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CONTROL, MANAGE OR COPE?

A politics for risks, uncertainties and unknown-unknowns

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Introduction

My discussion of a politics of uncertainty is best begun with a lesson in humility. I had the good fortune to be on an interdisciplinary team of researchers investigating the resilience of large-scale socio-technical systems: namely, the chance that levees and dikes would breach in the California Delta. I was the team's policy analyst, and other team members were from backgrounds in engineering, geographic information systems, crisis management and the social sciences. While this was an important US National Science Foundation project, we had been on big research projects and interdisciplinary teams before.

Now, the lesson learned: it was only after a year of regular meetings that the team leader and I realised we were operating under very different operating definitions of resilience. His was the time to recovery after a levee breach, mine was the ability of the levee to absorb shocks before breaching. This was a sobering experience, given the decades of experience of those involved and the explicit project focus on resilience. It is also a good example of the impact of ambiguity as outlined in the Stirling typology of incertitudes, discussed in the introduction to this book.

So, too, definitions of, and assumptions about, risk and uncertainty cannot be taken for granted in high-stakes settings across multiple disciplines. No matter how often we distinguish between, on the one hand, measurable risks (where estimates of the probability and consequences of failure exist) and, on the other hand, non-measurable uncertainties (where estimates of the probability or consequence of failure are missing, if not unobtainable), there are those who insist that risk and uncertainty are not separable. Arguably the most famous example is ISO 31000 'Risk management – Principles and guidelines', which states up front: 'risk [is defined as] the effect of uncertainty on objectives'. Of course, the International Standard goes into more detail about the probabilities and consequences of failure,

but the point of departure in uncertainty is unmistakable. So, too, for ordinary language and its deliberate ambiguity when it comes to the terms uncertainty, risk, unpredictability, chance and likelihood, among others.

This chapter demonstrates that another set of distinctions is as crucial as that between risk, uncertainty and the unknown-unknowns of unstudied/unstudiable conditions: it is equally necessary for a politics of uncertainty to distinguish between controlling, managing and coping with those risks, uncertainties and unstudied conditions. Here, too, however, ordinary language – and its lexicographers – take 'control', 'manage' and 'cope' as overlapping, if not synonymous on occasion. I should not then be as surprised – as I usually am – that when I say 'manage' to an audience from other disciplines, they think I'm talking about control. Believe me, there is nothing further away from my mind at that point than illusions of control!

I come from a profession – policy analysis – that has long given up organising notions of Weberian hierarchies, and command and control, in favour of – the names speak for themselves – muddling through, garbage-can processes, adhocracy, coping agencies, goal displacement with means-as-ends, bricolage and, my favourite, managing messes (for more on these notions, see Roe 2013). Of course, control can and does exist, but for policy analysts such as myself any starting assumption that complex systems, let alone contemporary politics and major policies, can macro-control each important micro-operation is misleading, where not outright dangerous.

The argument in what follows is that just as it is dangerous to close down democratic deliberations to risk only, so too is it dangerous to close down that deliberation to the pros and cons of control. A politics of uncertainty recognises that a world where risks must always be controlled falls far short of meeting the transformative challenges involved in better managing uncertainties and coping better with unstudied/unstudiable conditions where control is not possible. Indeed, transformation may be all about managing – or coping better – with so-called existential risks that cannot be controlled.

Preliminaries

This chapter's argument is grounded in research findings on real-time personnel operating large socio-technical systems – think: critical infrastructures for water, energy, telecommunications and transportation (for details see Roe and Schulman 2016; 2008). In ways described later in the chapter, personnel must manage real-time operations *precisely because* they do not have control of the entire system as a system at any one time, and at the same time because coping passively with system-wide shocks that are outside of their direct control is also not an option. Instead, they must actively manage risks they cannot control, as well as actively manage key uncertainties so as to avoid unstudied conditions. Moreover, when they find themselves in unstudied conditions, they cope not just reactively but by planning the next step ahead. Worse behaviour for a politics of uncertainty can be imagined!

