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Mobilizing the Emergence of Phronetic TechoScienceSocieties: Low-Carbon E-Mobility in China

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1   Introduction – 'What do I do next?'

A surge of new terms denotes the emerging birth pangs of a new era. TechnoScienceSociety (TSS), Anthropocene (Pálsson et al. 2012), metamorphosis (Beck 2016), etc… All hope to capture a significant global discontinuity of unprecedentedly far-reaching *ontological* human-constructed novelty and thus of equally unprecedented responsibility; responsibility for all this innovation and even for "reality itself".

'TechnoScienceSociety' aims to capture something specific about this and regarding the importance of STS and the new directions STS must take in responding to this imperative. As I understand it, TSS connotes the condition of intra-active and mutually implicated crises, specifically of each of 'technology', 'science' and (the familiar and conventional mechanisms of public, socio-political and administrative governance that are) 'society' considered *individually* vis-à-vis a world in which they are being brought into multiple and deepening but novel, inseparable and as-yet ungovernable *conjunction* (= 'TSS') while *also* generating novel insoluble problems in the process. Moreover, these crises for each of 'society', 'technology' and 'science' concern both their productivity on their own terms (e.g. for science, of new knowledge) *and* their capacity for problem-solving of contemporary real world issues, which as intrinsic and extrinsic conditions together construct their public legitimacy.[1] This suggests the global turbulence may be understood as a game of 'catch-up' regarding forms of government (in the Foucauldian sense of the conduct of conduct) and politics up to the task of governing and fostering this new world, i.e. of government *by* techno-science-society *of* techno-science-society itself. This is thus a challenge of emergence, and one that places 'science' and 'technology' – or better research & innovation, or better

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[1] See respectively, chapters by [].

still their conjunction as techno-science-society – at the heart of contemporary issues of government and politics.

But this is not just a matter of redecorating the edifice of our old politics with the new furniture of contemporary ideas and issues. Too much has changed and is changing for that approach to work – and, indeed, not to exacerbate present system failures. For TSS is a new *ontological* predicament and one that is profoundly challenging at present in both the speed and *slowness* of its emergence. In short, there is no shortage of evidence today that TSS is emerging primarily in deeply troubling forms.

"What can be done?" thus becomes the primary issue for TSS, as new practical and political challenge of how to respond, and respond prospectively and constructively, in the face of such irreducible complexity and uncertainty. For without prospect of rational mastery what emerges clearly is the irreducibly practical nature of the imperative, still firmly in place, of knowledgeably guiding such complex systems, a knowing that is only now possible situated *within* such systems and through the active process of interaction with them. In this pragmatised, situated, processual and limited perspective of knowledge, then, we are no longer discussing adequate means for the definitive achievement of clear ends, abandoning also the subject-object dualism underpinning this dichotomy. Rather we have practices of learning that build up deepening capacities of skilful, complexity-attentive judgement, which in turn underpins those practices. 'Transition' and subsequent 'maintenance', e.g. of the government of TSS, are thus seen to be simply different temporal gazes on the same process at different stages of its fruition.

TSS thus spells the wholesale reorganization of the constellation of related concepts that together make up the very common-sense meaning of 'politics' and 'government', not least of which today are knowledge, science, technology and society, all of which are currently founded on essentially literal, dualistic not pragmatic, processual grounds. We will argue here that grappling with TSS and a *politics* of TSS demands a shift broadly from a universalist (if possibly critical) epistemo-politics of critique or criticism to an onto-politics of situated practical wisdom (*phronesis*). Important pointers in this direction come from existing work in actor network theory (ANT)-inspired STS. But while useful starting points, this work is also insufficient in some key regards, to the point that we must now move beyond it. In particular, the need for a shift to a situated, processual and practically engaged

perspective applies no less to discussions such as this in STS. We here trace out some of the argument for, and consequences of, that move.

The argument proceeds as follows. First we will consider the after-ANT argument of ontological politics and how this demands a break with the familiar epistemological and 'one world' politics still dominating contemporary discourse, mainstream and critical. Then we consider some of the key problems with this conception of ontological politics vis-à-vis the predicament of an emerging TSS. This includes a brief discussion of an alternative perspective, of complex power/knowledge systems (CP/KS) within a phronetic onto-politics. Finally, we illustrate the arguments by analysing, using this CP/KS and onto-political perspective, a key case study of contemporary TSS: the ongoing attempts of innovation towards a transition in urban mobility system in China.

2   *Ontological Politics and TechnoScienceSociety*

The predicament of TSS, and its skilful government, is greatly illuminated by ANT and the post-ANT discussion of ontological politics. ANT provides thick empirical description of heterogeneous assemblages of humans and non-humans, thereby showing how *knowledge* too is an enacted achievement of such processes of effortful construction, not the rational uncovering of *a priori* truths. This is thus a non-teleological and empirically-grounded account of an ontology of multiple concrete actor-networks for which some apparent closure, for instance into what we call 'facts', 'structures' or 'identities', can only be achieved in actual practice, and so that are necessarily unknowable abstractly and in advance. Such picture clearly resonates strongly with precisely the political predicament of TSS regarding both the abstract challenge of complexity and unknowability and the more concrete one of firmly grasping the extraordinary ontological productivity of the endeavour ANT fuses into techno-science.

But it also follows from this account that there are not just different *perspectives* on a common, singular reality, as is generally supposed, but rather *multiple realities*. This shift not only undermines the clear distinction between knowledge and reality. It also necessarily has profound implications for politics, including the politics of STS, given the presupposed importance of the category of knowledge in contemporary default understandings of both 'politics' and the 'agency' involved in it.

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STS started as a form of science and technology criticism (if not critique), following Kuhn's historicizing of the process of scientific knowledge construction together with contemporaneous political and normative concerns about specific scientific developments. This was based on a philosophical triad: ontological realism, epistemic relativism and a conception of critical social science as guidance and illumination to political praxis, holding actual S&T to explanatory and normative account vis-à-vis the (single) reality. Let us call this epistemo-politics: a now *post*-Enlightenment, *post*-positivist politics built on and against the still-dominant common-sense presumptions of reason, reality and progressive social Enlightenment of which science itself is usually such an important standard-bearer.

As the empirical fecundity of less realist approaches became apparent through strong social constructivist and then ANT research, however, this edifice became increasingly shaky. But the major blows to epistemo-politics come from ('after'-)ANT at the turn of the century onwards; through attention to the growing socio-political centrality and complexity of *political* (and not just scientific) controversies centrally involving S&T issues, and the growing evidence of the inadequacy of the 'many views on one world' approach. Symptomatically, these are inadequacies of explanation only *secondarily*, and primarily inadequacies in politics and practical understanding: e.g. how environmental controversies prove so resilient to 'the facts', this then raising questions regarding '*which* facts?' or rather '*whose* facts?' and thence 'whose *objects* and cosmologies/ontologies?'.

