Jan-Peter Voß

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PERFORMATIVE POLICY STUDIES: REALISING ‘TRANSITION MANAGEMENT’

Jan-Peter Voß, TU Berlin

Abstract

The paper analyses the relations between policy studies and public policy. It traces how they are constitutively entangled. Conceptually, this builds on a notion of performativity that has been developed in science studies. The performativity of policy studies is explored in a case study of the innovation journey of ‘transition management’ as a model for governing socio-technical change. The paper shows how practices of knowledge production and policy-making take shape in interaction with the model and how a specialised research field co-evolves with political alliances and policy programmes. They interact in the process of realising transition management, both by establishing the model as collective knowledge and by materially enacting it. In this interweaving with public policy policy studies contribute to creating the reality that they describe. The conclusions discuss ‘realising’ as a mode of governance.

Keywords

Policy instruments, science and technology studies, innovation, governance, performativity, real world experiment, science-policy interaction, co-production, expertise, sustainable development

Introduction

Policy scholars collaborate with policy-makers in constructing workable problems, articulating policy proposals, providing legitimising rationales and tools of analysis, and configuring practical arrangements for policy implementation. They thereby become part of the policy process. At the same time, they study policy processes as a given reality and account for their dynamics. Their own work, however, is usually absent in the accounts they give of the policy process. They edit themselves out of the picture. The production of knowledge about public policy is treated as external to policy-making. Knowledge and expertise enters the policy process ready-made, as a product of science – which itself is another, quite different world. It is acknowledged that scientific knowledge may be used in policy-making in different ways – for problem-solving and learning or for symbolic politics

and legitimation (cf. Knorr 1976, Colebatch and Degeling 1986, Radaelli 1995, Schmidt 2008, Boswell 2009). But the processes of its making are assumed to be external to and independent of the policy process. Almost like the weather.

I challenge this perspective by articulating a conceptual perspective on the performativity of policy studies. This builds on a more general understanding of performative science that has been developed in science and technology studies (e.g. Hacking 1983, Pickering 1994, Knorr-Cetina 1995, Callon 2007). In this view, the work of policy studies is constitutively entangled with the work of policy-making and vice versa.

I focus here on innovation policy studies. Interestingly, this is a field where policy studies are unusually reflexive about their own involvement with their object of study. There is the used metaphor of an “innovation dance” jointly performed by policy studies, policy-making and research and development activities (Rip 1998, Kuhlmann *et al.* 2010), and there has also been some discussion of the performative effects of particular kinds of knowledge work for innovation policy (Godin 1998, Godin 2003, Pestre 2004). From early on, attempts have been made to understand science policy as developing jointly with science and technology and being embedded in broader societal contexts (Rip 1988).

I pick up on this reflexive line of enquiry by providing an empirical account of the process by which transition management has been made true in interactions between research and politics. I contend that, by looking at interactions between knowledge production and policy-making in practice and over the longer term, we can recognise how knowledge and policy are co-produced and how research fields and facts become established jointly with policy coalitions and laws.

By tracing the history of transition management as a specific model of governance, we discover how policy studies and policy-making mutually depend on each other.¹ For the model to become epistemically established it requires political support, not only to obtain funding, but also to generate empirical evidence in real-world experiments. Researchers can mobilise political authority in support of epistemic agendas, because public policy reciprocally depends on research: epistemic authority is required to certify proposed courses of collective action as rational and feasible (Ezrahi 1990). Extending this logic, it would be possible to forge collectives without cumbersome efforts at crafting political will if proposed policies could be established as the only viable option, simply by deeming them objectively necessary. Policy studies thus have something to offer for policy-making as well. They can couple political support for research agendas with epistemic support for policy agendas. Models of governance can constitute a shared object for actors seeking to fulfil scientific and political agendas. They thus work as theoretical hypotheses as much as designs for collective action.

The model of transition management was developed over the last quarter of a century, first in The Netherlands, then, from about 2005, at a transnational level. It describes a multi-

¹ For an introduction see the seminal article Rotmans, J., Kemp, R. & Asselt, M.V., 2001. More evolution than revolution: Transition management in public policy. *Foresight*, 03 (1), 15-31. and a recent review of the development of the model Voß, J.-P., Smith, A. & Grin, J., 2009. Designing long-term policy: Rethinking transition management. *Policy Sciences*, 42 (4), 275-302.

level dynamic of socio-technical change: innovative practices are embedded in socio-material regimes (of science and engineering, industrial production, consumption practices, political regulation etc.). These regimes constrain radical change. Governance of radical change thus has to address the regime level. Niches have to be created as protected spaces within established regimes, experimental activities have to be stimulated so that novel configurations can develop within niches, and experimental work has to be coordinated across niches with a view to breeding an alternative socio-technical system that can replace the incumbent one. In addition, interventions in the wider selection environment (e.g. through regulation, subsidies or taxes) can help niche developments to proliferate and expand. Against the background of this model of change, transition management articulates an experimental and explorative rationality of governance and suggests a specific procedural design for interactive vision-building and socio-technical experimentation. Transition arenas that are designed to work as platforms for committed stakeholders (frontrunners) to coordinate experimental activity and allocate publicly provided R&D funding to nurture sustainability transitions are a key element in this respect.