What do these professionals mean by control, management and coping? In formal terms, control is when the system's input variance, process variance and output variance are rendered low and stable. Think of the nuclear reactor power plant: guns, guards and gates are used to ensure outside inputs are controlled; processes within the nuclear station are highly regulated by government 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 as low variance as possible (nuclear power is often considered the 'baseload' for a system, on top of which are added other types of electricity generation).

The problem now and in the foreseeable future is that the number of critical infrastructures having low input variance/low process variance/low output variance are fewer and fewer because of increasing political, economic and social unpredictabilities affecting their service provision. Indeed, the very same political, economic and social turmoil has undermined older control-centred notions of the Frankfurt School's 'totally administered society', Harold Lasswell's 'garrison state' and Erving Goffman's 'total institutions' – where key social entities were determined by elites (a theme that is also central to academic discussions of totalitarian politics and societies).

It is the case today that an increasing number of electricity generation sources – and very important ones – face high input variability. Deregulation (involving liberalisation and privatisation) of the integrated utilities has brought with it volatile electricity markets and prices; and, in addition, environmental factors like the climate have become more unpredictable. Consequently, operational processes inside other power plants have had to become more varied (this being the so-called law of requisite variety (Weick 1995; Ashby 1952)), with more options and strategies to process and produce what still must be a low-variance output: namely, electricity at a regulated frequency and voltage. Coping in these 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. Earthquakes, catastrophic fires and tsunamis have had just this effect with default of professional behaviour and operations to coping behaviour.

These initial strategies and types of 'unpredictabilities', as infrastructure operators would call them, are summarised in Table 5.1. To be clear, they are based on the observations of and descriptions provided by infrastructure operators in our research.

Why do these infrastructure distinctions matter for a politics of uncertainty?

The infrastructures we study, like water, energy and transportation, are mandated to operate in a highly reliable fashion – that is, to provide the critical service in question safely and continuously even during (or especially during) turbulent times. To do so requires the variety of operational approaches just described. In like fashion

TABLE 5.1 Forms of unpredictability: definitions and outcomes

Type of unpredictability	Definition	Type of operational approach	Outcome
Risk	Probability and consequences of failure are known and estimated	Control	Low and stable output variance through keeping low input variance and low process variance
Uncertainty★	Either probability or consequences of failure are unknown or not estimated	Manage	High input variance matched by high process variance to ensure low and stable output variance
Unknown-unknowns	Neither probability nor consequences of failure are known for estimating	Cope	High and unstable output variance and/ or inadequate process variance to match input variance

★ This definition, consonant with how infrastructure operators see uncertainty, is less expansive than 'uncertainty' in the Stirling framework (Stirling 2010). Note also that the operator term 'unknown-unknowns' does not capture the subjective and intersubjective features conveyed by 'ignorance'.

are politics described as being about – and are expected to be about – underwriting and stabilising respective services, and this too requires varieties of power.

Further, once you realise that operations in critical infrastructures and in politics are undertaken in the face of a host of shared uncertainties and shocks, five inter-knitted features of infrastructures and politics take on prominence:

- **First, infrastructures and politics often have the same operational/administrative areas.** States and cities, for example, have their own transmission grids and water supplies, including respective political and regulatory oversight. In fact, it is difficult to imagine how modern politics could be undertaken without foundational infrastructures for telecommunications, energy and such like in place.
- **Second, both infrastructures and politics centre on high stakes**. Managing uncertainty is a matter of life and death if critical infrastructure services fail; the often-related high stakes of politics are visible and central across governmental and administrative scales relying on the infrastructures.
- **Third, managing uncertainty in real-time for infrastructures is an ever-present challenge, as it is in politics.** If you cannot manage non-measurable uncertainties now when it matters, why would we believe your promises to control or cope with them better later on?
- **Fourth, non-measurable uncertainties, and not just measurable risks, are to be managed in infrastructures and in politics.** Politicians and

reliability professionals (including their staffs) manage real-time uncertainties in ways that do not stand or fall on undertaking formal risk assessment or standard methodologies. Also, it is notable that the 'public interests' of large, critical infrastructures – ensuring system-wide safety and reliability across political settings – necessitate sensitivities to different types of uncertainty, and their respective management.