This led to formulation of a picture of never-ending jostling amongst multiple lived realities and ontologies of what *is* in the world (Latour 2004), including both human and *non*-human agencies (the latter including both 'nature' and 'technology') and with the latter often vastly outnumbering and/or outweighing the former in any given actor-network; a move that further heightens the relevance of ANT to discussions of TSS given the characteristic proliferation in the latter condition of precisely such human-techno-natural assemblages. This conception is thus clearly set against the more orthodox presumption of political contestation being amongst rationally cognizing (human) agents by argument, supposedly moving to rational consensus. These theoretical developments were then propelled by political objection and experience regarding the residual politically-troubling epistemic superiority implicit in the 'many views, one world' approach of epistemo-politics. The result thus is 'ontological politics'.

The classic statement of 'ontological politics' is Mol (1999). Tracing ANT's shift in emphasis from analysis of the relation between knowledge/science and reality to that between reality and politics, Mol uses the example of anaemia to show how ANT reveals multiple realities not just multiple perspectives. Anaemia, here, is not a singular reality manifest in three settings ('pathophysiological', 'statistical' and 'clinical') that may sometimes disagree with each other; but actually three different, if overlapping, phenomena that are then constructed, more or less successfully, – and then commonly treated or mistakenly 'known' as – singular. For (after-)ANT, therefore, anaemia is *nothing but* the contingent assemblage of diverse phenomena, human and non-human, technoscientific and somatic, that in any given particular case achieves a diagnosis and subsequent treatment as 'anaemia'; and there are *three* of these realities that go under the same name.

This account thus presents the essential qualitative ontological sameness of 'technology', 'science' and 'society', rather than their *a priori* difference, and hence affords accounts of their mutual and novel implication, conjunction and interaction that speak directly to the challenge of (understanding) TSS. Moreover, regarding a new politics of TSS, then, the most obvious questions that arise concern both the multiplicity and contingency of realities constructed with technoscientific activity. On the one hand, *other* realities could (have) be(en) constructed as dominant instead of those that currently prevail. Different understandings of the world and different socio-political positionings would then be privileged (as 'natural', 'real' and 'rational'). On the other, the realities that have actually been constructed thereby contingently enable and disable some of the humans and non-humans all inter-dependently involved in the construction of that world. While this may not matter particularly regarding anaemia, in the case of infrastructure mega-projects the symmetrical attention to humans and non-humans reveals how rivers and streams, for instance, or the planetary ecology as a whole are recruited and disciplined in such processes, and likely with little attention to their own integrity as agents (Rowland & Passoth 2014). This is thus to highlight crucial political issues for TSS that are otherwise occluded.

But things are then immediately complicated further by ANT. In that any given heterogeneous, enacted assemblage is not the result of any identifiable agential choice. Indeed, even the subjects and their knowledge(s) are as much *results* of this construction. Against a founding premise of epistemo-politics – the pre-eminence of rational agency –, therefore, a world of multiple, possibly novel and/or proliferating technoscience-mediated

realities calls for a concept of politics that is substantially alien to incumbent common-sense: not just in terms of being concerned with (as object) the very substance of particular realities, rather than contending perspectives on and explanations of it; but also in terms of it not being primarily conducted through and regarding such cognitive positions (as subject and means). And yet it is recognisably and undeniably politics nonetheless given the ways in which different assemblages privilege and penalize both differentially and contingently.

For Mol, multiple worlds and their inseparable knowledges give rise to an 'ontological politics' of multiple dispersed and empirical recalcitrances, hence one *conducted* ontologically. But also, true to ANT, one without (definitive) agency, directability or direction. And without which, in reflexive coherence, nothing much informative can be said in the abstract. *It all depends* – on what/who/how the specific issue is formed and enacted. Ontological politics thus becomes defined as a process of *interference* of what seem *post hoc* to have emerged as contingent 'choices' of one 'world' over another.   This also implies a new and different relation with (what still gets called) 'social science': an 'associational' analysis (Latour 2005), tracing the empirical connections in particular cases. Hence not serving up totalizing and explanatory critique but rather new, detailed, effortfully-constructed descriptions that may *themselves directly* be ontopolitical interferences, opening up given common-senses of what/who matters (ontologically) and does not. This is thus a politics as permanent meta-political process of iconoclasm and stirring up regarding *specific* issues and, in the process, thereby constantly reproblematizing 'one-worldism' and the seemingly resilient human compulsion to treat as singular that which (ANT claims) is multiple.

Finally, then, this is not just a non- (indeed anti-) utopian politics, not motivated by and condensed around a Grand Vision; but also one that does not even *claim or expect*, much less strive for, relatively predictable outcomes from its political engagements. Regarding the key question of TSS regarding prospective practical guidance, therefore, it appears that an ANT ontological politics can offer only limited assistance. At most, this approach affords *post hoc* grounds for political strategic judgement as criticism (not critique) from the thick description of existing closures; and/or a counsel to the epistemically modest goal of a programme of unrelenting Baconian experimental tormenting of given realities-cum-common-senses to *see* what these interferences achieve and to prevent one-worldist common-senses from solidifying in the first place. At the least, however, a post-ANT approach can offer no guidance at all, as in the case of future actor-networks that are, by definition, inaccessible to

thick description as not yet actual; or, more abstractly and ethically, in the turn instead to an orientation of care or concern that simply embraces the total bafflement of rational mind implicit in complex, concrete network realities and their ceaseless and unmasterable rising and falling, and so chooses to take an undifferentiated positive affective gaze to all things and eventualities.

Such responses are understandable and not unpersuasive. Certainly, an ANT ontological politics brings out particularly clearly the self-defeating irrelevance of a post-Enlightenment epistemo-politics in that the more such world mastery is attempted the more it simply encounters (and itself elicits) further (possibly novel) recalcitrances, in a treadmill that has, with the emergence of TSS, reached planetary proportions (Latour 2013). Positively, therefore, this approach highlights the need for a paradigm shift in common-sense, abandoning the realist concepts of modernity – not least 'technology', 'science', 'society' –in search of new and empirically-grounded ones of their overlapping construction into manifold techno-science-social worlds.

As such ontological politics also captures crucial aspects of the ethical/normative challenge of TSS, in that it essentially grasps the extraordinary ontological productivity of contemporary technoscience and the responsibility this brings with it. This includes showing clearly how contemporary default understandings stand in the way of assuming that responsibility by soothing us with false reassurances about the necessary progressiveness to human mastery implicit in 'science', 'technology' and 'society', there presupposed irreducibly in their very meaning. In short, ANT ontological politics brings to life how these concepts are not only not essentially good, but that they are not even essentially anodyne. To the contrary, they are potentially (and have proved in fact to be) massively destructive, particularly of 'other' humans and non-humans (and their cosmologies), and especially where they are indeed vested with such unreflective 'progressive' and tacitly imperialistic commitments. If this does not strike us into over-awed, ethically reflective silence, what will?