In following the innovation journey of transition management I focus on the practical construction work that went into the articulation of and experimentation with this new form of governance (cf. Van de Ven *et al.* 1999, Voß 2007b). The journey leads us through various sites of knowledge production and policy-making (and also through sites of business and profit-making; however, this aspect will not be treated in this paper). It shows the entanglement of activities in different sites and how transition management, in effect, is co-produced by knowledge-making and political actors, as a science and a new form of policy-making. Epistemic and political authority develop in a mutually supportive process. I propose to understand this form of coupling as a specific mode of governance which I term ‘realising’, a joint process of coming to know and making existent.

This paper particularly contributes to the broader questions of the special issue by offering a perspective that understands the construction of expertise to be integral to the development of public policy. Politics of expertise are thus not limited to the public uptake or the use of knowledge in the policy process. Politics is already involved in the process of articulating models as knowable realities, and in interactive work to make them true. This is a contingent process of negotiation which involves strategising and decision-making and which works to establish collective order – in knowing and doing. Real-world experiments play a key role in the production of policy knowledge and in the reconfiguration of social order. They produce evidence and configure power relations. And they both interfere and compete with other experiments that serve different coalitions of researchers and policy-makers in pursuing the realisation of alternative models. Politics inheres in those webs of entangled epistemic and political practices, and in their formative dynamics for collective order.

I proceed, in the following section, by providing some background on a performative understanding of policy studies. Then I move on to present the innovation journey of transition management as a case. I conclude the paper with a discussion of the dynamics of realising as a specific mode of governance, with respect to its productive potential and possibly self-undermining consequences.

Realising governance

Performative science

Behind the performative approach to policy studies lies a broader perspective. This perspective concedes that the making of knowledge about reality is not simply a matter of representation, in the sense of mirroring an untouched objective existence, but that it involves a hands-on reconfiguration of reality (e.g. Knorr-Cetina 1981, Hacking 1983, Latour 1983, Pickering 1994, Rheinberger 1994, Callon 1998, Latour 1999). In order to be represented in the form of particular models that explain it, reality has to be transformed. The messy complexity of reality “in the wild” is to be reduced, miniaturised and mobilised in order to fit theories that can make sense of it (Callon *et al.* 2009, ch. 2 “secluded research”). This is the practical task of research work, whether it involves designing computer models, constructing and assembling data from field studies, drawing maps of a territory, or composing stories and arguments on the basis of a text corpus or historical sources. All processes of knowledge production transform the reality that they describe. They assemble an “experimental system” (Rheinberger 1994), a simpler and more easily manipulable reality in which phenomena can be controlled so that they translate into symbolic representations such as formulas, texts, diagrams, images etc. (Latour 1986). Such representations are empirically valid in the specifically reduced and transformed reality. Theories work locally in the context of the laboratory. To gain wider validity, i.e. if descriptions are to hold, if theories are to have predictive power in other localities, these settings have to be remoulded in the image of the laboratory; the local reality of the laboratory has to be replicated – it has to be rebuilt and expanded (Latour 1983).²

What kind of reality can be made to work depends on the matter of study. It affords or resists certain configurations, meaning that reality is not freely decomposable and manipulable according to human will. A constructionist perspective, as inspired by Gaston Bachelard’s thinking about science in terms of *phenomenotechnique* and its development in empirical studies of laboratory practices (Rheinberger 1994, Knorr-Cetina 1995), understands knowable realities as being made, but not determined by the social dynamics of the research process. Scientific realities are contingent upon interactions with the object of study and how this object lends itself to being configured for the reproduction of theorised phenomena. Laboratory mice, for example, can be bred and genetically modified; they can be put in cages that make them move in specific ways and they can be injected with drugs. But they have certain requirements if they are to stay alive, which are beyond the will and imagination of human experimenters (cf. Gomart and Hajer 2003). Similar things could be said for elementary particles, chemical substances, language or human beings as matters of study, even if staying alive would mean different things in these contexts. The laboratory reality must remain productive. Matter thus has a say – it interacts in the research process. This

² Even though the concept of performative science developed in view of the natural sciences’ material constructions in the laboratory I propose to use the notion of ‘laboratory’ for any kind of confined research context, for example, also a seminar with humanist scholars which assembles selected references to passages of text in an attempts to create a knowable reality of human culture. Also here, findings are valid only locally, in the particular setting of a scholarly discourse. Expanding the validity of truth claims requires the expansion of the discourse which incorporates the set of references that make up the world that it describes.

understanding of a making of reality goes beyond symbolic interaction and performance (Edelman 1964, Hajer 2010) or the tilting of beliefs and generating of self-fulfilling prophecies (Merton 1948). It is a process of material-semiotic engineering that is performative in the sense that it not only produces discursive accounts, but along with them the very realities that they describe (Callon 2007, Law 2009).