• **Fifth, the inevitably major role for real-time uncertainty management remains under-appreciated when it comes to the craft of politics, as well as the craft of infrastructure operations.** Some discipline-based or science-based experts and academics tend to dismiss the professionalism, domains of practice and processes for managing large socio-technical systems and politics.

You can think of real-time managers of infrastructures operating in the same way as those in policy-making and politics who have learned that managing a mess in policy and management (stopping a good mess from going bad or preventing a bad one from getting worse) may be far better than trying to clean that mess up once and for all. Why? Because attempts at achieving a 'once and for all solution' can and often do make major policy messes more difficult to manage (Roe 2013). 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 from the terminology of 'control rooms' and 'control operators' to, for example, 'operations centres' and the more accurate job titles of 'dispatchers' and 'schedulers'. In order to avoid any confusion with 'controllers', my research colleague, Paul Schulman, and I have termed such infrastructure operators and their real-time support staff 'reliability professionals'.

More detailed argument

Since 'control' and 'manage' are perceived differently, senior staff in some infrastructures we have researched make a big point about how risk controls (read: compliance) are not the whole of risk management. As one high-level risk manager for a large energy utility put it:

> The approach we've taken is that compliance is the first step in risk management. Compliance requirements that are in place are our first obligation in risk management. It's the minimum that we built the rest of our enterprise risk management on. You can do more than just compliance. So compliance and risk management aren't two separate things, where we do one and then the other. You do both at the same time.
>
> For example, we do risk management with respect to compliance: We determine how comfortable we are with respect to our controls for compliance. What problems are there in our compliance programmes? Where do we stand in respect to industry standards or even better on this? (From transcript of an interview held on 30 March 2015, with the senior manager of a risk enterprise unit of a major northern California utility).

TABLE 5.2 Primary approaches to operating for three types of unpredictabilities

		Objective of operational approach		
		Risks	*Uncertainties*	*Unknown-unknowns*
Primary operational approach	*Control*	▒		
	Manage	▓	▓	
	Cope			▓

This difference between control and management of risks is graphically displayed in Table 5.2:

Since no existing compliance measure or preset risk control can be expected to be 100 per cent effective, the cell 'Control/Risks' in Table 5.2 is lightly shaded and must be complemented by 'Manage/Risks', the darker shaded cell, for risks that cannot be controlled in real-time or must not be assumed to be controllable right now, when it matters. For example, it is because tomorrow's heat wave is uncontrollable that electric and natural gas grids have to manage the added load requirements for, and associated risks relating to, assets and personnel.

Such management strategies for measurable risks, we found in our research, include having a range of subject matter experts and outside certification programmes and reviews for process safety management and risk management protocols – again, as a way of increasing process options and strategies to match an increasing input variance. The crux, though, is that even in managing risks, the reliability professionals do not rely solely on a single distribution of numbers. Numerical averages and ranges wobble, and this has to be compensated for by experienced and skilled reliability professionals.

It is not only risks that have to be managed because it is dangerous to assume they can be controlled: key non-measurable uncertainties must also be managed. Infrastructure operators typically distinguish uncertainties in terms of missing estimates for the probability or consequence of failure. Since the estimate of risk is defined as the product of the estimates of the probability and consequence of failure, uncertainties are cases where operators have (rough) estimates of probabilities and consequences of failure, but not for both at the same time. The same follows when the logic of risk is cast in terms of threats, exposures and vulnerabilities. Real-time infrastructure operators may have better knowledge of the probability of failure than they do of the consequences of failure; alternatively, they may have better knowledge of consequences than of probability.

Over and over again in our research, and to complicate our initial definition of 'uncertainty' (Table 5.1), real-time operators told us they were able to manage uncertainties about which they may know something more about their consequences than they do about their likelihoods, or *vice versa*. Where utilities know more about probabilities of failure than the expected consequences of failure, we found one management strategy to be planning for or preparing around worst-case scenarios

and extra safeguards. Where more is known about the consequences of failure than the likelihood of failure, one management strategy (also for increasing process variance) is the expanded use of simulation studies and of investments in uncertainty reduction with respect to the probability of failure. For example, 'deep dives' into specific cases are undertaken by experienced personnel – and not just subject matter specialists. The cell 'Manage/Uncertainties' has a darker shade in Table 5.2, to reflect this primary approach.

