

From Sustainability through Diversity to Transformation:

towards more reflexive governance of innovation

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Extended Summary

Though the two are often linked, it is unclear precisely how Sustainability relates to reflexivity in the governance of innovation. There is a frequent argument that progress towards Sustainability requires 'reflexive governance'. In this sense, reflexive governance involves two kinds of socially-distributed quality. First, reflexivity requires recognition of the possibility of a diversity of contending, but equally-valid, epistemic and normative perspectives. Second, reflexive governance highlights a need for humility, self-awareness and critical reasoning about the particular ways in which different social (including scientific and technical) perspectives are affected by their context – and especially power.

At the outset, this characterisation of reflexive governance requires some clarificatory sentences. Contrary to the frequent anxious caricature, recognition of the quality of reflexivity in these terms, does not imply that 'anything goes' – scientifically or morally. Reflexivity is entirely consistent with acknowledgement of (and efforts to avoid) technical or ethical 'error' (however conceived). But just because many extant positions are held manifestly (normatively or epistemically) to be plain wrong, does not mean that a variety of other positions cannot be equally right. Likewise, the explicit reference to power, requires anticipation of another frequently negative reaction. The word 'power', though simple, is not in itself simplistic. It refers to the consistent effects exercised by a diversity of complex, distributed, multidimensional social processes. Taken together, these amount to what is arguably the single most important 'social fact' – that agency is not symmetrically distributed. And simply to acknowledge the systematic effects of power also does not of itself imply that this is necessarily thought to be a bad thing. Under any political position, there are contexts in which the exercise of power is not only acceptable, but essential. This is especially so, as positions become more radically ambitious (thus presenting more demanding aims for exercise of agency through various forms of power). Yet there persists a normal etiquette under which even mere mention of 'power' is often taken as a sign of nihilistic criticism. But the point here is entirely positive: that reflexive governance requires us simply to think and speak about power.

Either way, whatever position is taken, it is clear in these terms how reflexive governance might (in principle) aid appreciation of – and progress towards – Sustainability. All the elements in the above definition seem manifestly salient to the realpolitik of Sustainability. But the situation is more moot, when it comes to the reverse contributions made towards more reflexive forms of governance by present policy activities around Sustainability. Here, reflexivity appears to be seriously impeded by a variety of features of contemporary global governance structures and practices. In short, these tend to treat 'Sustainability' in terms that fall far short of the canonical Brundtland triad of values: social equity, human wellbeing and ecological integrity. Indeed, it is all too often the case that 'Sustainable' development collapses under the influence of powerful vested interests, merely to the sustaining of conventional economic development. Under such conditions, 'Sustainability' discourse is seriously diminished in its potential to catalyse or support reflexivity. Even where these wider Brundtland qualities are better addressed (as in some current global 'development goals', 'emissions targets' and protection regimes), typically indefensibly slow rates of progress contrast starkly with the often strongly-asserted self-congratulatory claims. This conjunction of complacency and failure is, for sure, seriously inconsistent with reflexive governance.

More than this, however, tensions between Sustainability and reflexivity are aggravated by the persistence and pervasiveness of superficial and self-serving rhetorics of legitimation. For instance, we find routine references to 'sustainable science', 'sustainable innovation' or 'sustainable business', which leave the particular values, institutions or infrastructures thereby 'sustained' (at best) deliberately obscure. At worst, the typically-incumbent interests which hope thereby to help sustain themselves, are manifestly undermining of the Brundtland values. This is arguably the case, for instance, of claims to 'Sustainable' nuclear power – which (for instance, when compared with renewable alternatives), presents manifestly more intractable security, environmental and intergenerational equity issues. Likewise IP-intensive transgenics (for instance, when compared with other advanced – but more 'open source' – biotechnology-based and participatory

forms of plant breeding), arguably compound corporate and agronomic concentration, increase mismatches with diverse ecological settings and foster inequity in global supply chains. Taking these aspects together, it seems the main contributions made by current 'Sustainability governance' towards its own ostensible ends, may lie in the 'civilising effect of hypocrisy'. But this is an exact opposite of the explicit, deliberate, self-aware critical social reasoning implied by reflexivity.