3   From Ontological Politics to Phronetic Onto-Politics

This is a compelling new vista of how profoundly 'politics' must be rethought before we can grapple with the multiple realities being continually constructed in the technosciencesociety that ANT also effectively describes. But for all these important ways in which it illuminates the predicament of TSS, ANT ontological politics still does not address the key pragmatic

challenge discussed above, which can specified now even more clearly as: if and how it is possible to conceive of politics within an account of reality of complex assemblages of human and non-human agents, and to do so in a forward-looking way that can inform (re-)constructive practice in real-time, not just as retrospective accounts in thought of what has already happened?[2]

Phrased thus, however, the political priority of TSS emerges as different to that of after-ANT: no longer (just, or even primarily) the problematic proliferation of novel technoscientific-mediated worlds not held sufficiently to account, as specific, manifest issues and their evident contestations and even injustices; but now also the problematic *slowness* of the emergence of *better* such worlds. Meanwhile, the current relentless emergence of TSS presents deepening and accelerating positive feedback loops of innovation focused on facilitating ever-more individualized consumerism, corporate-financial appropriation and corporate-state violence, engendering worsening environmental, geopolitical and socio-economic crises. These dynamics must be actively displaced not merely destroyed. In short, the political problem of the present is as much, if not primarily, one of the urgent need for *construction* of new sociotechnical assemblages. And where these must be *both* successfully expedited (vs. incumbent system lock-ins) *and* somehow qualitatively 'guided' in terms of the specific social futures to which they are giving rise; an intrinsically political question.

To be sure, the tools and insights of an ANT-inspired perspective certainly could, and have, furnished significant insights regarding such a politics (e.g. Passoth & Rowland 2010, Barry 2013). But what we may crudely characterize (with my apologies) as a 'pure' ANT approach tends not to, since – and to the extent that – it is framed as an intellectual endeavour of the observer-analyst. Conversely, we here argue for an approach that builds on the insights of ANT but does so while fully embracing the key challenge of TSS and hence rebases the analysis itself in an explicitly pragmatic, processual and strategic approach that is directly engaged in the problem field that it is studying.[3] This is provided by a turn towards *phronesis* – or situated, strategic and power-aware wisdom – whereupon the ANT ontological politics analysis remains an important step but no longer the only, nor the final, one. And in

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[2] I thank one of the anonymous referees for helping with this formulation.
[3] By 'strategic' I mean not means/end calculative reasoning but the more circumscribed and itself processualized, complexified sense of intelligent, productive but limited self-conscious guidance of conduct implicit in Foucault's discussions of power/knowledge and 'government' as the conduct of conduct in a world of uncertainty.

a process of engagement with TSS that not only illuminates TSS better but also, in doing so, *is* directly the cultivation of the wise government of complex systems that it is seeking to move towards. Instead of wasting the potential contribution of ANT to TSS, therefore, it is harnessed, but only by taking a key step beyond ANT towards its regrounding in an essentially pragmatic, engaged project.

What is meant by 'phronesis'? Phronesis is the third form of knowledge outlined by Aristotle, alongside *techne* and *episteme*. It is a practical wisdom that is irreducibly situated and the basis of skilful judgement relevant to the specific and unique situation in play. As such, it is also always the presupposed basis for the successful deployment of *techne* and *episteme*, as in the tacit skills and embodiments of the master plumber or laboratory scientist. Yet, while the latter two are utterly familiar – the work of consultants and 'disinterested' academics respectively –, phronesis has been systematically ignored, or even disparaged, in the modern period. Today, however, in a moment of the exceptional overlapping crises of the emergence of TSS both of these familiar forms of knowledge are self-evidently inadequate in the face of these wicked problems (as 'technology' and 'science' respectively) yet we have just as much need for knowledgeable guidance as ever, if not more so. What is needed, thus, is precisely such situated, engaged and politically-attentive wisdom as a cultivated, practical virtue – a way of life (Hadot 1995) that also thereby includes an implicit knowledge-attentive ethics that is itself also processual, situated and pragmatic.

To this Aristotelean account work of Flyvbjerg *et al.* (2013) adds an important Foucauldian twist, following Foucault's later work on power. Here, power is treated not in familiar juridico-discursive terms as that which is held by A over B and is illegitimate until it rationally consented to. Instead, power is essentially productive, dispersed and normatively ambivalent – dangerous not bad – and constitutive of social phenomena in terms of the power *relations* between people and things, and thereby also of those people and things themselves as *relata*. Moreover, amongst these things are concepts and knowledges as key mediations of this process of co-production, so that we have now constitutively strategic power/knowledges. Returning to phronesis, then, we can update the still-quite-rationalist Aristotelean account of phronesis to take into account the dynamic, complex constitution of things through power/knowledges. Phronesis is thus not just a superior form of reasoning (itself supreme, as for Aristotle), but also the crucial process through which oneself *and others* may be brought

to insightful strategic reflection upon how they are situated, and so constituted, within dynamic power/knowledge relations in real-time.

A post-Foucauldian phronesis thus also yields a framework for analysis of TSS phenomena that is both distinctly resonant with ANT and yet also importantly different. Instead of heterogeneous assemblages of empirical things, we explore reality as composed of complex, dynamic systems of power/knowledge relations and technologies or complex power/knowledge systems (CP/KS) (see Figure 1) (Tyfield, Ely & Geall 2015).

[**Figure 1 about here**]

This redefines ontological politics as an onto-politics (*Cf* epistemo-politics) in which, following ANT's lead, both ontology and politics are redefined in active negotiation with each other. An ontology of complex, dynamic systems of power/knowledge relations is akin to ANT's in several key respects: (power-)knowledge is still incorporated within and as an achievement of specific enactments and complex, concrete condensations of human-with-non-human things; the contingency and power-distributive effects of specific systems that prevail is preserved; hence there is no all-powerful and unquestioned/able presumption of a 'single reality' that can do all kinds of (usually tacit) political (and epistemic) work, as opposed to the priority of the productive, strategic effects of knowledge claims in possibly constructing systems that tend to *make* their claims 'real'; and thus the agents, knowledges and realities are both irreducibly dynamic achievements *and* strategic or political, in formation and effect.

But it is also crucially different too: the systems are emergent, yielding a synchronic emergent powers materialism (Bhaskar 1998) that exceeds a rigorously-policed flat ontology (to the extent it *is* thus policed in ANT studies); so too, the constituent elements of systems are *also* emergent as relata; hence relationality is thorough-going, rather than limited to the relations amongst empirically-given things and so capable of yielding qualitatively new, as-yet-non-actual 'things'; and this relationality is taken as irreducibly strategic, constitutively oriented to its own preservation in any given case. We are thus working with shifting relational assemblages, but as emergent, complex, dynamic systems, not ontologically flat mixtures (nor, of course, realist 'structures').

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The mutually compatible combination of an ontology constituted by power/knowledge relations and an analysis that is phronetic in approach and motivation thus completely transforms the purpose of such studies as well. The goal is no longer to analyse existing closures and perhaps be enlightened by their evident (political) contingency, so changing minds (of the analyst/reader) and orientating them instead to concern. But rather it is to examine possibly tendential processes of ongoing attempted closure in order to illuminate *for participating actors* their plausible prospective strategic positioning in the systems taking shape, and its interdependence on positioned others (human and non-human). The latter, however, *is itself* precisely the process of 'wise' government of complex TSS systems, albeit no doubt initially just embryonic.

