad, and eat at better restaurants – precisely things the modern puritans would deny the poor when it comes government income transfers.

Which leads to a tenth reservation about today's inequality discussions: the all-too-narrow focus on government income transfers as the primary redistributive mechanism. Private remittances, to pick one example, are more important than government aid to many poor countries. Why are we not then focusing more on increasing wage remittances as a way of addressing inequality? Or from the other direction: Since US incomes are **that** unequal and health care **that** inefficiently provided, then surely these inequalities and inefficiencies are a source of positive slack and reserves for future revenues and funding of better programmes and economic growth?

The itemisation could easily be extended but stop here and consider. So far, I have been listing complications (to which you may have had your own rebuttals).

But where are the recastings? Indeed, complications on their own render the appearance of intractability when the complexity means more opportunities to recast and rethink inequality. An illustration of the latter is suggestive.

Example

In May 1968, more than a thousand academic economists – Paul Samuelson, John Kenneth Galbraith, James Tobin, to name a few – endorsed a 'national system of income guarantees and supplements' for the US. Milton Friedman, as well, supported an equivalent negative income tax. But how would we today respond to this proposition?

> As long ago as 1968 over a thousand economists endorsed a national system of basic income guarantees – so we would do well to consider that still an option to address growing poverty and income inequality in the US.

Objections rush forward. So much has changed since then! Congress is more polarised, the American public more fissiparous; we know more; these days we

must be less idealistic. And anyway, we sort of ended up with a patchwork of income guarantees. We may have been positioned to realise a (better) national income guarantee initiative during the War on Poverty, but not now no matter how much you talk about Universal Basic Income...

Such feints may be hold as far as they go, but farther we must go. Why? Precisely because of the complications just itemised. For these difficulties and like complications imply that, rather than not being positioned now to produce a national income guarantee, we may well be in that position – it's just that we don't (yet) know it. In this view, those who do not know are at their cognitive limits of thinking about complex and difficult matters, like income inequality, in the absence of better ways to recast 'it'.

Which means: Even if we are positioned to implement an effective national income guarantee, we no longer know it to be so other than through the surprise that comes with having acted to that end. The just-so story – 'It'd take a miracle for anything like this to work now!' – becomes instead the surprise, 'Who would have thought we were able to do this now?'

The latter response we associate with A.O. Hirschman's Hiding Hand principle: Only by not-knowing in advance how very difficult some things are to achieve do we achieve them or something even better. Yes, here too there are no guarantees; yes, there are many recorded instances when the Hiding Hand has not worked; yes, we must monitor and be wary of those indicators of Big System Collapse mentioned earlier.

But the central point for policy and management is to be reiterated: Income inequality is not just difficult; income inequality is and has always been the result of difficulties, inexperience, and not-knowing.

Upshot

What does this a typology about difficulties applied to income inequality add up to, methodologically?

The challenge is not so much drawing implications at the level of that country's income support programme contrasted to this country's income support programme. The comparison is more across many actual income support programmes, all operating under their own varied difficulties of politics, money, and egos. Which ones perform better under similar difficulties (or worse) than you face where you are, right now?

That kind of pattern recognition is precisely what is needed for addressing income inequality – with a decidedly small-'i' – in the Anthropocene.

II.12 Other typologies for the Anthropocene, or making the best of linear thinking when it comes to 'coordination'

I come from a training in policy analysis and management that has little good to say about calls for 'more coordination'.

When having nothing else to say but feeling compelled to recommend more, then comes the 'what we need is more coordination'. And who can be against it? Though it is called for without a tincture of what to do, step by step and in real time. Like gold in seawater, coordination is impressive but pointing that out is of scant use now.

When I read criticisms that blame deaths or injuries in a disaster on the 'lack of coordination', I expect to see answers to two prior questions:

1. Can it be demonstrated that the lack of coordination did not arise because the responders knew – or thought so at the time – that they were undertaking activities just as urgent; and
2. Can we conclude that the event in question would (again: not could, should, might or perhaps) have been better responded to had it not been handled the way it was (the classic counterfactual)?

In my experience, rarely are answers attempted, let alone provided. (Note the counterfactual is a twofold 'would'. 'What would you do, in their place, and how would you do it?', asks sociologist, Raymond Aron, of the critics.)

Such details are of course difficult to summon, but that doing so is rarely mustered leaves us to wonder just whose inexperience is revealed – the responders criticised or those calling for, well, more coordination.

II.12.1 And yet, the Anthropocene...

It borders on truism that the Anthropocene requires unparalleled coordination among the populations and nations of the world. In light of the calls, coordination, this guide argues, is better understood as the chief limiting factor in policymaking and management under unavoidable conditions of high uncertainty, complexity, conflict, and incompleteness.

From that vantage point, 'better coordination' is less an aim than a limiting factor on being reliable and safe under Anthropocene conditions. Coordination is not an explanation, or a cause, or a rationale of better management and policymaking, but rather a test of the validity of that management and policymaking.

Coordination is **limiting** because no one knows how to coordinate when generalised across very diverse cases. It is **chief** because, even when better

management has been undertaken, pertinent issues remain causally unclear (uncertain); variably numerous, different, and interconnected (complex); interrupted and unfinished (incomplete); and under dispute (conflict). Yet calls for more coordination are **unavoidable** when the remaining uncertainty, complexity, incompleteness, and conflict are treated as needing to be reduced but are not at that point reducible. 'Thus', so ergo goes, 'we need better coordination'.

Where so, thus-coordination can be viewed as an empty signifier for our having not yet recast the issues. From the guide's perspective, the call for more coordination is to determine whether we can better utilise the recast versions' uncertainty, complexity, incompleteness, and conflict. That is: Recast the issue to see if the change in the amalgam of complex, uncertain, unfinished, and disputed is useful to you.

II.12.2 Recasting the coordinates

How do we recast issues so as to alter their complexities more usefully without simplifying them for the purposes of coordination? One answer, albeit seemingly counterintuitive: The recasting of issues in order to coordinate them better requires even more linear thinking under dynamic conditions (as thinking in terms of chief limiting factors is itself linear).

There is great irony in taking complexity seriously via linear thinking. This guide must quickly qualify: '… when that linear thinking is in the form of multiple typologies considered together for analysing uncertainty, incompleteness, and conflict as well.'

Any two-by-two typology on its own is easily criticised for simplifying reality. That, however, misses what has always been the latent methodological function of typologies in the plural: to underscore and remind us that reality is indeed more complex than lines, boxes, and lists can portray.

Multiple typologies are the norm in policy analysis and management, and to use them in sequence – one after another, different terms following upon different terms – is to render a major policy or management issue more granular for differing implications. The typologies in my policy-analytic work come largely from sociology, political science, and organisation theory.

In the most practical sense, you can begin with any typology, the point being there is no free-standing, *a priori* macro, meso or micro start when it comes to reframing what is uncertain, complex, unfinished, and disputed at the same time. The typologies I rely on include:

– Different types of unpredictability, including measurable probabilities, unmeasurable uncertainties, and unknown-unknowns (adapted from Andrew Stirling's typology of incertitudes [Stirling 2010]);

- Different types of organisations, where production agencies for example differ significantly from coping agencies in terms of their observable/unobservable outputs and outcomes (J.Q. Wilson's typology of agencies [Wilson 1989]);
- Different types of cases, e.g., 'cases out there in reality' as distinct from, say, 'the case emerging from your interaction with issues of concern' (Charles Ragin's typology of cases [Ragin 1992]);
- Different types of large-scale technological systems whose centralised or decentralised operations vary as a result of component coupling and interactivity (Charles Perrow's typology of high-risk technologies [Perrow 1984/1999]);
- Different types of cultures for differentiating ways of life and policy/management orientations (the four cultures of Mary Douglas, Aaron Wildavsky and the colleagues [Thompson *et al.* 1990); and
- Different performance modes – just-in-case, just-in-time, just-this-way, and just-for-now – for the real-time high reliability management of large-scale socio-technical systems (Roe and Schulman 2008, 2016)

You, the reader, may well have different or more recent typologies. But even then, the point remains: No major issue emerges unchanged from the seriatim application of granularising reformats. So too for Anthropocene issues – be they inequality, poverty, the climate emergency, pandemics, health care or more.

In all this, though, remember the methodological virtue in the application of multiple typologies. It is to move from the myriad types of contingent (adventitious, idiosyncratic) factors at work affecting a major policy and management issue – again, societal, political, economic, historical, cultural, legal, scientific, geographical, philosophical, governmental, psychological, neurological, technological, religious, and whatnot. In the same move, it is to push and pull you to the many criteria with which to identify and describe the factors that are pertinent. These reframing criteria are the dimensions (the horizontal and vertical gradients used in differentiating the cells) of each typology.

II.12.3 Upshot

It should be clear that no recasting resolves the amalgam of uncertainty, complexity, incompleteness, and conflict that remains after reframing a complex policy and management issue. The question, again, is: Are we prepared to sacrifice one amalgam of uncertainty, complexity, incompleteness, and conflict for another? What is more useful?

Which do we prefer, the one for today's major mess or the one that remains after having shown 'we can reframe or recast that in the following way...'? Which

means, practically: Are we prepared to over-sample the Anthropocene's unpredictabilities and many different drivers when undertaking these before-and-after comparisons?

We oversample, it must be noted, because of the fixation of so many others on the measurable and calculable as a way of generalising away case differences.

II.13 Wake-up calls make linear crisis scenarios V-shaped

It is easy enough to depict 'right, centre, and left' as a linear continuum: as when politics move from the right through the centre and onto the left. But the straight line becomes V-shaped, when the centre is stretched and pulled away from the other two ends, as when the sequence, beginning-middle-end of a story, is made to sag in-between, like a hammock.

Think here of the time-consuming catch-up to the contingencies that come our way *in medias res*, rendering beginnings long gone and ends further off than our storylines assumed initially. This is what happens when wake-up calls identify intervening crises that stretch time and space out of shape between thought-to-be beginnings and thought-so endings.

II.13.1 Covid-19

By way of illustration, the Covid-19 pandemic was reported to us by several emergency managers as 'a wake-up call' with respect to the interconnectivities and vulnerabilities among water, electricity, roads, and other backbone infrastructures in Oregon and Washington State. In the view of an experienced emergency management expert, 'the one thing that the pandemic is bringing out is a higher definition of how these things are interconnected and they're not totally visible'.

Covid-19 response made clearer that backbone infrastructures, especially electricity, are 'extremely dated and fragile' in the view of other interviewees. Shortages in road staff in the aftermath of a vaccine mandate were mentioned by a state emergency manager for transportation as making it harder to undertake operations. Covid-19 responses also put a brake on infrastructure and emergency management initiatives already in the pipeline (e.g., preventative maintenance), according to multiple respondents.

The pandemic combined at the same time with other emergencies. A heat dome episode required a treatment plant's staff not to work outside, but in so doing created Covid-19 distancing issues inside. The intersection of lockdowns and winter ice storms increased restoration times of some electrical crews, reported a state director of emergency management for energy. The vaccination mandate

on city staff added uncertainty over personnel available for line services. Who gets to work at home and who gets to work in the plant also created issues.

'We struggled with working with contractors and vendors' over the vaccine mandate, said a state emergency manager for roads: 'If we had a catastrophic disaster three months ago that would have been a challenge for us to work through.' 'All [Covid-19] planning happened on the fly, we were building the plane as it moved, we'd never seen anything like this', said a state logistics manager. The interviewee added, 'Covid-19 is so unique and out of the box that we've developed rules and processes that we're only going to use during [the] Covid-19 [pandemic] because they don't make sense in any other disaster'.

In other words, the pandemic was a wake-up call to frontline staff and managers about interconnectivities but did not serve as even a dress rehearsal for what is to come in terms of other crises (including the much-predicted magnitude 9.0 earthquake off the two states' coastline).

II.13.2 Upshot

Many crises are, this guide submits, better understood as V-shaped, not beginning to end. So what?

Minimally, it means that table-top exercises based on beginning-middle-end crisis scenarios will inevitably be less V-shaped than needed. This is not to say table-tops are not useful. It is to say that the most useful ones are likely to be wake-up calls to more crises or different ones than thought pre-exercise – and requiring now-attention as well.

We are again back to a key narrative discrepancy in crisis scenarios – between the stated urgency to DO SOMETHING NOW but to be reliable when doing so. The discrepancy lies in the fact that both demands are urged and underwritten by the very same unpredictability at the very same level of analysis, the system. It is one thing to exhort those below you: 'risk failure'; it is quite another when those urged are best reliable when operating to prevent system failure.

On one hand, it is argued we have to experiment even if it risks the limits of survival; on the other hand, being safe means no error should ever be the last trial. This is a discrepancy because it cannot be written off or talked out of. The discrepancy must be managed as one of the Anthropocene messes we are in. This means that the Covid-19 pandemic does not stop, as if it were a prequel to another story. Rather, it is part of the trough we are in between sometime-in-the-past and something-later-on. Having to manage what are always intervening messes is, this guide argues, the Anthropocene's biggest wake-up call.

II.14 Chop-logics about risks, trade-offs, priorities, and existential threats are not appropriate for the Anthropocene

Take a major policy issue – as an emergency or crisis. Immediately, the talk becomes one about the risks and trade-offs involved, and the priorities call for when both are taken into account.

Even trained professionals take for granted that risks, trade-offs, and priorities – RTPs, for short – are the right place to start analysis in a world of scarce resources and multiple urgencies. You see this for the Anthropocene.

This guide, on the other hand, cannot imagine a more misleading and misguided way to analyse complex policy and management now and ahead. Risks, trade-offs, and priorities have a role to play as demonstrated in the guide's preceding and following sections, but not as chop-logics that erase rather than highlight differentiations that matter for policy and management.

II.14.1 Why?

It is because risks, trade-offs and priorities are empirically far less in play for society's critical services up to, during, and immediately after a major disaster. Three sets of empirical reasons for this being the case plough forward.

(1) **Empirically**, yes major critical infrastructures – like those for electricity, water, and telecoms – operate under budget and personnel constraints. Obviously, RTPs surface and at times take centre-stage when path dependencies are as long as in society's critical infrastructures.

Even so, there is a point at which infrastructure centralised control rooms (if present) will not trade-off systemwide reliability for, say, for cost reductions in real time. Why? Because when the electricity grid islands, people die, and the foundational economy seizes up (Martynovich *et al.* 2022). Preventing disasters, more routinely than not, is what highly reliable infrastructures do. (This is true whether the infrastructures are sustainable or not.) It is in real-time routine operations where 'emergency management' starts, not in designated emergency planning and preparedness or pre-disaster mitigation programmes.

(2) **Empirically**, when a catastrophe happens, the pressing logic and urgency of immediate emergency response have been repeatedly demonstrated, namely: Restore the backbone infrastructures of electricity, water supplies, telecoms, and roads, right now. The trade-offs, if any, are secondary to that mandate and is one commonality that very much matters and will continue to do so in the emergencies coming ahead in the Anthropocene.