What is important for understanding the relations of policy studies to public policy-making, is that, in order to become knowable, the reality of policy-making has to be transformed, mounted, installed in a very specific way. This involves practical work beyond communication and interpretation. It involves the reconfiguration of social practices, the material and semiotic engineering of arrangements that “hold together” (Desrosières 1991). Scientific work is all about this troublesome probing and pounding of new realities. Models are made true in experimental creations of order. Selected elements of an otherwise overwhelmingly thick, connected, diverse, multivalent, complex and impervious reality in the wild are to be rearranged to carve out a mini-cosmos in which things are conceivable and explainable in how they work together and produce effects (Callon 2009, Callon *et al.* 2009). This involves the making of a collective of knowing actors and a knowable reality. Expanding the truth that is manufactured in the laboratory implies the challenge of expanding both at the same time.

It should be mentioned that the demonstration of phenomena in laboratory experiments and their subsequent expansion as an application of scientifically discovered truths is a particular kind of performativity. In the social sciences, such organised and project-like performativity is embedded in more diffuse forms of performativity. Humans as objects of research are knowledgeable agents. They make sense of their activities in interaction with others, including social scientists (e.g. Giddens 1982 on “double hermeneutics”). The social sciences thus not only create phenomena by technically configuring certain knowable realities of social practice (in the laboratory, and then by applying ‘social technology’); they already do so by participating in broader ongoing societal debates where concepts are taken and shape social action in a more distributed manner (Osborne and Rose 1999, Law and Urry 2004). Even if these more diffuse kinds of performativity are difficult to trace, there are plausible accounts of how, for example, the very reality of individual rational agency (Giddens 1990, Barnes 2000) or the modern welfare state (Wagner *et al.* 1991) may be understood as a reality co-produced by the social sciences, not so much by technically fixing and expanding a laboratory reality, but by their embedding in a wider discourse which shapes the (self-)understanding of social actors and thus their patterns of behaviour (e.g. Merton 1948, Berger and Pullberg 1965).

The performativity of policy studies

The performativity perspective offers a new view on relations between policy studies and public policy-making. It reveals how policy studies are intertwined with politics. These are not just macro-linkages like the provision of public resources and institutional protection for research or the mobilisation of expertise in policy-making (Cozzens and Woodhouse 1995). Policy studies also involve public policy in their epistemic practices. They are fundamentally intertwined with politics. To experimentally produce their phenomena, they require support

in the form of political authority to reconfigure social practices and create settings that allow them to test and demonstrate their theoretical representations.

Policy studies have to create an ordered cosmos of governance in order to establish knowledge claims about political reality. While this may be done in laboratory experiments (Lezaun and Calvillo 2013), computational models (Axelrod and Cohen 2000) or in philosophical treatises (Habermas 1991), it is difficult for such highly stylised model realities to maintain equivalence with the wider reality of governance (Black 1955). This limits the relevance and authority of the produced knowledge. Herein lies a basic dilemma. While the irregular and uncontrolled reality of governance in the wild remains too complex to be scientifically knowable, translations in the form of simpler laboratory realities remain fragile and contested. It would thus be practically impossible to accumulate empirically demonstrated 'hard' knowledge about governance (cf. discussion in Osborne and Rose 1999).

However, there is one way to resolve the dilemma: by reconfiguring governance in the wild. If real world governance could be transformed into a knowable order that could be used to generate evidence demonstrating the validity of a scientific description of it, then it would not need the detour through the laboratory. In effect, that would require a transformation of the wider reality of governance into a controlled, calculable system, making it a machine (Ezrahi 1995, Pickering 1995, 7, see also Barry 2001).

Even if such a transformation were desirable for epistemic reasons, the capacity to achieve this lies beyond the power of policy studies – at least when it is performed as academic activity alone. In modern societies, the authority to configure social order in the wild is held by democratic governments and is generated through a different set of public policy-making practices. This is why public policy-making is of interest to policy studies in an epistemic sense: it acts as a collaborator in building experimental systems to produce knowledge. Policy-making can contribute to epistemic projects because it has a capacity to mobilise collective action and to some degree reconfigure and control social action in the field. The role of policy-making is to craft political support and assume authority for installing scientific model worlds at 'scale one'.

It appears that the practices of policy studies may depend on practices of policy-making to produce robust knowledge claims. If we turn our attention to practices of public policy-making we find a similar dependence on policy studies for the very task of mobilising collective action. Policy-making lacks another crucial capacity that can be decisive in seeking to establish policy proposals as collective action. In itself, policy-making lacks the means to produce epistemic authority that can certify the rationality and feasibility of proposed policies, and establish their factual rather than their normative adequacy. Engaging with real-world experiments thus appears equally important for policy-making.