More subtle, but no less potent, than these relatively overt dynamics, there exist a further set of ways in which existing Sustainability discourses impair more reflexive forms of governance. Prominent among these is the widespread tendency to treat 'Sustainability' in an instrumental fashion – as a single self-evident objective with determinate implications. This ignores important insights from the field of STS concerning the methodological, institutional and discursive mechanisms through which the multivalent knowledges meanings and potentialities around Sustainability get 'closed down' in mainstream governance. For instance, 'risk-based' regulatory practices systematically occlude appreciations of ambiguity, uncertainty and ignorance about the diverse implications and strategies associated with Sustainability. This strategic circumscribing of attention and action is at the heart of Beck's 'organised irresponsibility' in the 'risk society'. It unfolds in various ways, for example in discourses, institutions and practices around: shareholder value, fiduciary responsibility, new public management, mission-oriented agencies, evidence based policy, limited liability regimes, contract law, insurance markets, consensus-oriented participation and optimising models. In all these ways, deeply irreconcilable indeterminacies concerning alternative trajectories or implications of Sustainability are artificially reduced and aggregated into the more tractable terms of 'risk'. The 'evidence based' results are usually precise and apparently authoritative, but they present inaccurate reflections of the underlying diversity. This is how prevailing regulatory practice in innovation governance routinely undermines reflexivity over the inherent incompleteness and multivalence in knowledges of Sustainability.

Further examples of how mainstream governance unreflexively 'closes down' the implications of Sustainability, can be found by shifting attention from knowledge to action. Here there exists a series of further forms of closure, driven by various fallacies and fictions around 'control'. These exaggerate the feasibility and tractability of discrete deliberate forms of action in complex, multidimensional, dynamic and nonlinear causal networks linking technologies, societies and their environments. Just as innovation governance is routinely confined merely to regulating 'risk' in incumbent trajectories, so there emerges a pervasive emphasis on actions aimed at the 'stability' of these same trajectories. This assumes a capacity deliberately to control the unfolding of innovation pathways, the form of their direct consequences and the scope of their indirect implications. So, in areas like transgenics, synthetic biology, nano- and neuro-science and autonomous systems, we see repeated assertions of capabilities to maintain stability by controlling potentially undesirable – for instance, unsustainable – impacts. The persistence of such aims and aspirations in the face of repeated historic experience of failure, constitutes a further important deficit of reflexivity in current innovation governance.

There also arises a further erosion of reflexivity in this stability-oriented approach. This is because the emphasis on control as a style of action can lead to a neglect of alternative governance interventions that are based on recognition of intractabilities to control. Strategies like adaptation, agility and diversity, for instance, are predicated on acknowledgement of the limits to controlling action and the need instead to focus on more humble, but nonetheless effective forms of response. Likewise, stability-oriented strategies tend to treat disturbances (social, technological or environmental) as episodic 'shocks', rather than as more transformative secular 'stresses'. This closure of appreciation of possible disturbances (from stress to shock), effectively privileges conservative actions – aimed at returning to the *status quo ante*. This mainstream notion of Sustainability-as-stability thereby systematically occludes other dynamic properties (like durability, resilience and robustness), as well as their associated often-contrasting forms of governance intervention. Crucially, the point is about dynamics, applying to any particular Sustainability values. Thus does mainstream Sustainability governance further undermine reflexivity over action as well as knowledge.

In the rather particular circumstances where Sustainability concerns **are** recognised to compel a change in technological trajectories, there still emerges a further form of obstacle to reflexivity. This is arguably even more insidious, for its deeper degree of subtlety. It can be seen, for instance, in the overwhelming tendency to discuss Sustainability imperatives in innovation governance in relatively instrumental terms, as an ostensibly single 'technological transition'. This prevailing academic and policy discourse compounds all the challenges to reflexivity noted above. It tends to marginalise the multitude of ambiguous and often conflicting interpretations of Sustainability. It tends to exaggerate the quality of societal knowledges concerning the viability and implications of favoured technologies. It tends to emphasise the capacity managerially to recognise what count as favourable innovations and exercise control over their contexts, such as to maintain the stability of their trajectories. Tending also simply to presume particular ends (typically those favoured by the most influential interests), the scope of political deliberation is effectively confined merely to means. Learning takes a primarily instrumental form, rather than in more reflex terms about normativity.