In fact, there is no better acknowledgement of the importance and centrality of vital-service infrastructures that do not trade-off high reliability at critical junctures in their operations than the self-evident necessity of restoring backbone infrastructures as soon as possible when their normal operations fail.

(3) **Empirically**, RTP-logic moves centre-stage in longer-term recovery after infrastructures fail, but only to the extent high reliability in service provision has yet to be restored to (a new) normal for the (sometimes new) infrastructures.

Even so, analysis and deliberation during recovery are far messier than, e.g., 'the risks, trade-offs, and priorities with respect to flood recovery are the obvious centre of attention'. Entailed in the RTP chop-logic is the frequent assumption that the real problems in recovery are politics, dollars, and jerks undermining good work. The real problem, this guide argues, is that the chop-logic of 'priorities follow from risks and trade-offs' is not anywhere near reality for longer-term recovery. Unsurprisingly, being anti-empirical gets RTP logic only so far.

Methodologically, the empiricism means that the first-order differentiation in policies and management that are critically society-wide is not presumptively around RTPs only. If afterwards, risks, trade-offs, and priorities are found centre-staged, at least they will be unavoidably policy relevant by virtue of being contingently path-dependent, where not case-specific.

II.14.2 Which leads to that other over-arching chop-logic: What about the Anthropocene's 'existential threats' that eclipse everything else

The methodological problem with existential threats is other existential threats.

From the perspective of this guide, at least two types of existential threats require attention in the Anthropocene: those with society-wide dread seeking to prevent them and those without that dread. As for the former, corporate greed and lies have yet to convince most people that it is alright for: jumbo jets to drop from the air, cryptosporidium to poison urban water supplies, electric grids and lines to explode, and huge dams to breach catastrophically.

It is notable that the climate emergency has yet to elicit this type of social dread to prevent the precursors of climate change from occurring. This failure to preclude causes of chronic climate failure is reminiscent of the widespread and endemic threat posed by deadly medical errors in hospitals and clinics: While to be avoided, they are tolerated in ways that blowing up a nuclear reactor is not.

To better highlight the competition for attention between these two types of existential threats, consider a case more fully discussed later: the massive destruction of Oregon's Central Energy Infrastructure (CEI) located in Portland, were the much-predicted magnitude 9.0 earthquake to occur in the Cascadia subduction zone off its coastline.

As a thought experiment, say everyone in Portland understands the CEI is a concatenation of massive ticking bombs. Assume everyone there, as elsewhere, demands that planes in the air and water from the tap do not kill them and that electricity lines don't routinely collapse and electrocute people. Why does social dread work with respect to the latter in ways that it doesn't for ticking bombs on Portland's riverside? (It would be difficult here to blame everything on said politics, dollars, and jerks.)

One answer is found in psychology: People are less in the grip of the Real with respect to the CEI. They aren't caught up (as yet) in the same existential dread as when, say, a car careens towards them, or when they are screaming inside the plane hurtling downwards, or retching to death over the kitchen sink, or caught in power lines whipping and sizzling about. The social dread is not there.

II.14.3 Where, then, is hope for better policy and management in the Anthropocene

The notion that hopes are rooted in neurology but existential threats are not would itself be an existential threat, if readers already did not know better.

For this guide, existential threats are too often thought of as what is left when hopes dwindle to nothing. But hope, philosopher Ernst Bloch (1988) put it, is something not bargained down. Hope is not traded off. It is disappointed, but it does not fail. In this guide, hopes are to existential threats as high reliability is to society's vital critical infrastructures. When high reliability is not traded-off against cost because lives matter, that is when hope is not disappointed.

II.15 When the method is curating, not just facilitating: a pastoralism example

You have done all these studies and research on rangeland herders. You've got all this information to inform government policy and management for pastoralist development. But no one is listening. You can't find the right person to take the findings as seriously as they should be taken. The wrong assumptions for government action continue.

So, what do you do now, regardless of who is or is not listening?

In answer, this guide proposes you rethink a primary method in development practice. We typically talk about the need to facilitate group discussions and participation for better identifying ways ahead. Here I want to suggest something more, or better yet, different is needed.

We should think of curating development so as to create new publics for developments. We want what works by way of development collected and presented in ways that stick more in the minds of wider publics, and not just

those of decision makers. As the curator, Claire Louise Staunton (2022: 143) puts it: 'I take as the curatorial maxim that by making something public, the curator creates a public' and adds:

> Curators know that preceding any appearance [of a work] is a long prelude of conversations that stretches out in time, especially if it is a continuous project or an institutional programme. Even if the event ends or exhibition closes, there are recurrences as others take interest. This might include continuing conversations, sequels, and whole new events that develop out of the embers of the previous project... (*Ibid.*: 144)

How long any of this sticks is, of course, an open issue. But stick it must and the 'So what?' question is all about what sticks better than current development narratives and counternarratives that are not going anywhere anytime soon.

Now, it is all well and good to talk about 'creating publics' and 'curating' as a useful analogy. But it is the method side of curating that this guide seeks to stress here and how it can generate platforms for new publics. Not just metaphorically, but literally as in the following example.

II.15.1 An authoritative website for pastoralist development

Let us propose an authoritative website established for advancing (primarily, but not exclusively) real-time decision-making concerning livestock herders and their systems worldwide.

An authoritative website provides sought-after, up-to-date, and hyperlinked knowledge so quickly and reliably that it is continuously browsed by increasing numbers of users who click on the website early and often in their search for on-point information, in this case about pastoralists and their systems.

These websites do not pretend to provide final or definitive information, but rather seek to assure and ensure the quality of the topical information continually updated. The website serves as a clearinghouse that encourages cross-checking and tailoring of salient information on, while also acting as a springboard for future information search and exchange. It is popular because it shortens the number of steps in search of relevance. A well-known US example: Going online to **www.mayoclinic.org** after an initial breast cancer diagnosis.

In the scenario proposed here, the web searcher – analyst or manager – starts her analysis by searching – give it a name – 'www.pastoralist_development.org':

– She goes to this website on the well-established better practice that information is more policy or management relevant when the people gathering the information are the ones who do use that information.

- That is, the authoritative website is constructed and maintained – in a word, curated – as a platform to make real-time searching and browsing easier for searchers, e.g., project and programme managers.
- It is authoritative because: (1) it is online, that is, can be kept up-to-date in ways other media cannot; and (2) it is digital, that is, can be curated for multimedia, including but not limited to: table-top exercises, graphics-rich tutorials and courses, advice lines ('ask the experts', such as other pastoralists), helpful documents, and even its own YouTube channel.[5]

In terms used throughout this guide, such a website would reflect when colleagues come together, perhaps for the first time ever, to curate a much fractured, much layered policy palimpsest, called for wont of a better term, 'pastoralist development'.

II.15.2 Upshot

Who funds, provides content, and curates such a website is, of course, the question, e.g., a consortium of researchers, centres, journals, and foundations. Access and language will as well be an obstacle, insurmountable in some cases. But the broader point remains: Arguably, the most 'pro-pastoralist policy' of a government, non-governmental organisation or pastoralist association is having some of their decision makers search online for better information in their real-time problem-solving. That, indeed, would be creating a new public.

Such authoritative websites may already exist on a regional, cooperative, or site/livestock specific basis (I'd have to wonder, though, to what extent the websites are linked and curated together). There are also other major implementation obstacles, such as the digital divide. But even some of these need rethinking.

We are routinely told, for example, that Africa is run by gerontocracies, but with 80 per cent of the populations 30 years of age and under. That, however, is a Good Position to be in, at least for people – the future decision makers – who are already relying on internet websites for salient information.

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[5] Real-time table-top exercises for disaster preparedness or stress-testing of critical infrastructures are, I believe, very much a development priority both for within/across pastoralist groups and for any such authoritative website.

II.16 Methods: Takeaways for Anthropocene analysis and management

Methods, like **Counternarratives** before it and **Key Concepts** and **Analogies** following, underscore how much of recasting complex issues depends on (re)focusing the granularity of the issues in question.

In this way, the methodological imperative, First, differentiate!, applies foremost to that admonition, 'Keep it simple!'. To adapt the critic Michael Wood (2005):

- When someone commends, 'Keep it simple!', you might respond by taking it more as sounding out what you think rather than affirming you don't have to think.
- 'Keep it simple!' is one of those instructions that seems to know us without having to know each of us. The demand is to decide – Keep it simple! – without knowing if the demand is decidable.
- When 'Keep it simple!' is responded to with 'Keep what simple?', the former doesn't begin to approximate a closed argument.
- There is also a sense in which we can respond to 'Keep it simple!' as if it were a parable about how to act. But the upshot is that, while it makes seeking out exemplars irresistible, exemplars are always easy for someone else to criticise.

More generally, this reflects the recognition that the granularity you see in a complex issue is not the level actionable for use in the case at hand.

How so? Here is another illustration.

What could be more granular than retrofitting bridge-by-bridge against future flooding or earthquakes? But methodologically, how do you choose which bridges to retrofit, now or just ahead, when so many ones could fail anyway?

That question assumes the level and unit of granularity to be bridge-by-bridge. Change the granularity and answers change. All islands connect under water, so goes the saying.

In the same fashion, retrofitting a bridge pre-disaster need not be a chancy wager on what might or might not happen to this or that bridge. Retrofitting is also managing latent interconnectivities between bridges and other infrastructures that become manifest during and immediately after a disaster. That interinfrastructural connections will shift is far more predictable than this or that bridge will fail, unless retrofitted.

For example, an interviewee with engineering and management experience told us their city water infrastructure was behind the electricity utility in the adoption of

automatic shut-off valves. Bringing water systems up to power's better practices, both systems being interconnected, is a way to manage latent interconnectivity in advance of disaster and what subsequently happens to the transportation network (including bridges) both depend upon.

This reframing from one element only – bridges – to multiple elements, including bridges and their interconnections – is not a goal or end, but a way of being alert to and analytically arriving at granularities tractable for policy and management.

Key concepts

II.17 'What's missing?' in the catastrophic earthquake scenario

Unsurprisingly for those who have read through to this point in the guide, it takes surprise to distract or guide you to what's been hitherto missing right in front of you. While nothing is assured here, surprise means a taking a second look and seeing what is there even though not seen beforehand.

Note the most plausible reason for not seeing what was first unseen – 'Well, it wasn't there at all' – turns out to be far less plausible when living in a complex world of many components, functions and interconnections. In this world, new connections can be and are uncovered all the time where not-knowing, inexperience, and difficulty are ever present.

II.17.1 A thought experiment

Just how do surprises move us from looking onto unknown-unknowns (without knowing it) to seeing the unknown and now knowing that? What conditions for or about surprise must be in place to answer what am I missing right in front of me?

The following thought experiment will seem silly, even forced, in light of the advances in neuroscience about how the brain works. But its virtue is in pinpointing the key condition for answering the preceding question with respect to recasting complex policy and management issues.

Assume you know nothing of the brain's structure or neuroscience. Assume then your brain is a chamber initially holding two kinds of spaces: filled spaces of what you know and empty spaces for what you do not know. Suppose that at times each filled space emanates a beam of bright light that, when combined with beams of light from the other filled spaces, produce a brilliance so intense that

the only shapes left visible in the brain are the dark cavities that this concentrated light did not reach.

Suppose the reverse also happens: Each empty space emanates at other times a penetrating beam of darkness so absorbing that, when combined with the blackening from other empty spaces, the only shapes left visible are the lighted cavities the dense blackness did not reach.

Now, think of the dark cavities that persist even in the glare of what your brain knows as what it really does not know, while the lighted cavities that persist in the blackness of what your brain does not know are what it actually does know.

Compare the two sets: the initial filled/empty to the now lighted/darkened. The archipelago of densely lighted and densely dark need not correspond to the original filled and empty spaces. That is, your brain thought it knew some things which it now sees it did not know; and some of what it thought it did not know is shown to be what it knew all along.

This thought experiment suggests that our brains, in order to move from 'not-knowing' to 'seeing the unknown', requires at least moving from what we thought we knew or not (those filled and empty spaces) closer to what we actually do and do not know (its cluster of lighted and darkened cavities).

If so, then the question is: Why would anyone believe that you can shift from looking onto unknowns without knowing they are there (the unknown-unknowns) to seeing unknowns in the Anthropocene and knowing it, if you have not demonstrated beforehand that you did not know what you thought you knew, you did know more than you initially thought, or both?

II.17.2 So what?

Turn to an illustration of how this 'not knowing' and 'knowing what is missing' work in policy and management. So as not to make this easy for ourselves, return to what many call the most catastrophic natural disaster in the US – were it to happen, a magnitude 9.0 earthquake or greater in the 800-mile-long off-shore Cascadia subduction zone in the Pacific Northwest. Focus on recent research and work at one site and its affected infrastructures: Portland, Oregon.

Background

A great deal of seismic attention and concern has been directed to the regional Central Energy Infrastructure hub in Portland. Roughly 10km in length, it houses a concentration of key liquid fuel and natural gas storage and transmission facilities along with electricity transmission structures. It is an area, however, subject to lateral spreading, ground shaking, and liquefaction, among other physical vulnerabilities (*pace* tsunamis, hazardous liquids explosions, high

voltage line collapse). Much of the infrastructure has not been brought up to seismic standards and was built with what are very major seismic deficiencies.

The CEI hub is, in other words, chronically vulnerable were earthquakes to occur and it is recognised that substantial improvements are required to minimise extensive direct earthquake damage and associated losses and ripple effects. 'We know the earthquake is coming. We know we have to take steps to address this', policymakers and legislators admit and studies agree.

New seismic standards have been brought into effect as have prohibitions on expanding CEI hub tank farms, better containment barriers have been studied, retrofitting is underway, automatic shut-off valves are being adopted, alternative supply chains and better emergency responses are actively modelled or prototyped, and proposals have been offered for increasing/relocating the storage capacities elsewhere and closer to communities affected. Not enough has been done, but then it is important to recognise that a magnitude 9.0 earthquake would test any 'built-to-last' scenario.

At which point comes the unsettling realisation that...
It is easier to imagine a magnitude 9.0 earthquake scenario both obliterating an even hardened CEI hub and unleashing catastrophic fuel spills, fires, landslides, death, and destruction than it is to get rid of these structures before it is too late.

If our interviewees are any indication, it is easier to imagine that a Presidential Disaster Declaration would be immediately issued, that personnel would be identified and transferred into the state to take over from infrastructure staff who do not show up because they are trying to save their families, that local people will only figure out what to do after they see what is left to work with, and that interconnected infrastructures, just like communities there, would be islanded off from each other indefinitely – it is easier to imagine that and far worse than it is to get rid of the CEI hub and imagine ramifications of the alternatives.