Both policy-making and policy studies take place in a competitive struggle between different coalitions who seek to establish particular versions of world order. The practical challenge for both epistemic and political coalitions is to ensure propositions are collectively accepted – either for the purposes of knowing or for action. To this end, they develop knowledge claims and research fields or policy programmes and governments. If successful, these coalitions gain status and power within the fields of science or politics and, via their institutionalised

authority, also in society at large. If the practices of science and policy build on each other for success they become constitutively intertwined.

But there is a difference in how practices of policy and knowledge-making engage with experiments that reconfigure social reality. For policy-making it is a way to mobilise epistemic authority and legitimisation to support a project of collective (re)ordering and generate political power – e.g. by winning elections or negotiating strategies among stakeholders. Epistemic support may be important to settle controversies and enrol actors when the articulation of a common identity, values and interests remains difficult. The assertion of policy proposals may then depend on the ability to claim logical and factual necessity. This suggests that policy-makers should be concerned with the building of epistemic programmes that are aligned with political visions of collective order (Wittrock *et al.* 1991).

The potential entanglement of epistemic and political agendas can find concrete form in particular models of governance that act both as theoretical descriptions of governance and as policy proposals. They can function as organising devices that align epistemic and political practices in a shared project to install social order. While working for a particular model of governance, nascent scientific and nascent political coalitions can thus support each other in growing. The model provides a platform, an informal constitution for heterogeneous and distributed activities, a prospective structure which is to be fleshed out, stabilised and filled in with agency (also Callon 1987, cf. 'prospective structure' in the context of technological innovation introduced by van Lente and Rip 1998, Callon 2007 for a conceptualization in terms of actor-network theory and 'agencement').

For models to work in this way, they must be relevant to policy scholars and policy-makers alike. They must have epistemic and political promise. That implies that they must have epistemic potential, i.e. fit the dominant scientific discourse or offer scientific entrepreneurs a chance to break with and replace it. And they must have political potential, i.e. fit the political discourse and institutions or resonate with arising policy issues or expected shifts in political culture. In seeking to trigger and mediate a process of epistemic and political co-production (Jasanoff 2004), much depends on sketching a model so that it meets the requirements of potential constituencies in science and policy. Another critical issue is whether scientific and political coalitions can identify the potential synergies between their agendas and how they link-up and negotiate a productive intertwinement.

Real world experiments are at the core of epistemic and political co-production. If a research field and a political coalition, each with a particular scientific theory and a policy programme, have gained some ground in their respective fields, they are in a position to install a real world exemplar of the model that links their agendas. Real world experiments demonstrate the relevance of research agendas and help to mobilise public funding for the expansion of dedicated knowledge production capacity. They also generate empirical evidence to further corroborate epistemic claims. Enhanced science can, in turn, more effectively support the policy proposals and power strategies of political coalitions so that politics can more effectively reconfigure social relations, distribute resources, set up organisations, put people in positions and anchor the model institutionally. A new reality of governance is created, in knowing and in doing (for a schematic overview see figure 1).

Figure 1: Realising governance as co-production of epistemic and political authority

Involvement with the making of a governance model can thereby make both successful scientists and successful policy makers. A model may thereby give rise to a specific trajectory of collective agency that combines practices of knowledge and policy production. The prospect of a world in which the model is made a reality raises expectations among actors, who mutually align their distributed activities with a view to working towards its realisation (Voß 2007a, Voß and Simons 2014). Mutual alignment does not necessarily mean shared understanding. Within and across the fields of academic and political practice (and also fields of administration, business and journalistic practice, for example) there may be a range of quite different meanings attached to the governance model and those engaging with it may have different purposes. These various practices instrumentalise each other for their respective purposes, but this is not necessarily a conscious tactic. Positive feedback may simply lead them to grow together and become materially entangled. This may happen, for example, by jointly working on and with certain objects such as documents, charts, metaphors, databases, classification systems, metrics, analytical tools or dedicated institutional and technological infrastructures like conferences series, web portals, training programmes etc. Such objects and arranged spaces constitute material linkages between practices, even if their purpose is interpreted differently (for heterogeneous forms of collaboration around 'boundary objects' see Star and Griesemer 1989). For example, functional models, databases and evaluation schemes of governance experiments may be of equal importance to an emerging academic field and a striving policy movement, even if these elements serve them in different ways. Apart from the implicit emergence of such material entanglements the coordination of epistemic and political work for the realisation of a governance model may also be explicitly negotiated. Intersecting academic and political interests may be discursively reflected on and coordinative arrangements strategically set up – such as dedicated science-policy exchanges, learning platforms, or associations which support the development of certain governance models in theory and practice. Both within

implicit material entanglements and explicit discursive entanglements, policy studies and policy-making jointly work to configure a new political reality. As they embody and strive towards this co-produced reality, certain strands of knowledge generation and policy-making are mutually constitutive of each other. This intertwining of epistemic and political work with regard to particular models of governance is what I term *realisation*. I come back to it in the conclusions, where I discuss it as an epistemic-political mode of governance. But first let us have a look at how epistemic and political practices mutually shaped and supported each other in realising ‘transition management’ as a model of governing socio-technical change.