For this 'onto-politics', therefore, ontology and reality is irreducibly and constitutively political, being *constituted* always in mediation by relations and technologies of power/knowledge. To be is to be strategic. Onto-politics is thus arguably 'onto-' in a more profound sense, concerning the substance of being real *per se*, than is ANT's ontological politics, which seeks instead (only!) to highlight the hitherto neglected but essential contribution of (non-)human agencies to the contingent enabling of some humans. While conversely, politics is reconceptualised as always *primarily* a matter of the rolling (re)production, in strategic material-discursive practice, of systems that are co-produced with specific power/knowledge relations and technologies that *are* 'reality', and the forms of living together – who with whom and on what terms – that they enable and disable. Politics is thus indeed, with ANT, a never-ending process of strategic jockeying (incorporating both competition and collaboration, compulsion and consensus, argument and (possibly everyday) practice in interaction of human and non-human things), but also and primarily of world-*production* conducted in ontic-enacting practice of everyday life, not (just) high-political argument and strategizing.

This thus preserves but also entirely transforms what is 'political' about onto-politics, just as it transforms what is 'onto-' about it, in mutual redefinition. Notably, against ontological politics, 'politics' remains distinctively human and emergent only from the irreducible presence in such human-non-human assemblages of the strategizing, cognizing *zoon politikon* that is the human in pursuit of their specific understanding of a 'better world'; a strategic process (in the deflated Foucauldian sense described above) that is fundamentally about and conducted through the ontologically-constitutive power/knowledge relations of systems-

selves. It is onto-*politics* only insofar as it *also* involves the power/knowledge relations distinctive of, and constitutive of the emergence of, humans, but whose primary character is their ontological productivity, not argument, contestation and/or coercion. Such jockeying as constitutes ontological politics is more simply accounted for as 'onto*geny*'.

Yet this is also *not* just the traditional notion of politics as a sphere pertaining to humans alone. For it does not just 'pertain' to humans in the sense of 'applying' to humans alone, even as it does presuppose their presence, somewhere, in the assemblage under discussion.[4] Indeed, now constituted through relations with others, human and non-human, and their emergence in turn to greater systems, the concept formally known as 'human agency', as supposedly self-subsistent and answerable only to itself, is seen to be the emergent product of always concrete inter-dependent relations. This is thus to bring human agency profoundly and permanently into question. This is, however, a question specifically for the self-reflective human agent; and one, moreover, that is again answerable only in reflective practice, based in an essentially pragmatic orientation of study of reflective, strategic interaction with the world.

This shift to such a practical, phronetic basis is also arguably immanent in ANT ontological politics itself. For an ANT ontological politics perspective implies the inclusion of the (ANT) analyst themselves in both such a world and the uncomfortable predicament of the axiological imperative confronting irreducible uncertainty to the exact same extent that it is itself a compelling analysis. But this immediately subjects the very distinction of analyst-agent to the same process of deconstruction as ANT has achieved for the subject-object dualism more broadly. While this may not entail the total collapse of one onto the other (see below), it certainly does demand the profound reframing of ANT and/or ontological political analysis itself as primarily characterized by precisely the same epistemic shift that it counsels for knowledge and science more broadly, i.e. towards a pragmatic, processual orientation itself within and so working (messily) with complex, dynamic unknowable actor-networks.

To admit this essentially pragmatic motivation and drive to, and immanent in, a post-ANT analysis, however, is also thereby dramatically to reframe the entire enterprise, as in the shift to phronetic CP/KS analysis. For it means that the essentially analytical question of ANT regarding "what is 'X'?" – "what actually *is* the manifest human-non-human assemblage and

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[4] For instance, note how this onto-politics affords a spectrum of emergent strategicness as differences in degree not kind, e.g. for higher mammals.

its current (here, now) closure that we unreflectingly refer to as 'X'?" – is neither the first nor the last question implicit in that very train of thought. Rather the motivation for even asking "what is 'X'?" in the first place arises for a (human) agent and from their encounter with a problem in the world. Moreover, this will likely be a difficult problem not answerable through the default first attempt at its resolution in which that thinking agent identifies the problem as (caused by) 'X' and the proceeds to attempt to deal with 'X' in practice. Of course, this very often works, since our understanding of the world is sufficiently intelligent that we do indeed know the world as it is amenable to our given understanding – an understanding, after all, emergent from and in part constitutive of that world.

But, as ANT would expect, it is also sometimes not the case that this approach works, and especially now regarding issues of TSS, since these are by definition realities constituted in ways that transgress our unreflective default understanding (i.e. 'our' as early 21st-century Westerners) in terms of 'science', 'technology' and 'society' (and 'nature'). In these instances, and others besides, therefore we need to ask the question of ANT ontological politics (or CP/KS) and adopt the productive disciplines of its conceptual poverty and empirical 'flat' ontology in order to attempt to construct more insightful conceptual innovations that, hopefully, can 'see' X and its world more clearly.[5]

But what is meant by "more clearly"? How is it judged? The answer, of course, is in a further step beyond in which that revised ontological understanding – concrete and abstract – is tested in a new attempt to resolve the practical problem with which we started, to practical standards of satisfaction. Having rethought and reopened 'X', in other words, we are impelled to return to test and see what can now be done. Of course, the strategic predicament of the limited constitutively-situated (human) agent remains unchanged as regards confronting a world of real but limitlessly unknowable recalcitrances of others. This new post-ANT-analysis (or post-CP/KS-analysis) understanding, thus, does not reinstate the empty promise of 'now' knowing the world (around 'us') completely and comprehensively, with the concomitant and all-important promise of its potential mastery (also 'for and by us'). But neither are we simply back where we started as regards our total ignorance of the recalcitrance that is currently frustrating us, even as we still interact with the the world in significant (indeed, overwhelming) ignorance as to its 'actual' constitution.

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[5] I thank an anonymous referee from the idea of productive "conceptual poverty".

Rather the analysis has made two crucial changes, in terms of what we have learned and what we are now open to and capable of learning, going forward. Simply going through this thought process we (will) have already learned much in both concrete and abstract about the practical problem field at hand. Concrete insights cannot be specified here, of course, since they pertain only to the specific issue under consideration (though see below for an example). But abstractly we have learnt that the 'objective' reality we are confronting is not, in fact, an 'object' at all – as supposedly fixed, monolithic, self-subsistent and substantial – but is constitutively relational, complex, dynamic and inchoate, as we are ourselves. And so we have also become newly capable of learning – indeed, primed to learn further and be ourselves changed by – specifically how this given reality is each of these characteristics, through our ongoing experimental encounters, in practice, with world(s), thereby cultivating a newly informed and other-attentive phronetic stance.