In other words, think more about what our interviewees and others do not – cannot? – see right in front of them, namely:

> What better way, save war and the plague, to bring governments in the Pacific Northwest to their collective knees than 'solutions', like those pre-disaster mitigations and preparedness plans?

It is as if the existing economies are so taken for granted that the believers see no choice – no alternative – but to be catastrophic now on unprecedented scales. No track record in learning and unlearning needed here. Now that's a surprise!

II.18 Preknown-known-unknown and their implications for 'unintended consequences'

If we start with the commonplace that analysis and deliberation centre around what is known or not, then the boundaries of the known blur not just into the unknown, but also into the preknown.

The latter is the pre-existing knowledge that one is born into and 'takes for granted'. In his essay, 'The Well-Informed Citizen', Alfred Schütz, the sociologist, describes it this way:

> The zone of things taken for granted may be defined as that sector of the world which, in connection with the theoretical or the practical problem we are concerned with at a given time, does not seem to need further inquiry, although we do not have clear and distinct insight into and understanding of its structure. What is taken for granted is, until invalidation, believed to be simply 'given' and 'given-as-it-appears-to-me' – that is, as I or others whom I trust have experienced and interpreted it. It is this zone of things taken for granted within which we have to find our bearings. All our possible questioning for the unknown arises only within such a world of supposedly preknown things, and presupposes its existence. (Schütz 1964)

One consequence of ignoring the blurred borders of preknown, known, and unknown is: We end up acting as if it does not matter that it takes preknowing and knowing-enough to avoid entering into the unstudied conditions of the unknown.

If Schütz is right, the preknown is where we 'find our bearings' with respect to the known and unknown.

II.18.1 So what?

It turns out that all the talk about 'unintended consequences of human action' is itself unintentionally simplistic:

- 'Unintended?': When the preknown is the platform that has nothing to do with intentions but that enables us to take our bearings so that other factors in the known and unknown carry the weight of argument about 'unintended consequences';
- 'Consequences?': Rather than that blurred borders of knowing, preknowing, and not-knowing we chalk up also to contingency and exigency; and

– ‘Unintended?’ + ‘Consequences?’: When too often what we are dealing with are contingencies with aftermaths about which we have little or no causal understanding in the moment.

II.18.2 Upshot

‘Unintended consequences of human action’, to rephrase the bullets, is a coherent phrase only by missing the rest of that overwritten palimpsest called ‘human action’, off of which the phrase is cobbled together for the purposes of policy and management. Learning and unlearning are very complex indeed.

More positively, it is that policy palimpsest and related ones we should be studying, not some floating signifier call ‘unintended consequences’ (more on those palimpsests below).

II.19 The problem with adaptive learning and management in the Anthropocene

When I started in rural development in the early 1970s, one challenge was to manage for optimal ignorance. Professionals should manage to the point where what they are learning is not worth knowing. Managing for optimal ignorance got a good deal of press from a range of writers at that time, notably social scientists Warren Ilchmann and Norman Uphoff, development scholar Robert Chambers, and Peter Berger the sociologist. (Read Chambers who remains evergreen!)

The appeal of optimal ignorance waned when I implemented projects that I had helped plan. I’d find myself mulling over what my first boss, the district commissioner, told me early on: ‘A piece of advice, my dear boy. Either stay in the kitchen all the time or never go in’.

Nothing major gets implemented as planned, and only by staying in implementation – later, management – did I appreciate how little I knew with my master’s education in public policy analysis.

So what? Well, for one thing, the term, ‘optimise’, should be banned from policymaking and management. Optimality criteria can never be satisfied with the uncontrollability of contingency. But I didn’t really understand that until I started researching large critical infrastructures, their control rooms, and operators.

These large sociotechnical systems are so complex that their managers cannot really ‘know’ what are inevitably unstudied conditions. Indeed, their real-time inexperience and difficulties are permanent reminders of this. On the other hand, optimisers with whom I’ve worked seem to think it’s better they burn the building down to save the rest of us the trouble of repairing it.

Yes, of course, studying and adapting to unknown-unknowns are important and that's why the idea of 'chipping away at ignorance' is not all hubris. But control room operators are trained to stay out of unstudied conditions not because some things are not worth knowing but for the opposite reason: No way can these professionals afford to be in prolonged ignorance when the safe and continuous provision of critical services, like water and electricity, is paramount. '[I]f the grid fails and there are blackouts, people die', one infrastructure executive told us (see Roe and Schulman 2008, 2016). Control room operators put up with uncertainties they can live with in order to avoid unknown-unknowns they cannot or must not tolerate.

II.19.1 But you press: What could be more respectful of complexity than managing and learning adaptively?

No one can be against learning, right? Even when that is true as far as it goes, it surely does not go far enough.

An episode from my time as an advisor in Kenya helps clarify. I had some oversight responsibilities for a handful of integrated rural development projects in that country's arid and semi-arid districts. One of the worst projects, in my view, was fixed around soil and water conservation measures.

You asked villagers there what their three most important development priorities were and they'd say: water, water, water. Water for drinking, water for cooking, water for their livestock, water for everything that mattered. Here instead the donor was spending a fortune on ditches and bunds to prevent dryland erosion on the hillsides primarily for crop purposes, without any direct increase in water supply for the households and livestock.

Villagers just wouldn't 'participate' in the project: Food-for-work schemes didn't work, giving them hoes and such didn't work, nothing worked. Later on, I tracked down one of the project's designers and asked: 'Why ever was the project designed that way? Absolutely no one there was for soil and water conservation'. It was as if he'd been waiting years for someone to ask him just that. He leaned forward, 'But who can be **against** soil and water conservation?'

II.19.2 Upshot

So too for managing adaptively: Who, really, can be against it? That would be like arguing against norms of rationality, the scientific method, or evidence-based policymaking, or worse yet, being against trial-and-error learning.

And yet, as with soil and water conservation and other projects, we must press: managing adaptively for what? With respect to what scenario granular enough for its details to be evaluated?

Furthermore, that 'respect to what' is often water, water, water – highly reliable water for urban use, for agricultural use, for ecosystem restoration and the environment; for ports, for shipping lanes, for recreation, for hydropower, for... you name it, reliable water is needed. And a very great deal of that provision depends on large-scale water supplies, electricity grids, and other infrastructures – which is why I keep returning to their importance in this guide.

II.19.3 Nor will this mandate for system reliability go away in the Anthropocene, notwithstanding exhortations to 'manage adaptively' and 'embrace failure'

Even where systems must be – repeat, must be – smaller, more decentralised, and more sustainable, those systems too will be managed as if peoples' lives and livelihoods depend on it. Because they do.

Obviously, operators of large or small infrastructures (again, not all infrastructures have control rooms) are from time to time pushed into the unknown-unknowns by contingent events. It turns out, however, that to ask really-existing infrastructure operators – 'What if the unimaginable happened?' – is not to ask something new or unusual. They are always asking themselves what-if scenarios, where the details matter.

Only later in my career did I understand that the test of efficacy in these circumstances is not 'Have we designed a system that can be managed?', but rather: 'Is this a system we can manage to redesign as we go along?' Management is in excess of design and technology.

For control operators, real time is too important to experiment in when their first error ends up being our final system trial. The last thing we want is our airplane pilots 'to embrace failure' at 11,000 meters, notwithstanding all the business and management advisories on the virtues of unstudied conditions. Too much of that privileging borders on priestcraft and miracle-mongering for the Anthropocene.

II.20 What to do when criticisms are spot-on, but the recommendations are not

Some of the guide's readers probably have had this experience: You are reading an utterly convincing analysis of a major policy issue – when you are blindsided by the final recommendations. 'Now, where did these come from?', you wonder.

Yes, it is a major contribution to detail and document the very real land problems in Kenya; but when did 'implement massive land reform' follow? How did 'We just need political will to do so' become an option, when it is evident that too much

political will – 'we need to do this! no, that! now, those! no, these!' – propels so many of the difficulties in falling short of the needful?

II.20.1 A realisation and way forward

Convincing criticisms that led nowhere once exasperated me. It took too long for me to realise that my 'These critics should know better' mirrored their 'We should have the political will to do better'. No amount of my 'they should know' will change their policy advocacy. Nor for that matter do I have standing in insisting policy advocates do not undertake critiques grounded first and foremost in their moral and ethical principles.

Rather, I realised eventually that drawing recommendations from their analyses is the readers' responsibility. I am the policy analyst here, whatever else the authors are doing. I may not be smarter, but my framework – this guide's framework – differentiate their matters differently. I also like to think I have something to add, both by way of advice to the policy advocates and with respect to the same issues about which I am too am worried for the very reasons they have established.

How so?

II.20.2 Example

Start with the Big Polluters and their 'net-zero emission' schemes, where their emissions are to be offset – promise! – by their securing equal emission reductions in other places. Think of the pastiche of carbon offsets, carbon capture-and-storage, direct air capture of carbon dioxide, and carbon markets, among others.

Who these Big Polluters are and how their obfuscating schemes is documented in *The Big Con: How Big Polluters Are Advancing a 'Net Zero' Climate Agenda to Delay, Deceive and Deny* (Bragg *et al.* 2021).

The policy analyst's problem starts with report's recommendations, not with the spot-on analysis preceding them. 'The cross-sectoral solutions we need already exist, are proven, and are scalable now (see 'Real Solutions, Real Zero' in the resources Box)', asserts the report. Going to box's link leads to another document with examples of climate change solutions – its term. 'Many of these are already implemented at local and national levels. Several of these measures can be easily implemented directly, while others require international cooperation'.

Fair enough, but then come the listed recommendations, including:

- Drastically target the excessive and wasteful consumption of corporations and wealthy elites.
- Ensure just transitions across all sectors that ensure workers are able to move into new, secure green jobs.
- Create an immediate moratorium on all new fossil fuel extraction.
- Leave the ecological integrity of natural ecosystems unharmed and conserve biodiversity.
- Vastly scale up ecological restoration to recover natural forests, peatlands, and other degraded ecosystems for both climate and biodiversity...
- Immediately ban expansion of airports, particularly in developed countries...

Obviously, argument by adjective and adverb is not confined to policy advocacy (I still do my share). But no number of 'immediate', 'drastically', or 'vastly' stop the policy analyst and others from having to push further to 'Yes, but': Just how drastic or vast is this drastically and vastly? Immediately means immediately, but you cannot mean **immediately**?

II.20.3 Implications

Note again the point of 'Yes, but' is not to stalemate action, but rather to locate an actionable granularity relevant for policy and management.

In this example, that level of granularity reflects the where and under what conditions moratoria on new fossil fuel extraction, bans on airport expansions, and the efficacies of different 'targets' on wealth consumption have worked as really-existing practices to be modified and improved upon by others – and under constraints of politics, money, and egos like or even worse than your own case.

More, the second you differentiate is the second you begin treating seriously the aftermaths of implementing blanket recommendations and macro-design 'solutions. Which leads us back to the 'more political will' the authors call for, the question now becoming: Have we already wasted finite political will when it comes to stopping Big Polluters from destroying even more? Or from the other side, are we in a position to do something major but not know it?

II.20.4 Upshot

To ask the latter is to take us back full circle back to uncertainty and complexity, but as in: 'the varieties of revolution do not know the secrets of the futures, but proceed as the varieties of capitalism do, exploiting every opening that presents itself' – to paraphrase political philosopher, Georges Sorel.

To revert to the earlier affordance: Where is there a track record in people seeing they did not know all that they thought they knew and knew more than they had initially thought about, in this case, net-zero emissions and such?

II.21 Begin, rather than end, with the radical agenda

The Yale Law Journal has published a significant article, 'Building a Law-and-Political-Economy Framework: Beyond the Twentieth-Century Synthesis', by Jedediah Britton-Purdy, David Singh Grewal, Amy Kapczynski and K. Sabeel Rahman (2020). It concludes with a call for action (here quoting without the embedded footnotes):

> If it is to succeed, law and political economy [i.e., the framework in the title] will also require something beyond mere critique. It will require a positive agenda. Many new and energised voices, from the legal academy to political candidates to movement activists, are already building in this direction, calling for and giving shape to programmes for more genuine democracy that also takes seriously questions of economic power and racial subordination; more equal distribution of resources and life chances; more public and shared resources and infrastructures; the displacement of concentrated corporate power and rooting of new forms of worker power; the end of mass incarceration and broader contestation of the long history of the criminalisation and control of poor people and people of colour in building capitalism; the recognition of finance and money as public infrastructures; the challenges posed by emerging forms of power and control arising from new technologies; and the need for a radical new emphasis on ecology. These are the materials from which a positive agenda, over time, will be built.
> (*Ibid.*: 1834)

Let us agree with that and undertake the following thought experiment.

II.21.1 Assume we start our own article with the above quote

Where do our subsequent paragraphs lead? In what directions do we drive what is now our agenda? To make this interesting, five extensions of this guide are sketched that most contrast, I believe, with what readers take away from the original article:

(1) Instead of feeling overwhelmed by the enormity of the implementation challenges, I'd ask: Where are the agenda activities already underway? What are the better practices there that can be modified and applied here, or if not

here, then elsewhere? The point is that the agenda is too good to be restricted to the US.

(2) Instead of thinking the agenda stands or falls on how key terms (capitalism, power, democracy...) are defined, the better practices identified in #1 do just that. They entail the ends sought by the means used.

Here, behaving democratically is with respect to these practices to achieve those outcomes. There, power is supposed to be controlled by these means for those ends; elsewhere, power is having to manage or cope ahead in these rather than those ways as control is not possible (if it ever was).

(3) Instead of starting by prioritising what do first, second, and so on, I'd stay with the mess of interconnections and see where they lead. Think of the agenda as a composite argument read off a very layered and overwritten palimpsest of earlier arguments about power, capitalism, democracy, and the rest. Each new argument is assembled from older effaced ones. Even when each argument seems integrated, it is in fact an unstable composite.

Resurfacing earlier erasures becomes then a way to signal where out paragraphs can go instead. As in: toward those avoided cases where capitalism looks less like control and more like negotiation and bargaining among unequals.

(4) Instead of trying to reduce the agenda's uncertainties and complexities, I'd see if there were analogies that recast the tasks ahead usefully. Return to that long-standing analogy of 'being at sea', as in challenges likened to: keeping your balance while mucking across a shoal, treading water with no bottom to touch, tacking into unpredictable winds, repairing the ship at sea only with what is at hand, no safe harbour to return to in the storm, or keeping your head above the rushing tide-race.

That, in the Anthropocene, is the view-scape within which or on which the positive agenda, over time, will be based.

(5) Instead of seeking to integrate the agenda into a reduced-form policy narrative, I'd look for narrative discrepancies that indicate where other more useful narratives may be complicating matters.

For instance, it is not surprising as someone who writes on critical infrastructures that I would trip over the conflation of stock (e.g., facilities) and flow (e.g., money to run the facilities) in the quote's reference to 'infrastructures'.