Thus in various kinds of 'transition management' approach, attention tends to focus firmly on some particular privileged vision of Sustainability – as a singular end-point of a controlled transition. More open-ended forms of transformation (under which ends are acknowledged to be less clear) are correspondingly downplayed. More distributed styles of governance are thus systematically obscured. In particular, the fertile (but radically diverse) potentialities of social technology, civil society innovation and critical social movements remain unduly neglected in prevailing governance debates. This is despite the manifestly formative roles played by social actors outside the conventional core of governance in government and the private sector. The successful establishing of various currently widely-celebrated forms of 'green innovation' – like wind power or CFC-free refrigeration attest to this. Indeed, it is in the most ostensibly peripheral areas of global innovation governance systems taken as a whole, that we may find the consistent historical impetus for contemporary Sustainability agendas themselves. After all, much of what is currently loudly (if sometimes unconvincingly) claimed as commitments by mainstream governance actors, initially arose in grassroots 'counterculture' networks that were originally actively ridiculed, side-lined and resisted by mainstream governance actors. Examples include agricultural pesticides, industrial solvents, fuel additives, acid rain, ozone depletion, carbon emissions, low-input construction, waste recycling, organic farming and possibilities of nuclear accidents. The failure more generally and explicitly to recognise this crucial factor in the dynamics of social and technological transformation, is a telling sign of a lack of reflexivity in the governance of Sustainability.

This neglect of the formative roles played by critical (therefore marginal) societal voices in the governance of technology, illuminates one final aspect in the erosion of reflexivity by current governance for Sustainability. This lies in the repeated emphasis on the positive nurturing of some particular favoured innovative technology or practice, rather than on the complementary necessity for governance measures deliberately to disrupt (whether by efforts at control or response), the incumbent regimes which these emerging innovations seek to replace. Again, we see a profound asymmetry inculcated by the unreflexive etiquettes around power referred to at the beginning of this paper. Instead, the 'sustaining' or 'resilience' of incumbent infrastructures is routinely taken as a proxy for the Sustainability of their associated functions (ie: centralised electricity grids for energy services; roads and cars for mobility). In fact, the 'Sustaining' of progress in meeting the human needs of Brundtland's social equity, human wellbeing and ecological integrity often requires not the sustaining of associated institutions, practices and infrastructures – but governance interventions aimed at their deliberate **disruption**. The failure fully to recognise this imperative in governance of Sustainable innovation, represents a further important lack of reflexivity.

Despite all these points, this paper will end by arguing that there does exist one potentially deep and important link between current forms of governance for Sustainability – and the possibility of more reflexive governance of innovation. This becomes evident, when attention turns away from the many pathologies of contemporary governance dynamics around Sustainability, and turns instead to currently-dominant alternative forms of discourse in innovation governance more widely. Here, the default understanding of progress in science, technology (and, by implication, society itself) remains merely that of a one-track race. This is the model continually asserted in loudly-proclaimed anxieties of global elites in diverse international settings – around 'going forward', 'forging ahead', 'falling behind' and 'catching up'. The crucial question in every case is: 'which direction?!' Yet such queries are typically virtually absent – for instance in mainstream European 'Knowledge Society' and 'Innovation Union' discourses. Here, what counts as the appropriate 'way forward' remains conspicuously undeclared. Even 'Sustainability' remains under-emphasised in these core innovation policy debates. And where it is mentioned, it is typically subject to the acute forms of unreflexivity noted above. Similar dynamics are evident in high-level policy elsewhere around the World, where figures as diverse as President Barack Obama, Premier Wen Jiabao and President Mahmoud Ahmadinejad all identify 'progress' simply with the advance in science and technology – without specifying which kinds or directions.

This dominant high-level technology policy rhetoric reflects more routine international practice. Worldwide, and at every level in research, innovation and regulation, we hear repeated invoking of undifferentiated 'pro-innovation' strategies (without saying which innovations), lamentation at generic 'anti-technology' sentiments on the part of the public (after criticism of very particular technologies) and strident claims on behalf of 'sound science' as a means to settling inherently political controversies. Such language subverts reasoned or democratic deliberation over the limits and normative orientations of the knowledges or innovations in question. Ironically, it thereby also undermines the general credibility of science and technology. The net effect is expediently to suppress reflexivity over alternative directions for advance. Rather than inviting rigorous and inclusive debate over values such as social equity, human wellbeing and ecological integrity, notions of 'progress' are reduced simply to whatever emerges under incumbent patterns of power and privilege in established markets, research and innovation systems. As a result, debates over science and technology circle around deferential quibbles over 'how far?', 'how fast?' and 'how efficient?' More profound questions like 'which way?', 'who says?' and 'why?' remain not just unanswered, but unasked. Against this background, even existing Sustainability debates look reflexive! At least they contain the **idea** of normativity.