Returning to practice in this final step, however, raises one final problem for ontological politics and the need for its reframing. For, back in an explicitly practice-oriented position ourselves, we find immediately that the opening of 'X', however much it may be insightful in its own right, fails in itself to assist us with deciding on the practical question of "what do I do next?" To answer this question, which presents itself to us interminably including as the motivation for ANT itself as we have seen, is immediately and inescapably both: to demand some active reclosure, by that thinking self, of what 'X' is such that 'I' can now interact with it on the new, revised basis; and so, in turn, to adopt a position that, in practice, presupposes both the ontological monism of self and world and hence the epistemic dualism of subject-object. Such closure is thus productive, prospective, active and dangerous, and by 'me', not post hoc, already achieved by others (vis-à-vis the analytical gaze) and normatively appraisable. It is the latter, however, that can be analysed by ANT and is implicit in its ontological politics. Yet it is the former that is needed to be able to return finally to the practical problem and to its (possible, possibly temporary) closure in turn.

This thus leads to arguably the fundamental philosophical difference between an ontological politics and onto-politics. The watchword of the former is to stand against the cardinal sin of one-worldism, as an error not just of epistemic judgement but of ethical and (ontological) political domination. On this account, one worldism – the positing of the twinned commitments of ontological monism and subject-object epistemic dualism – is precisely and

directly to deny the foundational insights of such ontological politics that worlds are multiple and composed of contingent non-human and human (Western and non-Western) assemblages in which the agency of the (Western, male etc…) human is actually utterly dwarfed by that of the 'others' it thereby comes to dominate. One-worldism is thus intrinsically and totally opposed to ontological politics and vice versa.

Similarly, then, ontological *politics* can then be conceptualized in terms of a symmetrical contestation and negotiation between any number or quality of agencies that do not have to – indeed, should not – be accorded the rational, means-end calculative powers that would always privilege the (Western…) human over and to the detriment of all other agents. To the contrary, what is needed, it is insisted, is a new conception of politics, and the agency implicit in it as a 'politics', that systematically redresses the imbalance away from the vastly greater but no less 'real' or ethically worthy collection of non- or 'other' human agencies that one-worldism denies.

To be sure, this is a compelling ethical call and one all the more important to heed carefully amidst the emergence of all the novel human-non-human agencies of global, cosmopolitized, planetary TSS and its problems of emergence. But the problem is that it is only possible to stick righteously attached to this position insofar as one remains in the role of an observer-analyst, which is thereby to reinstantiate the subject-object dualism and hence, not just to not contribute to the practical construction of TSS, but actively to participate in its continuing frustration.

In order to respond to this call, then, we must do so in practice. And this demands a resuming a practical, engaged perspective, of 'our' agency in the world, situated *within* the complex heterogeneous assemblages and *as* ourselves; i.e. reflective, self-conscious and righteous (Haidt 2015) beings and hence as beings who spontaneously, relentlessly and unstoppably posit ontological monism and subject-object dualism. The option before us, then, is no longer one between retaining a regressive ontological monism or embracing an enlightened ontological politics – and both as explicit argued position – but of practically deploying ontological monism either unreflectively or reflectively, the latter being in the light of permanently discomforting insights regarding its fundamental groundlessness and normative dangerousness.

But this shift in perspective is much easier to take if the entire thought process has been conceptualized, from the outset, in the fundamentally pragmatic terms of phronesis and CPKS analysis. For, from this perspective, ontological monism is no longer an irreparable and inexcusable mistake (of judgement). Rather it is an inescapable, world-productive and constitutive concomitant of distinctively human, cognizing agency – i.e. that is expressive of the real emergence in the world of humans in the *human*-non-human systems of relations from which that species being itself arises – but also an active 'doing' that can nonetheless be done more or less skilfully and with more or less situated strategic wisdom, or phronesis. Again, therefore, we converge finally on the cultivation of phronesis, which becomes both the challenge and its own solution, as in the emergence of (self-)government of TSS.

Finally, then, this shift in perspective then illuminates the significant shift in our understanding of the conjunction of a complex heterogeneous ontology and politics as practice of possibly *making the world better* that still includes, but has fundamentally resituated, familiar epistemo-politics and in ways that can now be pursued in phronetic practice (albeit therefore fallibly and falteringly). An ontological politics attempts to do away with and sideline epistemo-politics by theoretical fiat, arguing that it is mistaken and wrong while supposedly replacing it even as it affords no alternative from of prospective guidance. By contrast, onto-politics subsumes and reconstructs epistemo-politics as an enduring condition of being human, but one that can be pursued differently and better to the extent it is based in *practices* of phronesis.

To be sure, an ANT ontological politics analysis can help significantly in this process in that, as *itself* a practice, it no doubt can and does cultivate, as embedded intuition (Cf Haidt 2015), the presumption that our ignorance of the world(s) we encounter massively outweighs our knowledge of them, and that those realities are precisely complex, dynamic, relational, systemic, inchoate etc… This can go towards transforming how it is we interact in and with the world. But these changes come to nought unless and until they are brought back to changes effective in practical, complex-system-situated life and its productive encounters between mutually mysterious selves and worlds, including in STS research. Again, therefore, we see that an ANT ontological politics is only itself brought to fruition in a step beyond itself.

Here, then, the world is still (and inescapably) encountered as an object by a subject, but where our very sense – perhaps only cognitively at first, but possibly more deeply over time – of these terms are themselves loosened, dynamized and brought closer together in ways that actively move away from subject-object dualism and ontological monism as practiced ontological commitments that unceasingly tend to the creation of world in their (split) image. Phronesis and CPKS thus definitely does not simply lead us back to a familiar politics and dualistic human agency even as these remain apparently in place. For the cluster of attendant and constitutively relational (intensional and inter-dependently defined) concepts surrounding that familiar constellation of epistemo-political concepts has been entirely transformed, both in form and in substance: now as self-consciously constitutively relational, complex, systemic, dynamic and pragmatic in form; and substantively inseparable from novel concepts of phronesis and its cultivation, productive power/knowledge relations and emergent systems thereof, government and its grounding in *self*-government and, of course, TSS.

In short, going beyond ANT ontological politics, we need a programme of *phronetic* analysis of the emerging co-production of technoscience *innovations* and forms of TSS *government*. For this will then move towards a productive onto-politics that can itself enable and instantiate practical (cosmo-political) projects of 'transition', or world creation and reconstruction, and their ongoing wise government.

Returning to STS research, then, this is thus a programme that can *only* be delivered by way of concrete, situated and engaged analysis, not abstract theorizing. To illustrate it at work, therefore, we turn to a key global challenge of emerging TSS: low-carbon urban mobility transition in China. Our question here is: how (when, by what/whom (Savransky 2013)) is urban mobility changing and in co-production with what emerging trajectories of socio-political regimes? To repeat, though, this is addressed with a view to practically informing diverse forms of onto-political strategic redirection, *not* to 'get the answer right'.

4   E-mobility in China: the Politics of Who 'I' (and 'China') May Become
A key contemporary site of the emergence of an onto-political techno-science-society is low-carbon innovation in urban mobility in China (Tyfield et al. 2015). It is an important case study for many reasons, regarding each of these terms.