Such, in short, would be the crux and gist of Results section for our proposed article.

II.21.2 But what follows after the Results section

I am in no position to sketch any Conclusion, but the first point in the Discussion section following Results is obvious to me: Why accept anything less radical than the starting agenda?

The standard retort of gradualism and incrementalism – 'Well, here we want something more modest having greater chances of being achievable' – makes sense only if other really-existing practices in like situations were not more successful. Are we expected in the Anthropocene to be the experts in global interconnectivity before undertaking that canvassing of the specifics? I do not think so and this guide most certainly hopes not.

In other words, the question remains as it has been: What are really-existing better practices across a wide spectrum of cases that work to achieve betterment under Anthropocene-like conditions?

Another virtue in reviewing actual practices as widely as possible beforehand is identifying those cases where that the latest macro fix-it – Stop this! Do that! – is the last thing people there are worrying about, and understandably so in their first-order contexts.

II.22 Managing risk and uncertainty, or coping better ahead with inexperience

Let us address each topic separately turning to their upshots as we go along.

II.22.1 'Risk management' and Alan Greenspan's tenure at the US Federal Reserve

> Given the uncertainties the Fed was tackling, Mr Powell [chair of the US Federal Reserve] argued in favour of caution on rates policy and a 'risk-management' approach, praising Mr Greenspan's 1990s approach of waiting for clear evidence of higher inflation before moving rates higher.
> (Powell, quoted in Fleming 2018)

For the guide, inexperience has to be managed because it is often a proxy for not-knowing. How this matters is illustrated by the example of Alan Greenspan as chair of the Federal Reserve and his risk management approach. The implications are unsettling in ways not usually supposed and not just with respect to central banks.

Starting point and background. Greenspan presented a major paper, 'Risk and Uncertainty in Monetary Policy', to the American Economics Association and

published in the *Association's Papers and Proceedings* of May 2004. As he and his confrères held, the pre-eminent focus of the Fed was the maintenance of price stability in the face of turbulent events and uncertainty:

> The Federal Reserve's experiences over the past two decades make it clear that uncertainty is not just a pervasive feature of the monetary policy landscape; it is the defining characteristic of that landscape. The term, 'uncertainty', is meant here to encompass both 'Knightian uncertainty', in which the probability distribution of outcomes in unknown, and 'risk', in which uncertainty of outcomes is delimited by a known probability distribution. In practice, one is never quite sure what type of uncertainty one is dealing with in real time, and it may be best to think of a continuum ranging from well-defined risks to the truly unknown.
> (Greenspan 2004)

One expects risk and uncertainty because the 'economic world in which we function is best described as a structure whose parameters are continuously changing'. Greenspan took this uncertainty, coupled with the demand to ensure price stability in the face of it, to mean that the Fed could not rely on a fixed approach:

> Some critics have argued that [our] approach to policy is too undisciplined – judgmental, seemingly discretionary, and difficult to explain. The Federal Reserve, they conclude, should attempt to be more formal in its operations by tying its actions solely, or in the weaker paradigm, largely, to the prescriptions of a simple policy rule... But at crucial points, like those in our recent policy history (the stock market crash of 1987, the crises of 1997–1998, and the events that followed September 2001), simple rules will be inadequate as either descriptions or prescriptions for policy.
> (*Ibid.*)

Action, accordingly, must be developed with and within context, as no single or simple rule 'could possibly describe the policy action to be taken in every contingency'. 'The world economy has become too complex and interlinked', he amplified in his 2007 memoirs (Greenspan 2007).

All the above makes sense – and eminent sense for the Anthropocene – were it not for the blisteringly obvious fact that THE APPROACH DID NOT WORK when it came to events leading up to and during the 2008 financial crisis. The financial crisis' estimated US$19tn in household wealth destruction hugely damaged Greenspan's reputation and the approach he fostered as Fed chair.

And yet….

When you peel away the pre-crisis hagiography and post-crisis demonology around Greenspan and his Fed tenure, that management approach still looks reasonable for accommodating risk and uncertainty: That is, as many others have summarised, don't get caught in analytic rigidity, remain flexible, prepare for surprise, and avoid theory in favour of tested practice when managing risk.

What's wrong is that the Fed approach failed, utterly, to demonstrate that they were managing risk in the sense of having a track record of experience in responding to, if not actually realising beforehand, that they did not know what they thought they knew. Further, they may have known more than they thought, but we will never know that from the existing record. Any such track record was nowhere evident in the self-regard Fed risk managers held themselves when 'managing' risk and uncertainty.

Only well after the financial crisis did Greenspan admit publicly anything like having had to cope in the face of unknowns. In a 2013 interview he conceded, 'when I was sitting there at the Fed, I would say, 'Does anyone know what is going on?' The answer was, 'Only in part' I would ask someone about synthetic derivatives, say, and I would get detailed analysis. But I couldn't tell what was really happening' (Tett 2013).

This implies that future histories of the 2008 financial crisis must extend the domain of inexperience considerably beyond that much-reported dearth of sophisticated mortgage buyers. (Anyone, for that matter, would be inexperienced when finding themselves in unstudied financial bubbles at that cognitive edge of knowledge and unknowledge.) I am suggesting policy and management will have to credit more of the 2008 financial crisis to inexperience than to the low, mean cunning of overpaid banksters aided and abetted by thraldom to Efficient Markets and Value at Risk.

In fact – and this is the sobering part – if inexperience was a very real and active agent then, we should be doubly worried now. It is exactly the lack of experience with quantitative easing, unprecedented bailouts, and sovereign debt negotiations along with their uncertain, if not unknowable consequences, that drives post-2008 responses and now (post-) pandemic responses by the central banks of the world's major nations.

II.22.2 Better coping ahead with inexperience

If the focus turns to one of managing inexperience rather than 'risk' *per se*, it turns out that inexperience has been identified as a major factor in other financial crazes than that of the 2008 financial meltdown. To understand this, moreover, helps recast what looks first to be a problem of managing risk and uncertainty into a problem of better coping ahead with the inexperience in financial bubbles.

Our case

Turn to an account of the 1720s financial fiascos of the South Sea Bubble in Great Britain and France's counterpart, the Mississippi Scheme, by historian Frederick Scott Oliver in his 1930–35 *The Endless Adventure*. The three volumes of *The Endless Adventure* – long out of print, dated in some of its language, but still worth reading – were well-regarded by the reading public and luminaries. I quote at length a wonderful high-alpine passage to draw out this key role of coping better with said inexperience:

> At the present day the simplest investor or the most junior Treasury clerk would be suspicious of such over-generous promises; but in 1720 even less was known than is known now of the mysterious laws that control the currents of a nation's prosperity. Our own generation, as it glances backward and downward into the eighteenth century, can of course discern without difficulty the points at which an earlier race of statesmen blundered off the highway and fell among brakes and briars and morasses. Viewed from our present altitude, the road of safety shows so white and unmistakable in the foothills below us that we find it hard to understand how men of intelligence and probity could possibly have allowed their steps to stray. The most facile explanation is corruption, or else of shameful ignorance.
>
> Our amazement, however, will be lessened, our censure may be tempered, if we pause to consider a nearer past, or if we turn our gaze forward and upward, where the as-yet-unbeaten track of the twentieth century winds out of sight among mists and mountain peaks. What lies immediately behind us is only trifle less obscure than what rises up in front...
>
> We can recall in a confused and broken memory that we have come through a period of miscalculations without number and that, time and again, the predictions of the wisest statesmen and economists have been proved false by events that followed shortly after. Our guides misled us, though they were for the most part honest men who knew by rote the maxims of their financial craft as it was practised by the civilised world at the beginning of the year 1914….
>
> Discredit fell upon the most approved principles, and so many strange heresies appeared to thrive, that mankind, panting for a new heaven and a new earth, was not unwilling to listen seriously to new guides, who vaunted the efficacy of specifics hardly less fantastic than the Mississippi Scheme and the South Sea Bubble. Those new

> guides were possibly as honest as the old ones, but it was certainly no less dangerous to follow where they beckoned...
>
> And yet it is not unlikely that, a hundred years hence, every political writer, every man of business, every intelligent undergraduate will be able to discern clearly the causes of our recent and present troubles. The road to safety may then appear to them so obvious, that our own failure to find and follow it will excite not only their amazement but their suspicions. They may find it as hard to believe that our faults were nothing worse than the innocent blindness of inexperience, as we do to believe that the French and English nations in the year 1720 were not criminal lunatics, or as we do to acquit the statesmen of those two countries of complicity in a series of gigantic frauds.
> (Oliver 1930–35)

It is Oliver's reiterated **honest men duped by inexperience** that deserves a second look. Does this, for example, mean finance officials, like Greenspan or all of BlackRock, should get a free get-out-of-jail card when inexperienced?

By way of answer, stay with Oliver a bit longer. For him, politics as governing requires apprenticeship because governing is complex: 'Methods that experience and necessity have evolved by slow degrees are bound to be complicated…', and it takes time to learn what is complicated and how to deal with them. Sadly, much of what passes for good governance conspires to distance senior officials from gaining more experience about the complexities:

> To-day, when a man of business or a cabinet minister is in doubt, or is at issue with his colleagues, he calls for a report. A host of technical advisers stands at his beck and call. A vast machinery lies ready to his hand... [N]early everything he learns is learned at second hand, so that the true nature of the problem is rarely visible to his eyes. When his colleagues ask him questions – sometimes pertinent and sometimes foolish – he can neither satisfy them out of hand with sound reasons, nor can he answer them according to their folly. He promises a supplementary report; and so the game goes on.
> (*Ibid.*)

We know that few investors or traders in the mid-2000s leading up to the 2008 financial crisis had any shared institutional memory or working knowledge of the preceding major financial debacle, the 1998 collapse of Long-Term Capital Management hedge fund. We also know that the turnover in political and business experience has been shortening over the last decades, e.g., due to term limits, political burnout, and constant economic churn. The only redemptive feature in any of this is a messy, this-world realism, according to Oliver:

> If we eventually escape from our present perplexities, it will not be because theorists have discovered some fine new principle of salvation; or because newspapers have scolded and pointed angry fingers at this one or that; or because we, their readers, have become excited and have demanded that 'something must be done'. It will be because [politicians]... have 'jumbled something' out of their contentions that will be of advantage to their country.
> (*Ibid.*)

Here too no guarantees. More important for Oliver is this: It isn't that experience in the craft of politics enables the practitioner to better see the future. Rather, experience enables the demanding present to be seen more for what it is, namely, complex now:

> Prophetic statesmen are a fairly common variety of the species, but those who not only foresee things but foresee them truly are among the rarest of human products. [The chief minister] made no pretensions to the gift of prophecy. Man of genius though he was, he owed little to his imagination. He excelled his colleagues, and opponents, and indeed every statesman in Europe, not in penetration of the hidden future, but in the clearness with which he saw things present, and in the accuracy with which he could judge by the lights or darkness of the horizon what weather might be looked for on the morrow. And he excelled them most of all in the rapidity with which his mind arranged in their true proportions the most diverse and unexpected events.
> (*Ibid.*)

Whether this description of the chief minister has stood the test of time, I cannot say. But Oliver's words describe what Part I has termed coping ahead better when one cannot manage longer – that is, not just reacting but working out the next steps 'for on the morrow'.

Upshot

There is, in other words, a track record to look for in coping ahead while confronting what you and your colleagues have (yet) to experience. It is one thing to think you are managing risk and uncertainty, when you are not. It is quite another thing – and a good mess to be in with the Anthropocene – that you and your colleagues are better adept at coping ahead.

Are there always track records? Of course not. But a practitioner's track record of different setbacks looks a good deal more useful when compared to, again, the irreproducibility of academic research findings in peer-reviewed publications. Note the good-mess corollary: Inexperience starts in the individual, but

experience may just as well end up across practitioners, untraceably distributed and interconnected.

II.23 Key concepts: Takeaways for Anthropocene analysis and management

If ever a key concept needed greater differentiation and granularity, it is 'interconnected' and its cognates. This guide seeks to demonstrate the reverse takeaway as well: 'Interconnectivity' itself becomes a major optic for differentiating cases and their granularity more tractably.

It was in undertaking research with Paul Schulman on the San Francisco Vessel Traffic Service (VTS) of the US Coast Guard (USCG) that I had my introduction into just how important it was to differentiate types of interconnectivities. After a year or so of research it became clear there were at least five major kinds of 'interconnected' at work, with sharp differences in the VTS's real-time operations:

- Interoperability: Like the textbook interoperable energy utility (where electricity is crucial for the natural gas infrastructure and vice versa), the VTS manages both vessel traffic and the regulated waterways that vessels use (where managing waterways affects management of the vessels and vice versa);
- Shared control variables: Water flows are a major control variable not just for VTS navigation purposes, but also for other infrastructures (notably large water supplies and hydropower systems). This means that unexpected changes in how one infrastructure manages water flows can affect the management of the water flows by the other infrastructures (indeed, interinfrastructural coordination around shared control variables turns out to be crucial);
- Whole cycle of infrastructure operations: The USCG has a range of missions and operations, two of which are the VTS and the SAR (Search and Rescue) units. VTS combines with SAR to cover the stages of this infrastructure's operational cycle – normal operations and disrupted operations (VTS) along with search and recovery (SAR);
- Variety of real-time configurations of interconnectivity: The VTS manages by virtue of utilising a variety of interconnectivity configurations. For example, when VTS management of a common pool resource (the waterways) on behalf of vessels is disrupted or fails (e.g., because of disruption in VTS communications), the interconnection configuration defaults over to the reciprocal one of vessel-to-vessel communication; and
- Inter-organisational linkages: USCG operations, including a VTS, are not only linked with other infrastructures through reliance on the Global Positioning System (GPS), but the Coast Guard's position within the US Department of

Homeland Security makes it strategically placed for focusing on GPS strengths and vulnerabilities when it comes to the US government's cyber-infrastructure.

Suffice it to say, 'interconnectivity', as a key optic for the Anthropocene, becomes a major means for learning about specifics that matter when it comes to 'with respect to what'. The last thing we should be doing in the Anthropocene is abstracting interconnectivities before (re)casting the granularities.

Analogies

II.24 Policy palimpsest: concept, examples, and the violence

The notion of 'policy palimpsest' arose early in contemporary policy studies (Simmons 1982), but never gained traction. The upshot is that current statements about long-standing complex policy issues are the composites of arguments and narratives that have been overwritten across time.

A composite argument rendered off a policy palimpsest reads legibly – nouns and verbs appear in order and make sense – but none of the previous inscriptions are pane-clear and entire because of the intervening the layers, effacements, and erasures. Arguments have been blurred, intertwined, and re-assembled for present, at times controverted, purposes.

So, what is new? After all, we want policy to come to us just as legible as the writing on this page. That instantaneity is the rationale for any composite argument. Recourse to the analogy of the policy palimpsest is to frustrate that taken-for-granted legibility.