Realising ‘transition management’

The case of transition management illustrates some of the above-conceptualised aspects of realising governance. It shows how the model mediates epistemic and political practices, and also how the model takes shape and undergoes change as part of the process in negotiations across the contexts of science and politics.

Strategic niche management and the Dutch ‘sustainable technology development programme’

In the beginning of the 1990s, a model termed “strategic niche management” (SNM) first provided a link between an emerging epistemic agenda of co-evolutionary technological innovation studies and an emerging Dutch policy programme to further green innovation as a means of environmental policy.

The new research perspective built on insights into the paradigmatic structuration of science and technology development provided by historians of science and technology and evolutionary economists (Kuhn 1962, Rip 1981, Dosi 1982, Nelson and Winter 1982). This view was amended with a sociological analysis of institutional and material structuration processes and how they linked up with cognitive structures to form “technological regimes” (Disco *et al.* 1992, Rip 1992a). Socially negotiated and historically embedded technological performance criteria and institutional infrastructures were found to have restrictive effects on innovation, meaning that radical novelty could only emerge in “protected spaces” (van den Belt and Rip 1987, Rip 1992a, Rip 1995). The theory thus proposed that policies seeking to promote path-breaking innovation had to actively create and shape such protected spaces as “niches” for radical technological innovations to mature and stabilise in a sustaining socio-technical environment.

This provided a background and starting point for new innovation policy approaches (Rip 1992a, Rip 1992b, Schot 1992a, Schot 1992b). The new approach was to grow new technology, together with requirements and specifications, user practices and accompanying regulation, directly in interaction with society. It provided an alternative to subsidising R&D work that sought to fix designs inside the laboratory – only to learn at a later stage that ready-made technologies don’t fit the wider societal context and have no chance of surviving ‘in the wild’ (Rip *et al.* 1995, Schot and Rip 1997). Professional technology developers and policy-makers were to cede control over specific designs and immerse themselves in an interactive process with users, concerned groups and publicly articulated concerns. This promised, in turn, to produce inherently embedded and robust innovations. It meant delegating agency to

collective processes of negotiating and probing new technological designs (see also Garud and Karnoe 2002).

This also allowed public policy to shift towards a procedural mode of engagement and step away from a problematic history of substantial technology decisions and technology forcing. By creating niches for collaborative developments to unleash their own dynamics, public policy was able to play a role on the meta-level, where its core task was to safeguard fragile and tenuous configurations against otherwise overwhelming competition from already established technologies (Rip 1981, Rip and Nederhof 1986, Rip 1992a, Rip 1992b, Rip and Groen 2002).

This allowed a growing policy movement to construct a theoretically supported proposal for a new environmentally targeted innovation policy (Vergragt and Jansen 1993). Technological innovation, and the public support associated with it, was mobilised to promise a shift in industrial production and consumption towards more benign patterns – and this without recalling failed attempts at state-directed technology development. Strategic niche management promised an approach that would grow alternative technological pathways rather than pushing and steering them.

For the emerging field of policy studies, the uptake of strategic niche management for policy-making put a real world experiment into perspective. This would generate empirical cases and evidence for the new co-evolutionary theory of technological innovation and its propositions for the governance of socio-technical change. By supporting the implementation of respective political practices policy scholars hoped to be provided with a series of exemplars of their governance model (Schot 1992a). This made a case for the environmental innovation policy movement and the emerging community of co-evolutionary innovation policy scholars to join forces on an agenda to realise SNM and interweave their epistemic and political agendas.

The wider landscape was supportive of the development of this new integrative model of innovation policy, which promised to reconcile environmental and economic goals for sustainable development. This occurred at the beginning of the 1990s, in the wake of the Brundtland Report (WCED 1987) and the first Rio Earth Summit (UNCED 1992). Tentative ideas for SNM were incorporated into the design of a policy programme for Sustainable Technological Development (DTO, Duurzame Technologische Ontwikkeling)(Vergragt and Jansen 1993, Vergragt *et al.* 2000). The programme, at the same time, picked up on a nascent discourse of ecological modernisation and made it concrete (Hajer 1995). The DTO programme was set up at the Environmental Ministry (in cooperation with four other ministries). It provided targeted support for experiments with technologies which were identified through backcasting measures as particularly promising for achieving a reduction in environmental impact of 20% within 50 years. In the period 1993–1998, DTO provided NFL 25 million to five focus areas (food, water, housing, transport and chemistry).

On the policy side, the DTO programme helped to align networks of environmental and innovation policy. A scientifically endorsed proposal for a policy that could direct technological development towards reduced environmental impact and still meet the goal to develop new products with world market potential was important in this respect. The design

of the programme had to “convince policy makers that technology can further sustainable development” and to make sure that it was possible to “influence technology developers to include sustainability in their list of design criteria” (Smits and Kuhlmann 2004, 21). On the side of innovation policy studies, the DTO programme boosted public support and relevance and gave researchers a range of empirical cases of innovation governance that sought to replicate the SNM model (Kemp *et al.* 1998, Hoogma *et al.* 2002). The DTO programme thus facilitated the further articulation of SNM as a governance model.