First, as 'low-carbon' and 'innovation' it relates directly to contemporary (techno-science-societal) efforts to forge new ecologically sustainable forms of life in response to the multiple environmental global risks reaped by/in the emergence of TSS to date; as well, therefore, as the new predicaments of the Anthropocene, cast in official Chinese policy in the slogan of 'Ecological civilization'. 'Innovation' is also, of course, a fetishized policy buzzword demanding critical attention by STS (Godin 2006). Then as 'urban' it achieves particular significance with the 21st century emergence of humanity as a predominately urban species; with cities as key sites of ecological footprint and innovation; and with cities (especially in the 'global South') as key sites of what 'living together' will actually be like for the majority in the 21st century. Urban *mobility* is, in turn, a crucial element of all of the three previous terms, as well as a central social practice and socio-technical and political system constitutive of (emerging) techno-science-societies (Urry 2007). Finally, in China we find how each of these, and other major issues besides, attains global superlatives; including as the world's largest (and still rapidly growing) car market, the world's top emitter of GHGs on an absolute basis (with *per capita* emissions also now overtaking those of the EU), and site of the largest and fastest (ongoing) urbanization in history that will greatly shape the global environmental impact of future humanity.

In this context of titanic structures and movements, the decarbonisation and cleaning (and decongestion) of Chinese urban mobility is an increasingly pressing imperative – for Chinese society itself, as well as the planet. As regards the practical question motivating study of this case, therefore, we are concerned with not just expediting but qualitatively shaping 'low-carbon transition' in Chinese urban mobility such that (techno-science-)social futures they instantiate are not just green (for some) but also equitable, empowering and convivial, i.e. politically enabling for the broadest possible group of human and non-human agents.

Certainly, there can be no doubt that the intense interest in e-mobility in China is profoundly political. For instance, the coming of e-mobility is seen as a unique industrial opportunity by the Chinese government of breaking into the vaunted global citadel of the global automotive majors by 'overtaking around the corner', through taking the lead in the plug-in *electric* car (EV). This is then manifest in perhaps the world's most ambitious national industrial policy, of a technology-push policy orthodoxy, supporting the EV, and applied to an industry that is still substantially state-owned within a country that supposedly has especially strong

authoritarian levers for top-down initiatives. Surely, then, China should be a ferment of new EV-based innovation, leading the world, and saving the planet to boot?

In fact, there is no such leadership in evidence. Rather, for all its support by government (across many levels), Chinese mobility today primarily evidences not accelerating low-carbon transition, but deepening ICE automobility system, at extraordinary pace and scale. Even to the extent EV sales are growing, they remain comparatively minuscule – a sales surge in late 2015 perhaps reaching 1.5% of the comparable annual sales of ICE cars, let alone the total number on Chinese roads and still maybe 25% below government targets (Bloomberg 2015). This certainly augurs no meaningful transition at system level at current rates for many decades. These sales are also utterly dependent on governmental subsidies, the continuation of which has recently been brought into question as widespread fraud has emerged (in turn, also raising questions about how many of the 'record breaking' 2015 sales figures were real EVs (Yang 2016)).

"Why, or rather how, are things working out this way?" thus becomes the tricky ("what is 'X'?") problem of conceptual innovation for a CP/KS analysis. But it is not the only one posed by contemporary low-carbon e-mobility in innovation and mainstream policy understandings. Another, of equal significance, arises from the extraordinary – and starkly contrasting – success of the the e-bike or electric two-wheeler (E2W). Over 200 million of these now ply China's road (more than *ICE* cars, let alone EVs), the vast majority of which are themselves Chinese brands. This is thus an existing global industrial success story that also has the potential to place Chinese innovation at the global core of a new, affordable, lighter-footprint and 'liveable' model of urban auto-mobility of China's burgeoning mega-cities (and those across the global South more generally). Yet far from embracing this opportunity, we find instead only its containment, if not outright rejection, by government, with E2Ws banned in many big cities and a major, nationally-coordinated clampdown on them in spring 2016. This, therefore, raises precisely the same question, where the stasis of both the EV and of the E2W contributes to the overall weakness of low-carbon transition more generally.

The central relevance of the foregoing discussion regarding onto-politics comes through in this case study in three key aspects. First, the key point emerging from these two concrete problematics is that while low-carbon transition is fervently desired, what is currently

systematically lacking – and missed by policy (analysis) – is a clear and present constellation of agencies that may be identified as the primary producers and beneficiaries of such a transition. In other words, the key question, that can only be answered in concrete (as ANT would counsel), of "*who* and *what* is – or will power – Chinese e-mobility transition?" (Tyfield 2014) is not only generally overlooked but also currently without answer. Yet the practical, strategic predicament compels precisely furnishing some (faltering, incomplete, initial) sense of *which* closure, *for* and *by* whom/what. Through the lens of phronetic CPKS analysis, in short, we see that the fundamental question for expediting low-carbon transition is the fundamentally **onto-political** and <u>prospective</u> one of "*which* <u>qualitatively new</u>, **constitutively strategic** agencies will be co-produced (**will come to exist**) with, and in the process of, e-mobility transition?"[6] This is thus a question that can be addressed neither by a conventional analysis of political manoeuvring and/or transition, working with and assuming only existing agencies, nor an ANT analysis, which makes no such assumption but struggles to address the prospective question. Rather we must to trace embryonic emergent dynamic feedback loops amongst artefacts, situated everyday practices amidst environmental risks, subjectivities and stratifications, cityscapes, regulations and high-level innovations policies and investment strategies in the possible emergence of qualitatively novel complex systems of power/knowledge relations.

Secondly, though, an onto-political analysis is needed because the problem field is not only thereby irreducibly onto-political (i.e. concerning what irreducibly political beings exist) but is also experienced as such in everyday life with an intensity that is uncommon, especially against a presumed Western 'normality'. This has three key aspects. First is the particular lived relevance in everyday life of the question above but translated into the first person as the essentially onto-political question of "Who will I (myself and my country, as Chinese) become?" This question presents itself as banal and everyday amidst a rapidly changing and individualizing Chinese society that is widely appreciated by those living it to be dynamic, pitiless, still in formation and littered with intense existential human-non-human-assembled dangers regarding, e.g., food safety and air quality (Yan 2010, Ren 2013, Han & Shim 2010). Here, in other words, it is a common-sense, lived reality that *everything* – one's very future being – is potentially at stake, conditioning a profound competition of social status and equally profound distrust of socio-technical-natural risks.

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[6] Where the terms in bold and underlined respectively go together.

Moreover, while not, of course, necessarily conversant with the *avant garde* heights of mobilities theory (Urry 2007), mobility choices nonetheless are appreciated to be highly significant in this regard, reflecting how strongly (personal positions within) mobility systems condition and are co-produced with 'who we are' (Kaufmann 2010, Sheller & Urry 2016). Such concerns play out, for instance, in the intense Chinese consumer identity politics of 'car' ownership, with an entrenched common-sense preference for the existential security represented by a private, foreign-built (hence high technical quality), big and expensive (ICE) car: as in the now famous catch-phrase of a young female game-show contestant who would rather 'cry in the back of a BMW, than laugh on the back of a bicycle'.