The concept of palimpsest insists that policy always comes with fractured backstories and that the backstories provide clues – like pentimenti in a painting that become visible over time and reveal working methods – for what could have been or now can be instead.

I use 'policy palimpsest' instead of its approximations – 'language games', 'archives', or 'discourse systems' – because the palimpsest is always with respect to policy, management, or a complex of specifics (e.g., failed states below) and at a level of granularity that matters for recasting the issue(s) now, not just later.

This implies that any composite arguments urged on us because of their elegance, simplicity, logical structure or win-win import are perilous. They only

wink at the complexity in their policy palimpsests. The analytic challenge is one of reading any current composite argument with the blurred-away now made visible in order to acknowledge and probe what has been rendered missing in the composite reading. Once you identify what is missing in the composite but was in the palimpsest being read off – no guarantees here – you identify potential means to recast the complex issue in new possibly more tractable ways.

II.24.1 Short example

Turn to the journal, *Foreign Affairs*, and a much-cited 2014 critique of the failed-states rationale put forth in the Bush Administration's 2002 National Security Strategy (Mazarr 2014). The Bush Doctrine argued that failed states were an important cause of international terrorism. The Mazarr critique, including a review of the literature at the time of the doctrine's formulation and later, underscored multiple problems with Doctrine assumptions.

Yet even where the Mazarr critique and others like it are true, analysis of the failed-states argument needs to go further. It needs not just to identify what was effaced in the policy palimpsest for terrorism at that time, but also what was effaced in these failed-states critiques which have become part of the very same palimpsest since then.[6]

The most (in)famous example of what has been erased, at least in many academic journals, is the polemical avowal that America deserved 9/11 as a nation and that this was the opportunity for that nation to take the lead in a new rapprochement with the Islamic world. This argument was expunged from subsequent discussion, in effect bowdlerising its policy palimpsest.

The least recognised erasure, however, but the one that would have been most visible had such an attempt at rapprochement taken place, was the centrality of the following question for international policy jettisoned from the policy horizon by the burning twin towers: Where are this century's new democracies to come from, if not from failed states, including – dare we say – parts of the US?

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6 More formally, a composite argument is blurred not only by the way it conveys an argument (as if straightforward when actually a concatenation of interrupted fragments), but also by what it doesn't convey – those elements that are now illegible or appear now interstitially as lacunae, non-sequiturs, slippages, caesurae, aporias, and narrative discrepancies. Composite time also changes when assembling fragments from different parts of a palimpsest. The composite may be sequenced in the form of 'first-this followed by that-then', when instead separate fragments are juxtaposed from different times and contexts. A familiar example is tagging onto today's major policy composites variants of that phrase, '… in a world threatened by catastrophic climate change'. Any such textual adjacency rejiggers time and context around the juxtaposed fragments.

II.24.2 Longer example

Each sentence in this guide could be said to be a composite made off of all manner of policy and management palimpsests of concern to the Anthropocene. What then am I missing in my own arguments? A great deal – though I believe this can enrich rather than paralyse analysis. Let me give a more extended example from my own practice.

Several years ago, I drafted a potted history of the travails in the EU's CO_2 cap-and-trade system, the Emissions Trading System (ETS):

> Upon its inception in 2005 when CO_2 emission credits were issued under the ETS, credit prices initially did rise, but it was realised too many credits had been issued when prices declined. (Always bear in mind the theory upon which the ETS was based is that the higher the price of carbon, the fewer the emissions, all else considered.) By 2007 it was conceded that not only had too many credits been issued, but that coal imports into the EU had been rising at the same time. Credits continued to be issued, and by the end of 2009 prices were said to be too low to encourage investment in lowering emissions. Around 2010, computer hacking, cyber-theft, and permit fraud occurred coupled with the obvious fact that the low carbon prices were in part due to declining carbon emissions because of increasing use of renewable energy (in other words, success by other means). The recession following the 2008 financial crisis had a depressive effect on credit prices as well. By the end of 2013, the European Parliament had approved a rescue plan for the ETS, including a provision to delay allocation of a third of the credits – even though the market would still likely be oversupplied by 2020, at which point it was thought that the ETS should promote green technological innovation, not just carbon reduction.

When I first presented this, one workshop participant remonstrated, 'Well, we had to do something like the ETS'. One option then was to answer her. Another is to update my history with more fine-grained information on the ETS for the period 2005–18.[7]

It seems to me instead that my original paragraph can be substantially recast via the ETS's policy palimpsest. In this case, the palimpsest is the massed

[7] A more recent history is found in the recent *Energy Transition or Energy Expansion?* published by the Transnational Institute and Trade Unions for Energy Democracy (Sweeney, Treat and Chavez 2021: 21): 'Power companies and energy intensive industries gained billions in windfall profits during the early years of the scheme — profits that mostly turned into shareholder dividends, with little invested in new clean energy infrastructure... After years of tinkering, the past two years have finally seen the price of carbon on the EU ETS starting to rise... But the EU accounts for roughly 10 per cent of the world GHGs and the EU ETS covers roughly 40 per cent of the EU's economy, or roughly 4 per cent of the world's GHGs'.

narratives and controversies, past and present, over just what is better for Europe's environment: a carbon tax, cap-and-trade systems, renewable energy technologies, 'net-zero emission' schemes, a mix of these, some other hybrid mix, or something altogether different?

The challenge is to reread my earlier description with the elements I effaced now visible, and not just with respect to ETS implementation. To repeat, resurfacing earlier points that I missed is my start in thinking along different lines. (In truth, policy palimpsests invite such rummaging.)

Recasting

As my earlier composite argument is a larger fragment assembled from smaller ones, my potted history is punctured with interruptions blurred out in the name of readability. Clearly, one missing element in my earlier ETS write-up is just what kind of (larger) fragment the ETS is.

Is the ETS primarily an institutional work in progress under intermittent construction? Is it partly the ruins left behind by techno-managerial and New Class bureaucrats operating beyond their cognitive capacities in the face of dynamic resource limits? Or is the ETS partly a hollowed-out palimpsest – now, just an empty signifier – for all manner of environmental hopes that longer there, overtaken by the Anthropocene? All of these, or more? None?

To cut to the upshot

The ETS palimpsest is written over constantly (consider the recent EU initiative for carbon border taxes based on average prices in the ETS). This means more than there is no last word for the ETS. It means being better prepared for the new interruptions and having to excavate potentially useful leads more deeply submerged in the past.

II.24.3 Palimpsest violence

Return now to a key point: Use of the policy palimpsest concept is to remind oneself how complex policy statements that read coherently are assembled out of fragments interrupted by missing parts, all of which are smoothed over for legibility and readability purposes.

For this guide, the policy palimpsest optic serves as a potent reminder of what goes into making a policy palimpsest and composite arguments read off of it: the violence in doing so.

For the 'effacements and erasures' include 'lacerations', all too often deliberate or wilfully ignored rather than unintended. To take an earlier example: obsolescence of AI software. This doesn't reflect just a track record of software innovation after innovation. It is part of a policy palimpsest about how obsolescence has been (re)constructed over time when it comes to thinking

about policy and management. People are hurt along the way. What is missing has been made missing by suturing the fragments about obsolescence.

The violence is why resurfacing what has been made missing is more than a matter of reflexivity: It is a duty of care that cannot deny the acts of extraction.

II.25 Heuristics as clues

Long-held heuristics – more familiarly, organisational routines and standard operating procedures – are shorthand ways of doing things without all the uncertainty of reinventing the wheel. Newer heuristics include big-data algorithms we do not understand and policy narratives we think we do. Both enable making decisions in the face of uncertainty. Both shorthands are treated pragmatically as good-enough, like a new atlas of maps.

Older heuristics were relied upon because they were said to reduce uncertainty. The more recent ones are used to better manage or cope ahead with uncertainty that has not been/cannot be reduced, at least for the moment that matters in decision-making.

However, a commonality between old and new heuristics deserves highlighting: Both are less a shorthand than clues for what to do ahead.

II.25.1 Example

Handbooks detailing how to respond to unpredictable floods and famines were written by and for administrators in Imperial China. Over the course of some thousand years, handbooks started to group together what had been learned into tables of maxims (sometime in rhyme) for ease of reference by later users.

Handbooks ‘are quick to insist, however, that using the tables is not sufficient in the long run: for the professional administrator they are rather a “clue”... that indicates where to go in the more complete texts’, writes Pierre-Étienne Will, the most recent and wide-ranging bibliographer of these handbooks (2020: XLIV). This status of heuristic-as-clue is to alert us to important omissions that require reference beyond any shorthand expression (*ibid.*: 568). Occasions when a map proves misleading are all too familiar.

Professor Will elaborates in an email: ‘ “clue” (*yinxian* 引線...) literally means “a thread that leads to...”, “that can be pulled to get..., or something of the sort. The same character *yin* is part of the words *suoyin* and *yinde*, meaning “index”, in modern Chinese. The tables or rhymes are like indexes to the complete texts.’

II.25.2 Extension and upshot

Apply this notion of heuristic-as-clue to the newer algorithms derived from large data sets. We are told that, even though the algorithms are not based in models of known cause-and-effect, they identify complex, more-or-less opaque, correlations worth relying upon. But that too stops short of the needful.

The status of a heuristic-as-clue underscores that, just as with causal models, there is also a great deal yet to puzzle out with correlations before going forward. The status of the algorithm-as-heuristic serves to clue you into the underlying assumptions for using big data set algorithms, including some say:

- algorithms deliver the best result among the other methods and heuristics available;
- while not free of bias, they do a better job by virtue of the huge run of cases and calculations;
- some kind of result at the scale of big data is better than no result, plus the algorithmic result is often timelier; and
- anyway, there is the danger that critics of big-data algorithms take them more seriously than the users, like consumers who comparison-shop and then make their own decisions.

The wider point is that, while the duty of care in using heuristics means treating them as indexes of that which cannot be omitted, the omission may already have occurred via the bulleted assumptions or like.

II.26 The genre of wicked policy problems

Cease-and-desist orders should have been issued long ago against the *haute vulgarisation*, 'wicked problems'. Academics have argued for just as long that far more nuanced sets of terms are required than the early wicked/tame dichotomy.

Fair enough, but that too does not take us far enough for the Anthropocene. More terminological differentiation may well reinforce a 'there' that is not there.

II.26.1 Recasting

To see how, recast wicked problems as part of a long-standing genre in literature that enables very different statements and competing positions to be held without them being inconsistent at the same time. Literary and cultural critic, Michael McKeon ([1987] 2002), helps us here:

> Genre provides a conceptual framework for the mediation (if not the 'solution') of intractable problems, a method for rendering such problems intelligible. The ideological status of genre, like that of all

conceptual categories, lies in its explanatory and problem-'solving' capacities.

In McKeon's formal terms, 'the genre of the novel is a technique to engage epistemological and socio-ethical problems simultaneously, but with no particular commitment than that'. In this way, intractability appears not only as the novel's subject matter but also by virtue of the conventions for how these matters are to be raised.

This guide proposes you think of the literature on wicked problems as part and parcel of this enduring genre. The content is not only about the intractable in complex policy and management, but also their governing context is as historically tangled and conventionalised as that of the English novel. Masses of differentiated complexities take centre place in wicked problems both by virtue of content and context.

To be clear, I am not saying wicked problems are fictitious (even so, there are the truths of fiction). Rather, I am arguing that pinning wicked problems exclusively to their content (e.g., wicked problems are defined by the lack of agreed-upon rules to solve them) misses the fact that the analytic category of wicked problems is highly rule-bound (i.e., by the historical conventions to articulate and discuss such matters).

So, the guide suggests you turn to the conventions specifically, where to ask, 'Just what are these conventions that govern the genre, wicked problems?', turns out to be highly revealing by way of answers.

The obvious and most explicit convention is that you must not try to over-simplify wicked problems. But you would have to search long and far to find any intimation of its semiotically entailed opposite: 'Don't over-complexify wicked problems'. There is little understanding, it seems to me, that labelling a policy issue truly wicked can over-complexify a problem that would otherwise be open or even hospitable to recasting into more tractable forms without loss in its persuasive complexity.

II.26.2 Upshot

If wicked problems are to be better addressed, altogether different conventions and rules must be found under which to recast these... well, whatever they are to be called they would not be termed 'intractable', would they?

Which returns us to our earlier point in Part I. Wicked policy problems are complex problems that have yet to be recast through their complexity.

Wicked problems, as conversation stoppers, end up as exaggerations. Even if specifics of wicked problems hold as far as they go, the truth of the matter needs to be pushed further. Those who are quick to label complex problems wicked are

like many visitors to contemporary art galleries: They see what can be described further without noticing the deeply conventional and conventionalising rectangles, walls, and rooms in which all this is cabined.

Declaring something a wicked problem, to put it differently, creates The Ultimate One-Sided Problem – it's, well, intractable – for humans who are everything but one-sided. In so doing, these one-siders of intractability in the Anthropocene take the generous notion of intractably human and scalp it.

II.27 The analogy, 'we are at sea', remade for the Anthropocene

Apologies: The eleven quotes are a hefty read before I get to my own recasting of 'we are at sea in the Anthropocene'. That said, it is important you look for any of your own connections between excerpts along the way:

- Rene Descartes, philosopher: 'The Meditation of yesterday filled my mind with so many doubts that it is no longer in my power to forget them. And yet I do not see in what manner I can resolve them; and, just as if I had all of a sudden fallen into very deep water, I am so disconcerted that I can neither make certain of setting my feet on the bottom, nor can I swim and so support myself on the surface. I shall nevertheless make an effort... until I have met with something which is certain, or at least, if I can do nothing else, until I have learned for certain that there is nothing in the world that is certain' (Simic 1990).
- Charles Sanders Peirce, philosopher: '… the solid ground of fact fails… It still is not standing upon the bedrock of fact. It is walking upon a bog, and can only say, this ground seems to hold for the present' (Peirce 1992).
- Blaise Pascal, philosopher: 'On a vast ocean we are drifting, ever uncertain and bobbing about, blown this way or that. Whenever we think we have some point to which we can cling in order to strengthen ourselves, it shakes free and leaves us behind… Nothing halts for us' (Jaccottet 2015).
- Immanuel Kant, philosopher: 'This land [of understanding], however, is an island… surrounded by a broad and stormy ocean, the true seat of illusion, where many a fog bank and rapidly melting iceberg pretend to be new lands and, ceaselessly deceiving with empty hopes the voyager looking around for new discoveries, entwine him in adventures from which he can never escape and yet also never bring to an end' (Kant 2013).
- Michael Oakeshott, political philosopher: 'In political activity, then, men sail a boundless and bottomless sea; there is neither harbour for shelter nor floor for anchorage, neither starting-place nor appointed destination. The enterprise is to keep afloat on an even keel; the sea is both friend and enemy;

and the seamanship consists in using the resources of a traditional manner of behaviour in order to make a friend of every hostile occasion' (Oakeshott 1962).