The pairing of co-evolutionary innovation policy studies with an emerging coalition for environmentally oriented innovation policy was one among a number of ongoing projects that sought to realise particular models of governance. The nascent SNM project was partly complementary to, and partly competing with those other projects. There is no space here to give detailed accounts, but it should be mentioned that SNM-related activities interacted and interfered with a number of different approaches. These included models of push- or pull-oriented technology-forcing based on a linear understanding of the innovation process, free-market approaches that advocated abstaining from attempts to govern innovation apart from regulating end markets and thus giving incentives for environmentally oriented innovation, or approaches that saw innovation processes as embedded in broader power structures and therefore framed technology development mainly in terms of political struggle, leaving little room for problem-oriented collective learning on the side of innovators and society or in governance. Yet, at a broader level SNM was resonating positively with tentative articulations of a “third way” between economy and ecology that were transnationally taking shape at that time in the form of discourses of ecological modernisation (Hajer 1995) and sustainable development (Redclift 1993), and with an even wider increase in interest in a discourse of “new governance,” which decentred the role of state agency in accounting for processes of collective ordering (Rhodes 1996, Djelic and Sahlin-Andersson 2006, Bevir 2010). The latter helped SNM to gain ground in relation to competing models, both in policy studies and in policy-making. Both at home and abroad, the DTO programme was recognised as an exemplar of a new model for the governance of innovation (Schramm and Wehling 1998).

The experiment showed, however, that it takes more than presenting a theoretical proposition to realise a model of governance. Realisation requires the reconfiguration of material realities and involves contingency, setbacks and internal dynamics in working with resistant matter, in this case directly in the wild of Dutch innovation governance (cf. Callon 1998, Callon 2007; for a detailed discussion of the performativity of economics in the design of markets). The DTO’s experience of putting SNM in practice made the actors realise that the model had to be further developed to incorporate specific procedures for selecting and operationally managing niches. More significantly, it appeared that a focus on isolated technology-oriented experiments was not sufficient for environmental innovations to be successful in an adverse regime context. They had to be coordinated and linked with each other to create the momentum necessary for an alternative socio-technical system to shift the existing socio-technical regime. This was a new requirement added to the agenda for developing SNM as a model for the governance of environmental innovation processes (VROM-Raad 1998). Yet, even with this disenchantment with initial promises, DTO testified to the relevance of SNM and mobilised support for related research activities. It also created opportunities for an emerging political coalition supporting environmental innovation policy

to concretise a shared vision, enter positions of power and build their own institutions. Beyond academic research and public policy, the DTO programme triggered the development of a new consulting and services sector around sustainable innovation. Private consultancies, project developers, publishers, conference organisers, and the like, discovered the topic, and their engagement lent it momentum and shaped its trajectory. The Dutch National Initiative for Sustainable Development, NIDO, was established as a platform for facilitating interactions across science, public policy and business (van Leenders 2003).

Transition management and the Fourth National Environmental Policy Plan

In preparation for the Fourth National Environmental Policy Plan NEPP4 (VROM 2001), the SNM/DTO alliance was re-activated to support a new venture seeking to realise a co-evolutionary model of innovation governance. This time, ten years later, it was the transition management (TM) model – a revised version of SNM – that revitalised relations of co-production with the aim of establishing new knowledge and shaping social order.

In the meantime, additional research to articulate the dynamic relation between niches and socio-technical regimes had been conducted. The limited success of the SNM model in the DTO experiment was rationalised and explained in dedicated policy analyses, which pointed to structural barriers for the expansion of niches. They thus offered a revised governance model which gave greater weight to broader system changes in terms of the political economy of incumbent technologies (Kemp 1994, Kemp 1996). This led to a more explicit multi-level perspective on innovation that emphasised the wider socio-technical context of (managed) niche developments and their interaction (Rip and Kemp 1998, Kemp *et al.* 2001). The relevance and practical promise of the revised model was illustrated with designated policy tools such as scenarios of future innovation and transition dynamics which could serve as a background for orchestrating niche management activities with a view to regime changes (Geels 1999, Elzen *et al.* 2002). To prop up this new model with evidence, researchers undertook historical studies of multi-level transition processes (Geels 2001, Geels 2002a).