In case it needs saying, for a world where events are sometimes uncontrollable, and in other cases unmanageable (i.e., process options and strategies cannot be increased to reflect increased input variance), there are instances where neither the probability nor consequences of failure are known or studiable under the demands of real-time urgency. (Or, if you prefer, those concerned are at a loss to determine just what are the threats, exposures and vulnerabilities.) Here is where coping behaviour of infrastructure operators in the face of the unknown-unknown is notable – but it is coping with a difference.

When real-time infrastructure operations suffer a shock that pushes those operations into unstudied conditions, the professionals are not only expected to be resilient as regards absorbing the shock, they are at the same time expected to be planning the next step or operation ahead. They do not want to bounce back to the same position that left them vulnerable: they want to bounce forward to better real-time operating conditions. This coping is *coping-ahead* in the face of real-time unknown-unknowns (darker shade in Table 5.2), since it involves planning above-and-beyond reactions in real-time. One such coping-ahead strategy that is directed to planning the next steps for real-time operations is the routine use of variously named 'white hat' teams that are internal to the infrastructure. These teams seek to find ways to undermine real-time system operations so as to anticipate more effectively – predict *and* prepare for – defects that are exploitable by system attack, intentional or otherwise. Planning ahead for addressing defects becomes a template – imperfect as it must be for what are unknown-unknowns – when responding later on to what are encountered in real-time as functionally similar defects.

An emancipatory politics of uncertainty?

This chapter now shifts its register from the descriptive to the normative. The operational strategies and unpredictabilities that society's critical infrastructures seek to handle better are also necessary for the successful enactment of policy. To do otherwise, I suggest, is to open politics to more catastrophe.

Return to Table 5.2 and its highlighted cells. I ask you to see the highlighted cells as principal stepping-stones along a pathway for addressing unpredictabilities in complex, high-stakes systems and processes. (Note the accent on 'principal' leaves aside any complications arising when the empty cells in Table 5.2 are not empty.) I submit that to take a politics of uncertainty seriously centres on demonstrating – constantly – behaviour that recognises the need to better cope-ahead with unknown-unknowns, that recognises the need to manage some uncertainties

and risks better than they are now being managed and that recognises control of all this is not possible, where attempts to exert such control create grave political hazards instead.

This politics of uncertainty is, as such, a full-time job for those who treat the politics seriously. How then is it emancipatory? William Kentridge, painter and artist, provides an insight. To the interview question, 'You've been called the patron saint of ambiguity. How do you feel about that?', he responded:

> How do I feel? Ambiguous: I like it and I don't like it. I wish some things could be much clearer that one holds onto without any doubts. *I'm wary of certainty, but I'm very weary of uncertainty, also* (quoted in Buck 2016 [my italics]).

I adapt his insight – wariness of certainties (namely, the pretence to certainty that full control of major politics and policies is achievable) and weariness of having continually to manage and cope-ahead – as the starting point for a politics of uncertainty. This starting point forces us then to ask: why put up with wariness and weariness? What keeps 'us' going? What do we get from these multiple unpredictabilities and having to address them in multiple ways?

For me, the wariness and weariness are associated with emancipation: emancipation from thinking there is no alternative, and emancipation from thinking complex policy problems are wicked and as such intractable. The world cannot be controlled to be only one way; it is far too complex for that, with many components, each component having multiple functions (I am a husband, father, blogger…), and the many interconnections between and among components, functions and the wider environments in which these are embedded enable all manner of interpretations, explanations and descriptions. No single reading can cover, let alone exhaust, that complexity.