It is in this context, then, that we can appreciate the possible value of longstanding high-level Sustainability governance discourse – as a catalyst for more generally reflexive governance of innovation. This potential arises not in any asserted definitive or singular normative status for ‘Sustainability’. Instead, it lies in the very conjunction noted above – of the unapologetic retaining of aspirations to explicit normativity, alongside acknowledgement of the manifest and irreducible uncertainties, ambiguities and context-dependencies. In short, Sustainability adds an ambitious further dimension to social agency: not only to progress in some indefinite, expedient, emergent sense, but to be deliberate about the *direction* of advance. Here, the turbulent dynamics of power that are so evident in the more cynical legitimacy discourses around Sustainability, can – when recognised – serve as a spur to distributed social reflexivity. It is arguably only by actually witnessing the instrumental dynamics of power described here, that society as a whole can achieve a more robustly substantive collective understanding of the nature of – and necessity for – greater reflexivity. Reflexive governance in this sense, then, is not a prior design principle, nor a transcendent human virtue, nor explicit codified procedure, nor discrete identifiable practice, nor carefully-nurtured institutional sensibility, nor even a cognitive faculty in particularly enlightened disciplines. It is instead a more worldly, inchoate and distributed emergent social quality – a form of self-awareness continually provoked by its own opposite. Reflexive governance, then, lies in the unruly conjunction and iteration of social commitment and response.

It is in this sense, therefore, that the intimate, dynamic and highly diverse juxtapositions of unreflective commitments and distributed societal responses may best engender reflexive governance. Without the commitments (like those associated normatively with Sustainability or materially with incumbent trajectories), there would be no catalyst. Without the distributed critical faculties prompted by awareness of the self-contending nature of reflexivity, there would be no possibility of genuinely reflexive responses. Individual reactions may be no more reflexive than the provocations – in the full aspirational sense of the term. But the aggregate effect of interacting individually-unreflective stimuli and responses may – where there is a capacity for collective societal recognition – confer this otherwise elusive quality. It is only in such messy and imperfect – but compelling – ways, then, that a society comprised of intrinsically and unavoidably unreflective individual actors, can achieve the requisite degrees and qualities of collective reflexivity in negotiating the possible directions for human progress. Yet – as emphasised at the beginning of this paper – this is not a counsel that ‘anything goes’. In order for such distributed reflexivity to unfold, the focal innovation commitments must themselves be responsive to the responses they provoke. It is in this way that intractable irreversibilities, acute over-dependencies and concentrated monopolies (whether institutional, technological or environmental), are thus revealed as the most profound and general enemies of reflexive governance.

The paper will conclude by looking at a range of under-appreciated implications and properties of different kinds of plurality – as means to help foster this distributed understanding of reflexive governance. This involves ‘broadening out’ the social appraisal of science and technology, such as to include a wider variety of contending perspectives, knowledges and deliberated pathways for change. It also means ‘opening up’ more democratic and accountable politics of knowledge and innovation more generally. This is distinct from ‘broadening out’ because it refers to the way in which social appraisal (expert or participatory) interacts with wider decision-making and policy debates. And reflexive governance also requires more deliberate attention and efforts at diversity in portfolios of ‘Sustainable’ innovation trajectories. As with reflexivity in general, the point here is not that ‘anything goes’, but that attention should focus not just on the merits of individual trajectories, but on the ways in which pursuit of a carefully-balanced variety of disparate pathways to Sustainability can simultaneously, hedge against irreducible ignorance, counter intractability, accommodate irreconcilable values and interests, address complex context-sensitivities and foster further fruitful innovation.

Beyond this, reflexive governance for Sustainable innovation also involves actions aimed at fostering more multivalent dynamics in the socio-technical pathways themselves. Alongside simply ‘sustaining’ incumbent trajectories, then, this requires more symmetrical mainstream attention to conditions and imperatives for (response-style) disruption and transformation, as well as (control-style) stability and transition. One practical implication of this analysis, is that recognitions of these different dynamic properties, will each bring to the fore contrasting practical governance strategies. Specific to the particular dynamic properties distinguished here, some of these governance strategies will be briefly summarised. But another practical implication, is that a few governance strategies remain effective, *irrespective* of the intended dynamics. Foremost among these are the various forms of diversity and plurality explored here. These are equally amenable to the maintaining of existing trajectories or to adaptation to learning concerning the necessity for new trajectories or normativities. Rather than resting on some transcendent quality of reflexivity in individual social actors, institutions or practices, then, reflexive governance for more truly Sustainable innovation involves the distributed interplay of various kinds of social, cultural, institutional, technological and temporal diversity. This is the main way – as suggested in this paper’s title – we may achieve more reflexive forms of governance. This is how we may hope to move our societies away from narrow legitimacy Sustainability debates. This is how we may come more fully to appreciate different kinds of diversity. And this is how we may more confidently hope to realise the genuinely transformative futures that Sustainability imperatives compel.