Yet, and secondly, this is far from being a settled, sedimenting and stable common-sense. Rather contemporary Chinese e-mobility innovation reveals the essential onto-political contestation of a set of mobility systems all of which are currently 'monsters', i.e. precisely politically controversial in their very existence, This would include the massively incumbent ICE model just described, since this is palpably and permanently beyond the reach of a huge proportion of the population, and simply has no prospect of attaining to the aspired American levels of penetration without catastrophic planetary (i.e. onto-political) environmental and economic consequences.

Alongside the rapacious monster of late 20th century ICE auto-mobility, gorging itself not just on fossil fuels, but also land and clean air, however, the monstrousness of the EV and the E2W (both as emergent mobility systems) is even clearer, albeit more 'hopeful' (Cf Mokyr 1991, Law 1991). On the one hand, then, we find what may be informatively caricatured as the revolted rejection of the (systems of the) EV as a hideous parody of the 'real' internal combustion engine (ICE) car; a Frankenstein… in green lipstick. Faced with the deep-seated ontological concerns for one's future security and very identity, the 'monstrous' but still expensive EV offers only inadequate and uncertain (onto-political) boost to one's status to compensate for its new (onto-political) frustrations and risks, as in persistent anxieties about charging and/or being stranded (e.g. on a congested ring-road), financial risks of rapid depreciation and/or personal hazards (e.g. high-profile battery explosions and a widespread fear of 'radiation' from the batteries).

Yet on the other, for all its unquestionable demand, the E2W too is a monster. It inhabits a grey area both legally – in terms of regulations of its use (e.g. licence/registration required?) and production (e.g. standards) –, and regarding (industrial) policy – at best ignored as a potential Chinese global industrial champion, but also, at worst, penalized off the roads. This monstrousness must also be understood in onto-political terms. Crucial here is the larger context of the E2W's production and use. China is a highly dynamic society shaped by two key processes that are together amongst the most illustrative examples of the exceptional conjunction of deepening economic liberalism ('Reform & Opening Up' to globalization) and continued one-party-state government: respectively, migration from the countryside to the burgeoning industries of China's cities and the authoritarian biopolitics of the household registration system (*hukou*), that ties every citizen primarily to one location (classified as 'rural' or 'urban') for access to social services.

Together, this has created two clear and formally-defined tiers of society with only limited social movement between them, but with massive numbers of 'rural' citizens now in cities. This stratification is then performed and reproduced not just in terms of different employment but also – in the full gamut of human-non-human assemblages constitutive of the difference in lives – in dress, gait and language and in urban zoning, standards of housing and conspicuous consumer choices, not least of which is an auto-mobile vehicle: a car (and a 'good' car) being an expensive acquisition out of reach to the majority as against an affordable E2W. The onto-politics of individualised competitiveness regarding identity and possible projected life-course ("who will I become?") thus become particularly heightened, crystallizing in the key symbol of one's access to mobility – both physical and, thence, social (*Cf* Kaufmann 2010).

In this context, then, the proliferation of E2Ws – the growth of this monstrous new enabled agency – is primarily viewed by many, including government at different levels, not as a fantastic opportunity to shape a new, Chinese-dominated and China-appropriate (given the density of cities) e-mobility system, but as an existential 'security threat', with bans of them in several major cities. This takes many forms. At its most mundane it refers to the new menace of silent, quick, dangerous mobility, compounded by the unruliness of its use (on and off pavements, the wrong way down roads, skipping red lights, maybe veering unpredictably across traffic). Undeniably underlying and mediating this security discourse, however, is the imaginary of e-bike users as 'low quality' (*suzhi*) (Anagnost 2004) citizens vividly and

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readily exemplified in the transparent division of urban society into residents and migrants ('peasant workers'). While systemically-essential demotic mobility, underpinning China's continuing (if slowing) economic 'miracle', therefore, the e-bike also enables the 'wrong' people regarding the key form of contemporary government that is 'govern-mobility' (Bæronholdt 2013) – the people no-one aspires to become but rather fear (themselves falling back among), especially those constituencies currently most politically enabled. Similarly, against a widespread understanding of car-based automobility as the acme of modernity, from a Chinese state perspective of national industrial profile and visible urban landscape to the imagined rich-world tourist the e-bike is a symbol of a backward, 'developing' country, not one to be cultivated as the acme of 21st century green city living.

The result is the dynamic monster of the E2W (system): unruly, unfamiliar, dangerous and growing, yet also unregulated and unregulatable, let alone amenable to being banned or eliminated. But amid such widespread disquiet, or even governmental rejection, neither does the E2W threaten actual system change in competition with the parallel protean growth of the incumbent ICE car system. In short, as things stand, the answer to the question of "who is (the new agency co-produced with the transition to) e-mobility?" is a set of monsters that are monstrous precisely in the uncertain but potentially existential onto-political threat they pose to existing agencies. To be perfectly clear, therefore, the landscape of Chinese e-mobility transition in 2016 presents *no* clear options that could be embraced by a (more) rational politics (critical and bottom-up and/or managerial and top-down). Instead, as an essentially onto-political arena, the strategic question of "what will ultimately prevail and how?" offers itself to the analysis only in terms of tracing the complex strategic relations and interactions of the present, and the (possibly technological) mediations thereof, and how these could productively play out into the construction of entirely new mobility systems-cum-sociopolitical relations; and with this as lived predicament, not just theoretical conundrum.

This thus points to the third crucial way in which this case is fundamentally onto-political, namely how it is contested in actual practice and thereby being brought into being. The constraints in contemporary China regarding explicit epistemo-political contestation compound this, though issues of mobility, such as parking or clean air (Geall 2013) are in fact amongst the issues regarding which amongst their freest. But arguably more important are the no less intense, but banal, everyday and material contestation of (yet-to-be-settled) settlements of the power/knowledge relations of the ever-emerging green mobility systems

(e.g. practices of human-non-human encounters with charging infrastructures, weathers and clothing, pavements or traffic signals or the movements of other vehicles…).

The use of hundreds of millions of E2Ws every day in such humdrum but strategically productive ways by people *just living their lives* (vs. radical epistemo-politics), however, adds up to the persistent and consequential consternation of the top-down regime, feeding its equally existential determination to shape the very existence of the population – the subjectivities and socio-technical relations constitutive of a future China – in ways that preserve its monopoly of state power. The result, therefore, is the dynamic of contemptuous rejection of the E2W by the party-state, despite its seeming promise from the perspective of both expedited low-carbon transition and even techno-nationalist political economy, *and* its resilient persistence. Conversely, the EV has persisted to date, despite its widespread onto-political rejection and consequent lack of demand, because of the onto-political project it bears for the party-state in the construction of a prosperous, green and globally-competitive … and CCP-led… China.