The upshot of this inexhaustibility is that complex problems can be cast in multiple ways; or to come at it from another direction, any complex problem that has no description other than 'there's no alternative', 'it's intractable' or 'it's a wicked problem' is an exaggeration that has closed down discussion and analysis long before any insights into alternative possibilities have been obtained. More, those alternative descriptions lie in knowing better than striving for complete control and instead undertaking managing and coping-ahead. Knowing that this is so and acting on the knowledge is, for me, the hard work of emancipating new possibilities. Some would call this recasting of emancipatory possibilities transformative.

Note how different this politics of uncertainty is from the politics of the techno-managerial elites deploying concepts like 'uncertainty' for instrumental advantage, or the politics of international corporations who see uncertainty as blind-eye volatility for capitalist growth, or a conservative politics permanently sceptical of anything like implementing remedies. In the next section, I explore an example of how recasting and transformation can work.

Recasting global climate change locally

Let us assume the situation is one of 'too little/too late' with respect to ameliorating global climate change in global ways. I do this not because I insist it to be true; rather, let us assume this is the worst-case scenario and see if we can, nevertheless, recast it in ways that make it more tractable to positive intervention. If we can recast a worst case by appealing to the distinctions in the pathway of control, management and coping-ahead just discussed, then other scenarios are opened to recasting as well in the face of the very real global climate change now underway.

There are many ways in which the Table 5.2 pathway can be used to recast the too-little/too-late worst-case scenario without denying any of its urgency or validity. Time and space allow for just one illustration. Let us take as our point of departure a recent 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.

Let us go now 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.

If the reader's curiosity is piqued, they will turn to Supplementary Note 2, where the following passage is found. (Because this passage is long, the temptation will be to skim it. However, the following recasting depends on the reader giving 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 neighboring 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. [For ease of reading, text footnotes to each finding have been deleted.]

A close reading of all the passages quoted uncovers a narrative discrepancy in Mora *et al.* – and we know from policy analysis that such textual discrepancies can be the window through which we can re-see a problem differently (Roe 1994). 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 positive and neutral impacts' that 'cannot counter-balance *any* of the many detrimental impacts that were uncovered in our literature search' (my italics)?

So put, 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 in Table 5.2. Many of the listed examples begin to look like opportunities for coping-ahead and managing at the local level at which the responses were observed.

I do not know if the latter is true and 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. What better demonstration of a politics of uncertainty?

Note, finally, that the urgency and validity of the worst-case scenario remain, with local particularity persisting in new forms catalysed by global climate change. Am I implying then that global climate change turns out to be a 'good thing'? No. Am I saying that the Mora *et al.* article is representative of climate change meta-analyses? 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. Recasting is possible because of, not in spite of, the complexity. Further, a large array of local cases could form a distribution across which practices may be emerging for local transformations and emancipations (the plural is deliberate).

Conclusion

If the above is roughly on-point, the worst enemy of a politics of uncertainty is that assumption – shared by the right and the left – that 'management is control and control is power'.

Management is not control, and control is not the only power. Indeed, the power of power lies in acting on the fact that illusions of control have to be replaced by better notions of managing and coping-ahead in a world of multiple shocks, surprises and contingencies. Reverting to formal terms one last time, the desider-atum of a politics of uncertainty is more about increasing process variance in terms of options and strategies than it is about 'controlling for' input and output variance. (In this way, think of sustainable development as increasing human opportunities to respond to unpredictable change without killing ourselves and others in the process.)

Nor do we do have to invent a politics of uncertainty. In a planet of seven billion-plus people, with over 190 nations, it must be assumed practices already exist that evince such sensitivities to different types of unpredictabilities or incertitudes, along with different strategies with which to address them more effectively. What can the rest of us learn from these practices and across other scales than global?

Some readers may find the preceding to fall well short of social transformation and human emancipation. That may be true as far as it goes, but it does not go far enough. Only when we differentiate terms like transformation and emanci-pation across scales of analysis and action is the matter necessarily pushed further. And those wider truths? Just as an emancipatory politics of uncertainty recognises that uncertainty and unknown-unknowns cannot be closed down to measurable risk, so too do those politics require better differentiation among controlling, man-aging and coping with those risks, uncertainties and the unknown-unknown of unstudied – in real-time, often unstudiable – conditions.

Acknowledgements

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