- Alexis de Tocqueville, historian, and political scientist: 'The legislator is like a navigator on the high seas. He can steer the vessel on which he sails, but he cannot alter its construction, raise the wind, or stop the ocean from swelling beneath his feet' (Swedberg 2009).
- Leo Tolstoy, novelist: 'While the sea of history remains calm the ruler-administrator in his frail bark, holding on with a boat hook to the ship of the people and himself moving, naturally imagines that his efforts move the ship he is holding on to. But as soon as a storm arises and the sea begins to heave and the ship to move, such a delusion is no longer possible' (Tolstoy [1869] 1922).
- Otto Neurath, philosopher of social science: 'Imagine sailors who, far out at sea, transform the shape of their vessel… They make use of some drifting timber, besides the timber of the old structure, to modify the skeleton and the hull of their vessel. But they cannot put the ship in dock in order to start from scratch. During the work they stay on the old structure and deal with heavy gales and thundering waves... A new ship grows out of the old one, step by step – and while they are still building, the sailors may already be thinking of a new structure, and they will not always agree with one another. The whole business will go on in a way we cannot even anticipate today... That is our fate' (Neurath 1944).
- Hans Magnus Enzensberger, author, and essayist: 'The question whether it's best to swim with the current or against it seems to me out of date… The method of the yachtsman who tacks with the wind as well as against it seems more fruitful. Such a procedure applied to society demands stoic disbelief and the greatest attentiveness. Anyone who wants to reach even the nearest goal must expect, step by step, a thousand unpredictable variables and cannot put his trust in any of them' (Enzensberger 1992).
- Isaiah Berlin, historian of ideas: '... they pretend that all that need be known is known, that they are working with open eyes in a transparent medium, with facts and laws accurately laid out before them, instead of groping, as in fact they are doing, in a half-light where some may see a little further than others but where none sees beyond a certain point, and, like pilots in a mist, must rely upon a general sense of where they are and how to navigate in such weather and in such waters, with such help as they may derive from maps drawn at other dates by men employing different conventions, and by the aid of such instruments as give nothing but the most general information about their situation' (Berlin 1996).

– G.L.S. Shackle, economist: '[We] are like a ship's crew who have been wrecked in a swirling tide-race. Often a man will hear nothing but the roar of the waters in his ears, see nothing but the dim green light. But as he strikes out, his head will come sometimes well above the water, where for the moment he can see clear about him. At that moment he has the right to shout directions to his fellows, to point the way to safety, even though he may feel sure that next moment he will be again submerged and may then doubt whether after all he has his bearings' (Shackle 1955).

Stop there, as any wider selection of excerpts would be as arbitrary.[8]

II.27.1 Thought experiment and initial implications

What follows is my line of thought in drawing out connections that I had not seen before assembling the quotes together. My aim is discovering what I have missed about 'being at sea', and how this might help recast what that means for policy and management in the Anthropocene.

In reading the quotes, a colleague of mine thought the most obvious connection was between a comprehensive rationality (where you already know enough) and the actual bounded rationality of real-time decision-making. That level of generality was not the first thing that struck me. Rather, it is that Tocqueville says the navigator cannot alter the ship's construction while at sea, while Neurath's point is that the ship must be rebuilt at sea.

Pause a moment and note what I just did. By assembling the list of quotes, I have created anomalies – more specifically, anomalous connections – where none were before by definition. This has been done through the arbitrary juxtaposition and sequencing of quotations to extend my own thinking. And where does my juxtaposing the quotes of Tocqueville and Neurath lead me?

Whither the navigator 'cannot alter its construction, raise the wind, or stop the ocean from swelling beneath his feet' in contrast to 'During the work they stay on the old structure and deal with heavy gales and thundering waves'? To me, it shines a special light on the context granularity of swelling ocean, heavy gales, and thundering waves that the quotes share.

Actual responses to these forces differ (confirmed by the other quotes), but they cannot be wished away. Yet the more we think about being at sea like this, the more we grasp how so much of policy and analysis has been just that kind of wishful thinking.

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[8] See also the *locus classicus* on the topic: Hans Blumenberg's 1997 *Shipwreck with Spectator: Paradigm of a Metaphor for Existence*.

II.27.2 Indeed, this is my starting point for recasting: It is magical thinking that also keeps us at sea in the Anthropocene

We turn in a moment to how the following recasting helps. Suffice it here, long-lived debates in the policy and management with which I am familiar have peaked as dualities: Market and Hierarchy; Coordination and Regulation; Regulation and Innovation; Innovation and Politics; Politics and Science & Technology. So too: Holism versus Reductionism, Quantitative versus Qualitative, Positivist versus Post-positivist.

We are still told that, when it comes to high reliability of society's critical infrastructures, macro-design trumps micro-behaviour (i.e., operator error); alternatively, micro-behaviour drives macro-design (i.e., self-organising complex adaptive systems). If only we designed efficient energy markets, the grid would take care of itself; if only we had real-time metering in every household and business, the grid take care of itself; if only we distributed multi-agent software to self-heal the grid, the grid take care of itself.

If only we had full cost pricing, or the political will, or had publics that could handle Arrow's voting paradox, then it would be better. If only we got rid of all that mess in between, we'd be better off. We'd get to what only matters.

Which way Africa: Kenyatta or Nyerere? Brazil: Is it race or class? Whither the world: Globalisation or [fill in the blank]? Xi or Modi? Engineering an economy's soft landing, derisking its private investments, ensuring large systems fail gracefully, and other ways to slice clouds in half. We might as well talk about who is more likely to be in a Christian heaven, Plato with his soul or Socrates for his self-sacrifice.

Policy in these ways looks like the conjuror's misdirection. A policy directs your attention to one area while the real action happens elsewhere. You focus on the policymaker when the other hands of middle-level managers and professionals ensure rabbits and hats go together. As newly minted policy analysts. we were told we had first to nail the politics. Without the right political arrangements, how can we have the right policies? I remember vividly times when we were assured that change political institutions and human behaviour changes accordingly.

Further along, though, we were told: Actually, it is all about the economics. 'After all, you can't repeal the business cycle'. With the right macroeconomic and microeconomic arrangements in place, politics and political conduct would change for the better, we were assured.

Later on, we heard that, well, it's really about getting the science and technology down. Dummy, it's politics and economics that have gotten us into this mess and will keep us there, unless we start taking science seriously. We're in a climate emergency, after all!

And yet... the very same results of misdirection continue. Farms still get their subsidies – be it because agriculture is politically important, food is economically important, carbon sequestration is environmentally important, and global science and technology are even more important without which there will be no earth, no climate, no food, no agriculture, no subsidies, no nothing worth speaking of.

No wonder we are at sea in the Anthropocene, and literally.

How many times have we heard or been magicked by something like, 'If implemented as planned…', 'If done right…', 'Once the risks are under control...', or 'Given market-clearing prices…' Just like that older version: 'Monarchy is the best form of government, provided the monarch possesses virtue and wisdom.'

'If implemented as planned', when we know that is the assumption we cannot make. 'If done right', when we know that 'technically right' is unethical without specifying just what the ethics are, case by case. 'Once the risks are under control', when any notion of control is ludicrous for radical uncertainty. 'Given market-clearing prices', when we know not only that markets in the real world often do not clear (supply and demand do not equate at a single price) – and even when they do, their 'efficiencies' can undermine the very markets that produce those prices.

Admit it: We could as well believe that the surest way to heat the house in winter is by striking a match under the thermometer outside.

II.27.3 But this criticism is not enough for a recasting

Where then does reframing being at sea leave us? What does being at sea mean now and for the better in the Anthropocene? One answer returns to:
Be careful what you wish for!

Those who study wishes and wish-lists are likely to come across the fable of the mythical animal skin, which in the process of realising each new wish, shrinks smaller and smaller – until nothing is left upon which to wish further. And why would you need further wishes? Because of all the aftermaths – so the moral goes – in need of correction that follow from even the most well-thought-out wish.

This analogy of the mythical animal skin recasts, considerably, the conversation stopper, 'All that is missing is the political will to do what is needed…' Political will eats itself up and is manifestly a finite resource.

'Be careful what you wish for!' is, as such, now everywhere in the Anthropocene. It is not a conservative caution in response to difficulty, inexperience, and not-knowing ahead. The point is not to stop wishing, as if that were humanly possible. 'Be careful what you wish for!' is the way we admit these difficulties,

inexperience and not-knowing publicly and still recast so as to move on in our duty of care.

II.28 Thinking infrastructurally about seven major policy and management issues

Critical infrastructures are defined as those large-scale systems and physical assets so vital to society that their failures drastically undermine society and economy, in whole or major part. I hope that the guide's preceding sections convince the reader of their centrality and criticality, both positive and negative to the Anthropocene.

If I have learned anything from large-systems research, it is that critical infrastructures are a very useful lens through which to rethink topics of major importance like risk/uncertainty, or market failure, or health care and cyberattacks, or the next global pandemic for that matter. It is also a useful optic with which to think more about key concepts of importance to this guide, particularly social constructivism and sociotechnical imaginaries.

Below are seven (7) reconsiderations of ongoing importance in the Anthropocene. The points are presented by and large independently of each other and are intended to be illustrative and wide-ranging, where much more could be usefully written on each topic.

II.28.1 Thinking infrastructurally about whole-cycle risk and uncertainty

Think of an infrastructure as having an entire cycle of operations, ranging from normal, through disrupted and restored back, or if not, tripping over into failed operations, followed by emergency response including efforts at initial service recovery, then into recovery of system assets and other services, and onto a new normal of service operation (if there is to be a new normal).

There are other ways to characterise the cycle or lifespan – for example, shouldn't maintenance and repair be separated out of normal (routine) and disrupted (non-routine) operations? – but these demarcations from normal through to a new normal works for the guide's purposes here.

Our research suggests that 'risk and uncertainty' vary both in type and degree with respect to these different stages in infrastructure operations. In normal, disrupted and restoration-back-to-normal operations, we observed infrastructure control room operators worrying about management risks due to complacency, misjudgement, or exhausting options. But when large systems fail outright as systems, management risks and uncertainties become very different.

The cause-and-effect relationships of normal, disrupted, and restored operations are moot when 'operating blind' in failure. What was more-or-less visible cause-and-effect is now replaced in failure by non-measurable uncertainties accompanied by contingency-filled aftermaths, neither of which are well understood causally.

Further, the urgency and clarity in immediate emergency response in no way obviates the need for impromptu improvisations and unpredicted, let alone hitherto unimagined, shifts in human and technical interconnectivities as system failure unfolds.

As for system recovery (if they get to that stage), the infrastructure control room operators we interviewed (during their normal operations) spoke of the probability of failure being even higher in recovery than during usual times. Had we interviewed them in an actual system failure, their having to energise or re-pressurise line-by-line may have been described in the far more demanding terms of operating in the blind, working on the fly and riding uncertainty, full of improvisations and improvisational behaviour.

So what?

The point is that both nonmeasurability and high-contingency aftermaths still convey important information for their infrastructure operations during and after the disaster.

This information, moreover, is especially significant when causal understanding is most obscure(d). If experienced emergency managers find themselves in the stages of systemwide infrastructure failure and immediate emergency response, nonmeasurability and high contingency tell them to prepare for and be ready to improvise, irrespective of what formal plans and protocols state beforehand.

'Coping with risk' is, in short, a very misleading term when an important part of that 'coping' is proactive improvisations and in response to infrastructure failures that unfold in ways well beyond predicting or imagining what are often now conflated as, 'low probability, high consequence events'.

II.28.2 Thinking infrastructurally about that other market failure

Economists tell us there are four principal types of market failure: public goods, externalities, asymmetric information, and market power. Rarely do they talk about the fifth, the one where efficient markets actually cause market failure by destroying the infrastructure underlying and stabilising markets and their allocative activities.

Consider here the well-documented 2010 flash crash of the US stock market. Investigations found that market transactions happened so quickly and were so numerous under conditions of high-frequency trading and collocated servers that

a point came when no liquidity was left to meet proffered transactions. Liquidity dried up and with it, price discovery. 'Liquidity in a high-speed world is not a given: market design and market structure must ensure that liquidity provision arises continuously in a highly fragmented, highly interconnected trading environment', as a report by the Commodity Futures Trading Commission (CFTC) put it for the crash (CFTC and SEC 2010a, 2010b).

Here, efficiencies realised through high transaction speeds worked against a market infrastructure that would have operated reliably otherwise. The economist counters by insisting, 'Obviously the market was not efficient because the full costs of reliability were not internalised'.

But the point remains: Market failure under standard normal conditions of efficiency say nothing about anything so fundamental as infrastructure reliability as foundational to economic efficiency.

Implications

The policy and management challenge is to identify under what conditions does the fifth market failure arises empirically. Until that is done, the better part of wisdom – the better part of government regulation – would be to assume fully efficient markets are low-performance markets when the stabilising market infrastructure underlying them is prone to this fifth type of market failure. What, then, is 'prone'? Low-performing market infrastructure results from the vigorous pursuit of self-interest and efficiencies when hobbling real-time market infrastructure operators in choosing strategies for longer-term high reliability of the market infrastructure.

There is another way to put the point: High reliability management of critical infrastructures does not mean those infrastructures are to run at 100 per cent full capacity. Quite the reverse. High reliability requires the respective infrastructures not work full throttle: Positive redundancy or fallback assets, and options – what the economists misidentify as 'excess capacity' – are needed in case of sudden loss of running assets and facilities, the loss of which would threaten infrastructure-wide reliability and, with it, price discovery.

Upshot

In this view, critical infrastructures are economically most reliably productive when full capacity is not the long-term operating goal. Another way to put that is the long-run in question has not been differentiated enough for purposes of efficiency. Either way, efficiency does not serve as the benchmark for economic performance.

II.28.3 Thinking infrastructurally about health care

The US Department of Homeland Security recognises health care to be one of the nation's critical infrastructures sectors, along with large-scale water and energy supplies, among others.

Infrastructures, though, vary considerably in their mandates to provide vital services safely and continuously. The energy infrastructure differs depending on whether it is for electricity or natural gas, while the latter two differ from large-scale water supplies (I have studied all three). Yet the infrastructures for water and energy, with their central control rooms, are more similar when compared to education or health care without centralised operations centres.

What would health care look like if managed more like other infrastructures that have centralised control rooms and systems, such as those for water and energy? Might the high reliability of infrastructural elements within the health-care sector be a major way to better ensure patient safety? Four points are raised by way of answer:

(1) High reliability theory and practice suggest that the manufacture of vaccines and compounds can be made reliable and safe, at least up to the point of injection. Failure in those processes is exceptionally notable – as in the 2012 fungal meningitis contamination at the New England Compounding Centre – because failure is preventable.