The political debate in the aftermath of DTO concentrated on the limitations of niche-focused environmental innovation policy. Critics claimed its managerial approach avoided public debate and participation and ignored structural aspects of sustainable development such as deep rooted power relations (Hajer 1995). Responding to such critique, the policy discourse shifted to emphasise system transitions to overcome “persistent problems”, and included the requirement for a comprehensive participatory approach in order to win broad societal support (VROM-Raad 1998). This was supported by shifts in the transnational policy discourse, which, for the 10th anniversary of the World Summit in Rio de Janeiro 1992, featured the restructuring of “systems of production and consumption” as a core component of sustainable development. The broadening of the agenda strengthened the role of the Dutch environmental ministry where an emerging policy coalition around sustainable innovation had its institutional stronghold. An interdepartmental working group “Knowledge and Technological Innovations” (KETI) was set up in 1999 to prepare the 4th National Environmental Policy Plan (NEPP4). It emphasised that major problems were “persistent” in spite of past policies (e.g. biodiversity, climate change and depletion of natural resources) and called for policy to induce and shape system “transitions”, rather than focusing on individual

technologies. The report included a first sketch of a process to manage system transitions. This picked up on notions and mechanisms such as variation, learning in niches, the selection of viable options and it proposed a phase model of transition processes comprising stages of initiation, acceleration, stabilisation (KETI 2000). The environmental ministry (VROM) had one important expectation in seeking to push the transition approach for the National Environmental Policy Plan: it sought to enrol the ministry of economics (EZ) in support of an environmental policy agenda (Kemp and Rotmans 2009, 309-311).

In a next step, VROM offered research grants for innovation policy scholars to develop the notion of transition management and explicate it for the case of a low carbon energy transition. A grant was awarded in May 2000 to a consortium of scholars from the co-evolutionary socio-technical change community together with experts in participatory integrated assessment. The listed requirements for the model were that it would have to work for the concerns of research and policy, support a promise to achieve transitions in 20–30 years, and secure the support of wider policy circles and the broader public (Kemp and Rotmans 2009). In six months of collaborative work, the basic elements of a governance model of TM were articulated (Rotmans *et al.* 2000). These included the representation of socio-technical transitions in the form of an upward bent S-curve, a platform to articulate systemic sustainability visions and design experiments by relevant societal stakeholders, and a procedural framework for exploring and learning about sustainability pathways in iterative cycles of vision building, experimentation, evaluation and re-visioning. These elements were the result of intense negotiations between policy scholars and policy-makers across different departments in public administration (Kemp and Rotmans 2009). Initially, energy policy experts were reluctant to buy into transition management as a new approach to innovation policy, but they were convinced when they saw that the framework left enough space for different actors to individually interpret it and enact it. In order to ensure involvement in the energy policy field, the environmental ministry conceded that transition management would not specify substantial goals or measures, but constitute an open procedure for interactive learning with stakeholders. The model contained the provision that the “playing field” is to be “kept wide”, with no particular technological options excluded (Kemp and Rotmans 2009, 309-311).

While the model had drifted in the direction of a managerially steering approach to the transition process, and away from nurturing and modulating ongoing distributed innovation activities, the theory of co-evolutionary socio-technical change and the empirical evidence that had been produced to support it could still be mobilised to rationalise its approach and make good on its promises. And it worked to keep policy innovation scholars on board as it still let them anticipate a furthering of their epistemic agendas, if public policy moved ahead to implement the model.

When NEPP4 was published in June 2001, it featured transition management as a new policy approach to tackle “persistent problems” and overcome the limitations of support actions for isolated technological innovation projects (VROM 2001, 77). The research report, and a coalition of environmental and energy experts that had developed around it, helped VROM officials to win support from their minister who had originally favoured a regulatory “ecological footprint” approach (Kemp and Rotmans 2009, 312). In addition from its adoption

in the NEPP4, the model of transition management was published as a contribution to academic knowledge by members of the research team (Rotmans *et al.* 2001). These two strands continued to shape the development of transition management in the years to come, with researchers seeking to establish the model and its underlying theory in academic debate, and policy-makers seeking to use it to build political coalitions, win public support and realign the practices of doing technological innovation.

Establishing transition management as science and policy

The research community that was engaged in developing the transition management model, and here especially the members of the consortium that had been commissioned by VROM, sought further opportunities to articulate and test the model, which had only been vaguely sketched out for use in the policy arena. The leading partner in the consortium offered consulting services and convinced a client, the regional development office for the Parkstad Limburg that the regional planning task that they were facing was “a perfect opportunity to implement, test and further develop the approach of transition management” (Loorbach 2007, 201). This allowed the design to be further specified and operationalised. Parkstad Limburg was staged as “the first ever project in which transition management was integrally used” (Loorbach 2007, 47), notwithstanding the obvious difference between the challenges of regional development planning and the of governing socio-technical change. Another difference was that transition management now featured as a consultancy tool rather than a design for public policy, and that regional development was not as hotly contested as, for example, the transition to a new energy system. Nevertheless, the results of this (and other) experiments were publicly presented as proof that basic elements of the model, such as the “transition arena” for stakeholder engagement, could work with “real people” (Loorbach 2007, 210).