The key dynamic of contemporary e-mobility innovation, thus, is the dynamic clash between existing (ontopolitical) constituencies (and power/knowledge relations) and the emergent socio-technical monsters they support regarding "who/what 'I' will become" in the context of an *urgence* of rapid and individualizing social and planetary-environmental change, with potentially everything to lose and/or gain; and one in which mobility (physical and socio-economic) and there parallel emergence of socio-technical mobility systems and subjectivities occupies a central role. To the extent any clear conclusions can be drawn from this constitutively strategic process, therefore, what seems clearest is that both are converging on the increasingly self-conscious and deliberate attempt actively to shape the meaning of the greatest prize available in this contest, namely the very *form and meaning* of burgeoning Chinese 'middle class'. For it is this still-as-yet-undefined agency in particular that appears to be the answer to the question of "who is Chinese e-mobility transition?" – as the future monster but now *domesticated* (Zuev & Tyfield 2016) – since it is in claiming this label as constitutively connected in everyday common-sense with a specific model of e-mobility that such a model stands to amass the greatest power momentum towards its successful emergence (Tyfield et al. 2015).

As regards some meaningful practical guidance that can arise from this analysis, therefore, it directs us to consideration of the multiple ways in which 'middle class'-ness is being co-produced today with such e-mobility innovation, and the multiple possible (essentially political and strategic) future mobility systems to which this could lead. This is thus to reach the final way in which onto-politics is crucial to this analysis, namely in terms of presenting just such emergent futures, e.g. as a set of plausible scenarios, to multiple agents and stakeholders with whom they are then discussed, refined and republicized to stimulate yet broader strategic – phronetic – reflection. In the case of this particular research, this was done through a bilingual workshop held in Shenzhen in March 2016 to over 40 Chinese stakeholders – from government, business (both 'big' and 'start-up'), NGOs and civil society, and academia (both staff and students).[7]

Of course, this is hardly the only, or necessarily the best, way to do this, though. Rather, the very framing of situated strategic and informative/informed interventions in concrete public TSS issues demands, in itself, forms of situated practical wisdom for judgement regarding whatever ways present themselves as most promising given the issue, issue-public and incumbent power/knowledge relations at hand. This may take the form of familiar public, perhaps even polemical, interventions stimulating public discussion about issues hitherto not seen or overlooked. But it may not. And indeed, in the case of low-carbon urban mobility in China, given current limitations on free speech (i.e. epistemo-politics), this was hardly a viable option.

What is clear from this case study, though, is how the lens of ontopolitics illuminates every stage of its analysis, from conception of its motivation to framing of its goals via methodological choice and theoretical/substantive approach and insights. As regards the latter, for instance, this is not just a familiar case of post-socialist identity politics since what it precisely is not is a matter of 'catch-up' to a given and stable socio-political model, these being exactly what is essentially in question and for planetary reasons. Nor it is just a familiar case of authoritarian politics failing to contain a bottom-up overspill and mushrooming appetite for (TSS-enabled realization of) greater individual autonomy, since it is also and essentially a matter of how everyday *onto-political* practices by that very same individualizing but security-thirsty citizenry serve to perform, reinstantiate and possibly

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[7] These scenarios are also now available at: http://steps-centre.org/2016/blog/four-scenarios-of-future-urban-e-mobility-in-china/

transform the power relations of the party-state, as with E2Ws. And nor, of course, is it just a familiar case of authoritarian state-capitalist 'power' getting its wicked way, since the EV is struggling, and for ontopolitical reasons. Rather, it is a case that is amenable only to the onto-political gaze, and thereby, in turn, demanding of insightful phronetic engagement not correct, arms-length analysis.

5   *Conclusion – STS as Midwife of TSS?*

How does this approach furnish (the beginnings of) an answer to what a STS for and in TSS might look like, doing reconstitutive strategic and ethical work? Space forbids all but the briefest and programmatic presentations of an entire research programme. But the outlines are clear. For the example above illuminates a series of existing *problems* but where these are also *openings* and indeed *responsibilities* for STS, as well as providing the capacity to respond to them, regarding both orientation and ways to do so.

First, the meso-level dynamic of the emerging Chinese middle classes and its ongoing active shaping not only highlights likely embryonic trajectories of innovation-cum-socio-political change. But it *also* allows us to place ourselves imaginatively amongst this emergent power-knowledge system and ask about who will be the winners and losers in this emerging techno-science-society and how. This then allows us (i.e. you, reader) to ask questions about where society may be going *now*, making 'present' as lively political issues potentially constitutive socio-political divisions of future techno-science-society that are currently just emergent. And with that comes the responsibility to do something about it. Yet, since what is described are problems of emerging ontopolitics, and the ongoing and uncertain constitution of futures, this also crucially qualifies the register of the analysis in ways that are then potentially empowering: both politically, viz. the possibility of strategic action framed by this possible future and at a time when these (political) realities have not yet taken definitive shape; and epistemically, viz. shedding the impossible burden of getting the (single) future 'right'. An ANT ontological politics, unless based in an engaged programme, tends not to be able to assist with such prospective guidance. A CP/KS phronesis, by contrast, asks: "*Which* 'one world' is being constructed? For and by whom? Could it be otherwise? and, How?" (*Cf* Flyvbjerg et al. 2013). Here, then, STS both forges and grasps a strategic window and opportunity for intervention by way of the power/knowledge technologies that *it itself* is also in the business of producing: such as those that emerge from a CP/KS analysis.

Secondly, though, what is to guide this process of (modest but committed) strategic intervention? The answer lies in the foregoing discussion of complex power/knowledge systems and the vision that emerges from that of the phronetic society: multiple practices of situated practical wisdom, governing the multiple and growing techno-science-social innovations, and thereby generating – through a learning-by-doing, not as trial-and-error but rather as a building-by-exerting-oneself-to-be – strategically wise self-government of the complex systems, thereby *constituting* the emergence of technosciencesociety habitable for humanity. But this is also inseparable from the parallel emergence of its 'critical' (but also constitutive) politics, to which STS is crucial. For here STS itself is self-consciously reframed – from the outset of any specific concrete analysis – as new paradigm of 'knowledge production' as virtue practice of situated strategic wisdom. STS thus becomes a professionalized practice of cultivation of power/knowledge technologies for maximal strategic reflection and ethical reflexivity amongst as broad a human and non-human public as possible on issues of techno-science and innovation and their respective implications for who and what *is* (becoming) and how. In short, as stewards and physicians (perhaps with our own Hippocratic oath) of the complex, equitable and democratic government of technosciencesociety.

In short, if ontological politics comes 'after ANT', then – to answer Mol's (1999: 87) seminal question – perhaps we can say (or hope) that, amidst the turbulent emergence or birth pangs of TSS, phronetic onto-politics comes after that.

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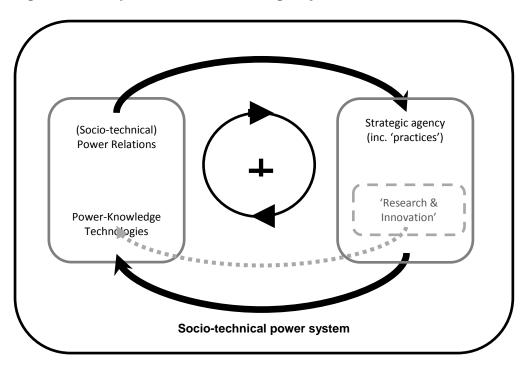
Figure 1: Complex Power/Knowledge Systems

Socio-technical power system