When the perspective is on medical error, the patient is at the centre of the so-called sharp-end of the health-care system. But health-care reliability is a set of processes that includes the capacities and performance of upstream and wraparound organisations. When dominated by considerations of the sharp-end, policymakers and managers overlook – at our peril – the strong-end of health care with its linkages for producing medicines and treatments reliably and safely.

(2) If health care were an infrastructure more like those with centralised control centres, the criticality and centrality of societal dread in driving reliable service provision would be dramatically underscored. Yet, aside from that special and important case of public health emergencies (think the Covid-19 pandemic), civic attitudes toward health and medical safety lack the public dread we find to be the key foundation of support for the level of reliability pursued in other infrastructures, such as nuclear power and commercial aviation.

Commission of medical errors has not generated the level of public dread associated with nuclear meltdowns or jumbo-jetliners dropping from the air. Medical errors, along with fires in hospital facilities, are often 'should-never-happen events', not 'must-never-happen events'.

What would generate the widespread societal dread needed to produce 'must-never-happen' behaviour? Answer: Getting hospital treatment kills or maims you unless managed reliably and safely.

(3) How a reliable and safe health-care system encourages a more reliable health-care consumer is akin to asking how a reliable grid or water supply encourages the electricity or water consumer to be energy- or water-conscious. Presumably, the movement to bring real-time monitoring health-care technology into the patient's habitation is part of that calculus.

(4) In all this focus on the patient, there is the equivalent of health-care control rooms beyond those of manufacturers of medicines mentioned above: Think most immediately of the pharmacy systems inside and outside hospitals and their pharmacists/prescriptionists as reliability professionals.

The four points raise an interesting question: Can we find systematically interconnected health-care providers so critical that they could bring your health-care sector down (say, as was threatened for the US when the 12 systematically interconnected banking institutions were under threat during the 2008 financial crisis)?

Where so, we would have a health-care sector in need of 'stress tests' for systemic risks and uncertainties just as post-2008 financial services institutions had to undergo.

II.28.4 Thinking infrastructurally about cyberattacks

In no order of priority:

(1) It is commonly assumed cybersecurity is a special concern for interconnected critical infrastructures: Failure of security in one (e.g., a ransomware attack) can well have knock-on effects for other infrastructures dependent on it. Examples are frequently cited.

Yet the empirical literature on real-time infrastructure operations indicates that disruptions in one infrastructure are often managed by real-time control operations so as not to disrupt the interconnected ones. Not always, not every infrastructure, but often enough not to be ignored. These saves need to be recorded and learned from as much as cybersecurity failures.

(2) Interconnectivity is configured in many ways between and among critical infrastructures. These configurations are not all tightly coupled and complexly interactive and do not cascade 'on their own'. Consider all those graphics that show large sociotechnical systems to be densely and multi-linked with other systems. Not all of interconnections, however and importantly, are ones of tight coupling and complex interactivity primed to fail in no time flat when normal operations are breached.

More, some interinfrastructural cascades look considerably less instantaneous and unmanaged than presumed. One interviewee underscored how a ransomware attack on an important city infrastructure was contained so as not to affect other units and their real-time operations within that department. In fact, and already noted, data also exist supporting the assumption that disruptions in some critical infrastructures are actually managed so as not to spread beyond.

No guarantees, again. It has to be asked, nonetheless, to what extent is this real-time management response capacity to cyberattacks undermined by security software prematurely promised as digital guns, guards, and gates.

(3) Another assumption is that the cyberattackers know what they are doing – as if they were as reliable as the infrastructures they attack. We hear and read far less about those cases where the hackers cannot control or otherwise manage their own attacks. They too must cope with aftermaths:

> A study of 192 cyberattacks by national governments found that Russia 'fails much more often than it succeeds' at hacking, and that even its victories have provoked self-defeating countermeasures. After enduring a denial-of-service attack from Russia in 2007, Estonia significantly boosted its defences, which now serve as the basis for NATO's cybersecurity strategy.
> (Neumeyer 2022)

(4) Significantly different professional orientations within an infrastructure exist with respect to cybersecurity. The 'cultural divide' between control room operators, system engineers, and IT staff is well-known. Those who run operational systems have had quite different views about new software and patches introduced by the respective IT units.

(5) Cyberattacks on critical infrastructures are said to be special not only because they portend catastrophic interinfrastructural cascades but also because they undermine confidence and trust in the public and private sectors that these interconnected vital services can be reliably protected. Where so, societal dread of these attacks should move centre-stage. Although it might reflect reduced confidence and trust, we would expect a societal dread of digital-wide collapse also to increase pressures on those public and private infrastructures to be more reliable.

How all this would work out is an empirical question

Again, dread of medical error has not been sufficient to make hospitals high reliability organisations. Differentiated contexts clearly matter: 'I'm more concerned about that [cybersecurity related to control facilities] right now than I am about a big earthquake', a district infrastructure director in the Pacific Northwest told us. 'It's a daily threat', said a roads emergency manager of cybersecurity in one state.

So what?

Prevention of cyberattacks is almost always seen as a technology and design challenge rather than very much the management challenge it also is. At least one very important implication for policy and management follows: While rarely discussed as such, 'thinking infrastructurally about cyberattacks' means taking that earlier discussed obsolescence – both in security equipment and management skills and not just with respect to cybersecurity software – much, much more seriously.

II.28.5 Thinking infrastructurally about the next global pandemic

My introduction to the policy side of pandemics was in 2005, when I read two articles, 'Preparing for the Next Pandemic' by Michael T. Osterholm and 'The Next Pandemic?' by Laurie Garrett, both in *Foreign Affairs* (Osterholm 2005; Garrett 2005).

I think any reader today would find these articles prescient. While some numbers have not turned out as supposed, the articles are spot-on when it comes a Covid-19's major first-order impacts on mortality rates, medical shortages, societal and personal security, food systems, finance, trade, and economics.

The problem is that newer understandings of the Covid-19 pandemic may be obscuring the very idea and necessity of pandemic preparedness.

At the start of the Covid-19 pandemic

Below are titles of a few among many reports to be found in the Covid-19 folder of the international aggregator, **the-syllabus.com**, between 23–30 April 2020 (please persist and read all):

- Tech Giants Are Using This Crisis to Colonise the Welfare System
- The Covid-19 Pandemic Crisis: The Loss and Trauma Event of Our Time
- Migrant Workers Face Further Social Isolation and Mental Health Challenges during Coronavirus Pandemic
- 'Calamitous': Domestic Violence Set to Soar by 20 per cent during Global Lockdown
- The Fog of Covid-19 War Propaganda
- The Case for Drafting Doctors
- Covid-19 Threatens to Starve Africa
- Covid-19: The Controversial Role of Big Tech in Digital Surveillance
- For a More Equal World: Coronavirus Pandemic Shows Why Ensuring Gender Justice is an Urgent Task

- Covid-19 in the Middle East: Is this Pandemic a Health Crisis or a War?
- Urban Warfare: Housing Justice Under a Global Pandemic
- New Age of Destructive Austerity After the Coronavirus
- The Coronavirus and the End of Economics
- Covid-19 is 'An Affront to Democracy'
- Health vs. Privacy: How Other Countries Use Surveillance to Fight the Pandemic
- World Bank Warns of Collapse in Money Sent Home by Migrant Workers
- Coronavirus: Will Call Centre Workers Lose their 'Voice' to AI?
- How Can Low-Income Countries Cope with Coronavirus Debt?
- Is Our War with the Environment Leading to Pandemics?
- The World Order Is Broken. The Coronavirus Proves It.
- The West has Found a New Enemy: China Replaces Islam
- Will Covid-19 Make Us Less Democratic and More like China?
- Pandemic Science Out of Control
- Tech Giants are Profiting – and Getting More Powerful – Even as the Global Economy Tanks
- The Legal and Medical Necessity of Abortion Care Amid the Covid-19 Pandemic
- Will a Child-Care Shortage Prevent America's Reopening?
- Covid-19 or the Pandemic of Mistreated Biodiversity
- Coronavirus, War, and the New Inequality
- Firms in EU Tax Havens Cannot be Denied Covid Bailouts
- This Crisis Demands an End to Mass Incarceration

You would have to search long and hard in pre-Covid warnings of the next pandemic for most of the above associations.

You would be right to conclude that these titles reflect the widespread and deep impacts of the corona crisis for society, economy, culture, and more across the world. You would also be a fool not to see pre-existing policy agendas glomming onto the pandemic as of way of furthering their own important priorities – be they inequality, climate change, labour, migrants, and the rest – that have risen to more attention and visibility since 2005.

So what?

Surely, you press, we need a 2020s version of 'the next pandemic', not one from mid-2000s.

True, but that point is pushed further by the obvious question when it comes to pandemic preparedness. Namely: How could we be better prepared for the future if, now and far more so than in 2005, we insist pandemics are caused by unresolved, interrelated issues over, among others, climate change, the international order, neoliberal economics, poverty, inequality, national welfare systems, global and local injustice, privacy rights, gender and reproductive rights, biodiversity loss and species extinction, geopolitics, cross-border migration, along with other claimants listed above and more?

If formulated this way, then predicting the future is the mess we are in now. To put it another way, the next pandemic is the one currently underway.

What then are we to do?

This guide offers one suggestion: here too, think infrastructurally.

The professionals who should have been informed about the dangers of the 2020 pandemic were far too often not among the people addressed by most public health experts. If our interviews are the guide, not consulted were those who operate critical infrastructures in real time, including water, electricity, telecommunications, and transportation. No one, as far as we can determine, told those men and women in the control rooms and out in the field that Covid-19 would wreak such havoc as it did in systems mandated to be so reliable.

From our interviews in Oregon and Washington State, it is obvious no one predicted the actual, mega-impacts and interruptions that Covid-19 has had on the real-time operations of essential infrastructures. You may already know essential workers were sent home to work offsite. Less known probably is the fact that those on-site had to be vaccinated, and some very experienced personnel left as a result. Far less appreciated is the earlier finding: Covid-19 put a brake on major infrastructure investment, improvement, and management activities.

In effect, public health experts were talking to the wrong decision makers. The pandemic experts seemed to operate under two misleading beliefs: their public role is to convince key politicians and officials about what to do, even if privately they know the 'real problems' are politicians and today's politics.

Both beliefs remain fall short. In the US, we would not have a foundational economy, nor would we have their markets, if it were not for electricity, water, telecoms, and transportation being reliable. Yet the professionals responsible for real-time operations in the infrastructures were never specifically warned, were never specifically talked to, and certainly never had a chance to listen to the pandemic experts and ask questions. They were treated as uncoupled and

unconnected to large sociotechnical systems whose interconnections depended fundamentally upon these professionals.

Upshot

Consulting critical infrastructure staff the next time around will not answer the questions of inequality, poverty, war, and plague, but would go some way to increase systemwide pandemic preparedness and response.

II.28.6 Thinking infrastructurally about social constructions, particularly 'scale'

It is no news that our categories for thinking are both strengths (e.g., your field of specialisation) and weaknesses (its blind spots). Nor is it news both are social constructions that morph over time and space. What is more newsworthy is where and when that social construction takes place and why they matter.

Example

Public policy and management often assume that meaning- and sense-making take place at the micro, meso and macro levels – even as we admit that these are socially constructed (think: international, then global, but now planetary).

That micro/meso/macro are easily historicised does not stop you or me from thinking through linkages and connections between these individual, emerging, and system levels. There are many instances where doing so poses no real problem to recasting complex policy issues more tractably.

There is, nevertheless, at least one set of cases where doing so is very problematic. It is where dynamic interconnections determine the scale and shifts in scale thereafter. Scale follows from, rather than precedes, action.

A city water manager said that recent improvements in the potable water system meant that, in case of emergencies, they could close portions of physical system, segment by segment, interconnect by interconnect. This enabled them to isolate, in their words, 'the scale of their problem'. At these times and for these purposes, scale follow from interconnectivity changes, regardless of the obvious that both interconnectivity and scale are social constructions.

So what?

If infrastructure operators, like those for the city water system, are unavailable after a disaster, then damage assessments to secure new funding typically default to the emergency management agencies. The latter are arguably more familiar with devastation (another social construction) than with the real-time interconnectivity of backbone infrastructures like water and electricity ('backbone' being a very different social construction). The latter personnel can be much more adept in moving mobile generators and cell towers nearby to affected infrastructures for their initial service restoration, by way of example.

Upshot

When the imperative is, First, differentiate!, it comes as no surprise that there are social constructions, and then there are social constructions. That is, the 'where' and the 'when' of the social construction really matter, where that 'really' is as material as are other material interests (more in the guide's **Conclusion**).

II.28.7 Thinking infrastructurally about sociotechnical imaginaries

> Sociotechnical imaginaries are 'collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology'...
> (Jasanoff 2015)

But then: whose visions? Within a large sociotechnical system like a critical infrastructure, whose imaginaries? Clearly not just those of the CEO and the rest of the C-suite. Nor investors and the regulators. Nor the policymakers and legislators.

For it is also the case that large sociotechnical systems have their equivalent street-level bureaucrats, frontline implementers, and middle-level reliability professionals, who in turn have their own templates and facts on the ground at variance with others in the same system.

Example

Consider the conventional wisdom that regulatory compliance is 'the baseline for risk mitigation in infrastructures'. Even so, there is no reason to assume that compliance – a sociotechnical imaginary if there ever was one – is the same baseline for, among others,

- the infrastructure's operators in the field, including the eyes-and-ears field staff;
- the infrastructure's headquarters' staff responsible for monitoring industry practices for meeting government compliance mandates;
- the chief officials in the infrastructure who see the need for far more than compliance by way of enterprise risk management;
- those other specialist professionals in the same infrastructure responsible for thinking through a wide range of 'what-if' scenarios that vary by all manner of contingencies; and, last but never least,
- the infrastructure's reliability professionals – its control room operators, should they exist, and wraparound support staff – in surmounting any

(residual) stickiness by way of official procedures and protocols – the 'official' sociotechnical imaginary – undermining real-time system reliability.

So what?

These differences in orientation with respect to 'baseline compliance' mean societal values of systemwide reliability can be just as differentiated as these staff and their responsibilities are.

Where highly reliable infrastructures are vital to a society, it must also be expected that the social values reflected in and by these infrastructures not only differ across infrastructures, but within them as well. Sociotechnical imaginaries, in other words, must be assumed from the get-go to be highly nuanced and variously coupled.

II.29 Analogies: Takeaways for Anthropocene analysis and management

Analogies, in the view of this guide, make visible just how much of recasting is not a one-way street, but more like traffic at an intersection. You drive to greater/different granularity... and yet, there are other analogies (and so too other **Methods** and **Counternarratives**) to take you in different views over the same area.

What does this mean, practically? It is predictable that existing but under-acknowledged analogies can redescribe complex policy and management issues. At the time of writing, the Green New Deal has most often been likened to Roosevelt's New Deal. It is also likened to the Civil Rights Movement, nineteenth century abolitionism, and the war economy of the Bolshevik Revolution. There should be no doubt that the climate emergency will be compared to many other events and benchmarks you and I will not imagine until that comparison is made. The crux is which one or others stick, and usefully so. Reality is the metaphor that lasts, as one wit would have it.

Go back to the notion of policy palimpsest. Each palimpsest is not only overwritten by past and current policies, laws, regulations, and the like. They are not only overwritten by past and current proposals that never got implemented and which haunt the present.

Policy palimpsests are also overwritten by all manner of analogies, methods, counternarratives, and the key concepts that come into play under conditions of complex policy and management. Yes, you are better off in the Anthropocene by knowing a lot about a lot. But this guide is insistent: 'A lot' is often not differentiated enough.

More positively, identification of actionable granularity is importantly pegged to shifting the analogies, methods, key concepts and counternarratives.

Part III: Conclusion. Where's power? Where's human agency?

The guide ends by drawing on the key concepts and notions of counternarrative, methods, and analogies to understand better the roles and functions of human agency and power in the Anthropocene.[9]

III.1 Human agency

The guide assumes human agency is constrained differently at different times in different places and by different factors. As such, human agency is not its own dominant policy or management narrative in the same way as some consider racism, sexism, militarism, imperialism, nationalism, populism, consumerism, extractivism, settler colonialism along with financialisation, urbanisation, marketisation, commodification, globalisation, and more.

Rather, human agency has a much more important function, that of permanent counternarrative. From the perspective of the guide, human agency is best seen as the key global counternarrative to hegemonic policies, strategies, and processes that have, if you will, degranularised human agency out of their dominant narratives and scenarios.

The differences in context and function are obvious the second anyone defines human agency. Here is mine (not uncommon one): a person's capacity to determine and make meaning from his or her context through purposive consciousness, reflection, and improvisation. This definition accents reflexivity. Yours in contrast might highlight self-determination, imposition of the one's will on the environment, or some other. My gamble is that similar or parallel points to which we now turn are to be observed in applications of your definitions.

So that we are on the same page, here are two examples of human agency that illustrate my definition, one from a case study of migration and the other from case studies of child labour:

> Specifically, the current mainstream narrative is one that looks at these people as passive components of large-scale flows, driven by conflicts, migration policies and human smuggling. Even when the personal dimension is brought to the fore, it tends to be in order to depict migrants as victims at the receiving end of external forces. Whilst there is no denying that most of those crossing the

[9] Earlier versions of points raised here appear in Roe (2023) and have been substantially revised tor the guide.

> Mediterranean experience violence, exploitation and are often deprived of their freedom for considerable periods of time... it is also important to recognise and analyse their agency as individuals, as well as the complex sets of local and transnational networks that they own, develop and use before, during and after travelling to Europe.
> (Schapendonk 2021)

> First, as the data [from three countries] have demonstrated, labour, and the need for children to work, is the predominant lens through which young people and the adults that surround them conceptualise children's engagement with gangs and organised crime. This was in contrast to the other standpoints that permeate discourse. Labelling the children as gang members is a poor reflection of their drivers of involvement in crime and is likely to stigmatise children engaged in a plight to ensure their own survival. Alternatively, the young people were not child soldiers nor were they victims or perpetrators of trafficking or slavery. A victim lens is also problematic in this context. The relationship between young people and organised crime is complex and multifaceted. Young people are victims of acute marginalisation, poverty and violence but they do have some agency over their decision making. The data from all studies illustrated how gangs offer young people ways to earn an income but they also provide social mobility, 'social protection'... and 'street capital'. In some instances, criminal groups offer young people ways to earn 'quick and easy money.' Thus, the young people are not devoid of agency, but their decision making should be considered within the context of restricted and bounded lives.
> (Atkinson-Sheppard 2022)

Human agency in this way depends on the positions from which you take your vantage point. There are those who think the realisation and/or control of human agency are among core principles around which to design large-scale systems involving humans, individually or collectively. Over-arching notions of 'the individual' and 'the collective' are also contested at this macro-design node.

Others focus on the individual or micro-level, where the agent acts in real time, reactively, proactively or whatever the adverbial property. Here too contestation abounds, if only because of vastly different optics on the 'micro' from psychology, phenomenology, law, and microeconomics, to name a few.

Then, there are two other levels and units of analysis, which are the positions this guide takes as the vantage points for focusing on human agency. First is human agency as empirically observed across a run of different cases, socially constructed as they are, of 'individuals', 'capacities', 'task environments',

'purposes', and 'reflexivities'. (Think of the analogy of searching out family resemblances.) Are there patterns to be recognised over a run of diverse cases of human agency, and do these patterns constitute contingent generalisations, even as they fall short of anything like macro-design principles?

And speaking of macro-design principles, are there cases where one or more of the contested principles have been modified to reflect local conditions and circumstances? For another example, is a country's driving code enforced or implemented differently in its mountainous regions than on its open plains? Formally, have macro-design principles been tailored to reflect local contingencies?

Compared to the macro and micro takes on human agency, far less mentioned are these better practices for realising human agency that have evolved over widely different cases or for modifying principles over widely different contingency scenarios locally. Often, case studies and literature reviews assert 'best practices' in the form of macro-principles ('this is what it means to act democratically') or where 'lessons learned' have been scaled up from one site or several only. This is true not just in the migration and child labour literatures with which I am familiar.

III.1.1 So what?

One could counter there are no 'better practices' in the absence of best-macro ideals involving democracy and justice. From the guide's perspective, though, the invocation of universal macro-principles is premature and accounts for why many the really-existing better practices are discussed as infrequently as they are. All the attention is on the macro or micro. Notable exceptions – e.g., participatory research and action accumulated from a wide variety of cases and modified in light of various equity principles – can be counted on the fingers of two hands.

From the perspective of pattern recognition and localised contingency scenarios, human agency is best understood as an insistent counternarrative for moving away from dominant and domineering micro- and macro-level narratives of human action and behaviour. This holds too as we go forward into the Anthropocene (more below).

But still: What about power? What about its constraints on human agency?

III.2 Power

Other than references to politics, money, and egos, the guide has been silent on the nature and role of power – actually, different kinds of power – now and ahead in the Anthropocene.

This would be a major gap for a text so focused as is this one on differentiation in public policy and management. Even a formal history of 'power' as used in ordinary language would describe attempt after different attempt to identify, compare, and contrast types of power (direct, indirect, dispersed...).

But formal histories are not the issue in this guide. What is not sufficiently acknowledged is that – on this already highly differentiated planet of these more than 8 billion people – numerous (formal and informal) counternarratives, analogies, and methodological approaches to and for power exist and thrive.

I cannot speak for these other policy optics nor would I try to generalise from own my reading. What I want to do instead in this **Conclusion** is illustrate how 'material power' is a very old, very overwritten policy palimpsest.

Those who write on material power, this guide submits, are grabbing specific fragments from the palimpsest so as to assemble specific composite arguments. Indeed, I will be doing the same for my own composite argument about material power below.

What is different about mine is this. Methodologically, my composite is visibly sutured together – no pretence to seamlessness here – and deliberately stitched into an argument that the reader has never read as written before. Yet my wager is that this unique composite will resonate with you. More, it will do so by highlighting the lacunae, erasures, and effacements that have been necessary for you to produce your own accounts of 'material power'.

To be clear from the outset, what follows is illustrative and in no way pre-empts the search for under-acknowledged counternarratives that already differentiate material power in useful, case-by-case ways.

III.2.1 My power counternarrative

It is said Lord Acton despaired over the prospect of ever finding French, German, and British historians who agreed on an account of the Battle of Waterloo. So too have others (Gay 2002). In *The Charterhouse of Parma*, Stendhal recounts the misadventures of Fabrizio, who makes his way to Waterloo on the eve of the battle. Everything turns chaotic, with confusion supreme:

> A few minutes later Fabrizio saw, twenty paces ahead of him a ploughed field, the surface of which was moving in a singular fashion... [O]ur hero realised it was shot from guns that was making the earth fly up all around him... 'But is this the real battle', he asks a sergeant.
> (Stendhal 1981)

Friedrich Hayek, Nobel economist, picks up the story and asks,

> Was the man ploughing his field just beyond the extreme wing of Napoleon's guards part of the Battle of Waterloo?... To follow up this kind of question will show at least one thing: that we cannot define a historical fact in terms of spatiotemporal coordinates.
> (Hayek 1948)

Literary critic, Nicola Chiaromonte (1970), revisits those coordinates:

> Certainly the Battle of Waterloo that Napoleon saw and directed (or thought he directed) is not the event Fabrizio wanders into. Nor is the explosion of incidents in which Fabrizio finds himself the same event as the mortal engagement of the soldiers who jeer at him... The Battle of Waterloo was all of these, separately and together, plus countless other happenings.

By no means last, a more recent Fabrizio, Tod Hackett, runs to watch the chaotic, confused, and eventually disastrous filming of the Battle of Waterloo sketched out in Nathanael West's Hollywood novel, *The Day of the Locust* (West 1960).

This kind of power in 'the Battle of Waterloo' is very much the power that political scientist, James G. March, described long ago as 'different parts of the system contribut[ing] to different decisions in different ways at different times' (1966). Contingency is writ large in this power version. It is, of course, countered that war, capitalism, and poverty are their own powerful engines of contingency, but so equally it must be said of, say, natural selection or human agency.

III.2.2 The power of contingency

Contingency, as underscored in Part I and Part II cases, is allied with surprise. Even when understanding that contingency takes place in context, this looks little like the direct power defined as the ability of A to get B to do something B would not have done otherwise. The contexts of interest here are more complex.

To appreciate how much this matters for the guide, start with the power that contingency plays in A getting A to do what A would not have done otherwise. Here is T.S. Eliot ([1952] 1985):

> My writings, in prose and verse, may or may not have surprised other people; but I know that they always, on first sight, surprise myself. I have often found that my most interesting or original ideas, when put into words and marshalled in final order, were ideas which I had not been aware of holding. It is ordinarily supposed that a writer knows exactly what he wants to say, before he sits down at his desk;

> and that his subsequent labours are merely a matter of a better choice of words, a neater turn of phrase, and a more orderly arrangement. Yet I have always discovered that anything I have written – anything at least which pleased me – was a different thing from the composition which I had thought I was going to write.

Consider below the range of other evidence that those 'most interesting or original ideas' – read: those most powerful ideas – are the ones you do not know until you act by setting them down or seeing them before you. A host of very different practitioners put the point on behalf of their associates:

- 'A writer doesn't know what his intentions are until he's done writing', says poet, Robert Penn Warren. Even when the writing is done, poets 'are apt to discover that what they decide to express is not everything their poems say', writes Anne Stevenson, herself a poet, adding: 'Nothing in my experience is more important about the writing of poems than that they should surprise you; that while you are submitting to their rigorous demands of rhythms and sounds they find a way of saying things you never meant to say or never knew you knew'.
- 'I never consider a poem done until a friend has seen it and put that extra glare of light on it', said poet, C.K. Williams. 'It's a very strange thing – as soon as you give the poem to someone else, even before they read it, it shifts a little, it becomes slightly something else from what you had thought it was, and you begin to look at it in a slightly different way.'
- 'How can I know what I think till I see what I say?', asks a character of novelist, E.M. Forster. 'Therefore, till my work is finished, I never know exactly what result I shall reach, or if I shall arrive at any', wrote Alex de Tocqueville to John Stuart Mill. 'I do not know what I think until I have tried to write it', adds political scientist Aaron Wildavsky.
- 'You never know what you're filming until later', remarks a narrator in Chris Marker's 1977 film *Le Fond de l'Air est Rouge*. A well-known curator admits, 'But then, often when I sit down to write the catalogue text, I discover that it's actually about something else'. 'You start a painting and it becomes something altogether different. It's strange how little the artist's will matters', avers Picasso (and any number of other artists). In like fashion, 'one important reason for making drawings, I imagine, is not to draw a likeness of what one sees, but to find out what it is you see', offers poet and art critic, James Schuyler.
- Harrison Birtwistle describes his composing music: 'I know what it is before I've even written it, but in other ways I don't know at all. As I unravel it, it never turns out to be what you think it's going to be.' J.M. Coetzee, Nobel

novelist, manages to make it sound commonplace: 'Truth is something that comes in the process of writing, or comes from the process of writing'.[10]

III.2.3 Upshot

If the point of departure in thinking about power is that ability of A to influence B to behave otherwise, then the persons we are after having learned we know more or less than we initially thought have enormous power over who we were before. How can changing your mind and acting differently not be materially to the point?

More pointedly, it is not good enough to say power is primarily about that A (now, an individual or a collectivity) making that B (individual or collectivity) do something instead. Nor is it good enough to say power is about controlling the decision agenda or determining peoples' interests without them knowing it. Power that is concentrated or dominating or everywhere in no way exhausts power's sheer materialities.

III.3 So what?

The trustworthiness of power in the above illustrative counternarrative lies in surprise and, since surprise is that chief feature of complexity, surprise as well as its powers should be thought of as complex from the get-go. So too for the global counternarrative of human agency.

The great threat in thinking about power and agency is to think there is an outside to contingency. This means that the most powerful response to the Anthropocene headline, 'Uncertainty is not our friend', is surely: 'It's more complicated than that'.

'It's more complicated than that' is, however, not good enough in the Anthropocene if treated as a conversation stopper, rather than the start of analysis and management.

The point underscored by this guide is that you work very hard to get good enough. Good enough does not free itself (nor does it pretend to) from difficulty, inexperience, and not-knowing associated with policy and management complexity. Good enough, under Anthropocene conditions, is what happens when you (plural) realise how much depends on advancing to the decision point

[10] Respective quotes in the bullets are from: Warren (1990); Stevenson (2017); Williams in Magee (2016); Forster ([1927] 2005); Tocqueville in Swedberg (2009); Wildavsky (1989); Marker in Kehr (2002); curator Ralph Rugoff in van Noord (2021); Picasso in Clark (2013); Schuyler in Kleinzahler (2017); Birtwistle in Maddocks and Birtwistle (2014); and Coetzee (1992).

of ‘yes but’ and ‘yes and’. How so? Because at that juncture, you are pushing complexity’s advantage further.

Plainly put, stopping short at current notions of progress or growth, be they bad-economic or good-sustainable, is just like stopping at the dominant power narratives of direct, indirect, and dispersed: Both stoppages are premature.

Why? Because managing for good enough can produce results even better than the initial ‘best-case scenario’.

One thinks, as many have (Zaretsky 2012), of Anwar Sadat, Mikhail Gorbachev, and Nelson Mandela. Each was a very imperfect person, comrade, and leader, but each – and the networks that positioned them – helped prevent some fresh hell on earth. They were good enough to take advantage of contingent time and place and in that way took us further than we could have expected, albeit we **of course** want to go further still.

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