In a context of policy-making, the transition management model, as outlined in NEPP4, was quickly taken up at the EZ. Departmental officials immediately used the reference to transition management as a basis for rationalising a reorientation of innovation policy to favour stronger interactions with industrial stakeholders. An energy transition project (Energie Transitie, ET) was set up with the aim of defining a shift from regulatory governance to more facilitative and business-oriented approaches. A market survey concluded that the “transition approach” could bring stakeholders together while still leaving open any specific decisions on the sustainability of various energy options. Five pilot projects were started on “biomass, new gas services, modernising energy chains, chain efficiency, and policy renewal”. Three of them were led by stakeholders from industry (van der Loo 2009, 4). Still, there was resistance, against an approach developed under the auspices of VROM, based on the fear that it would soften market principles. The “policy renewal” project concluded its work with a report in 2004 titled “Innovation in Energy Policy”, which confirmed a potential of transition management to improve relations with the business community and proposed an implementation plan. Five “transition platforms” were installed in 2005, headed by key figures from the business world, and supported by a new funding scheme which dedicated €35 million to experiments that were to be suggested by the platforms. Within the platforms, existing policy targets were taken as a basis for negotiating sustainability visions among a selected group of stakeholders. Transition platforms were

supervised by a high-level advisory group, the Task Force Energy (TFE), chaired by the CEO of Shell NL. TFE called for a doubling of R&D expenditure and required to guarantee a stable regulatory framework (van der Loo 2009, 5). In 2005, an Interdepartmental Project Directorate Energy (IPE) with 30 government officials from different ministries, jointly chaired by directors from VROM and EZ, was set up to counter the industry-led TFE. In 2006, it published policy measures aiming to keep the transition process on track. This included a Competence Centre for Transitions, which would offer trainings on how to do transition management right.

A change in government in 2006 brought a new interdepartmental programme on energy, labelled “Clean & Efficient” (Schoon & Zuinig), to be directed by a sub-council of ministers, with VROM in a central position. It preserved elements of the institutional set-up for the energy transition and put IPE in charge of “long-term innovation” while TFE became an industrial advisory board with representatives from transition platforms (Regieorgan). Transition platforms were supplemented with voluntary sectoral agreements on energy and climate and with a climate campaign to address consumers (van der Loo 2009, 13).

In June 2008 the cabinet adopted a “National Energy Innovation Agenda”, which was based on the visions articulated in transition platforms and backed by over 30 funding programmes with an overall budget of €438 Million for the period 2008–2012. About a quarter of this, €27 Million per year, was allocated to long-term innovation which led to the statement that the “energy transition is now anchored within government policy” (van der Loo 2009: 6). The administration of R&D funding, however, was handed back to individual ministries. In effect, the supported experiments were all innovation policy activities that were ongoing in any case. In conceptual terms, the language of socio-technical transitions was gradually replaced by more conventional concepts of innovation management such as a “valley of death” between invention and marketing, “accelerated market entry” or “social barriers to market acceptance”, and functionally oriented “innovation system analysis” (Hekkert *et al.* 2007). In operational terms, Dutch innovation policy, by 2008, had snapped back to its state before transition management, as “experiments” had to pass expert-led assessment with a view to moving “from demonstration to market” in order to receive funding.

Academic observers debated whether the model of transition management was successful in replacing the entrenched “neoliberal market model” that was prevalent in Dutch energy policy (Kern and Smith 2008, Kern and Howlett 2009, Smith and Kern 2009). Yet, in some respects the model had clearly contributed to a reconfiguration of innovation policy in The Netherlands. And its uptake, even if only as a legitimating framework, ensured continued public support for dedicated academic work. In 2004, VROM provided a grant of €20 million over six years to support the building of a knowledge infrastructure for transition management. The “Knowledge Network on System Innovation and Transitions (KSI)” comprised a consortium of nine universities and more than a hundred researchers, half of them PhD students. It enrolled a considerable number of Dutch innovation policy scholars for research into socio-technical transitions and their governance (Kemp and Rotmans 2009). Experts were frequently called in to support ongoing experiments that aimed to put transition management in practice. They acted as advisers, supervisors, evaluators, facilitators, trainers or expert witnesses, sometimes as delegates on behalf of VROM to

negotiate the set-up of TM with other stakeholders. With funding from the KSI grant, the Dutch Research Institute for Transitions (DRIFT) was set up as a think tank to further develop and implement the transition management model.

As part of their funding obligations, KSI undertook efforts to expand transnationally and to “cosmopolitanise” (cf. Deuten 2003) transition management as a governance model beyond the Dutch context. This included building linkages with established research traditions and theories of innovation, complex system dynamics and governance (e.g. Loorbach 2007, Loorbach 2010). KSI actively engaged with an international network of researchers that focused on co-evolutionary perspectives on socio-technical change, similar to the network that had given rise to transition management in The Netherlands. Throughout the 2000s, elements of this had already been used to design and experimentally apply governance approaches in other places. It has, for example, been a guiding concept in conceptualising and evaluating research programmes in Austria (Späth *et al.* 2006), in an interactive sustainability foresight process in German utility sectors (Voß *et al.* 2006b, Truffer *et al.* 2008), in the analysis of innovation policy options in the United Kingdom (Foxon *et al.* 2004, Geels *et al.* 2008), and in policy initiatives on health and innovation in Finland (Heiskanen *et al.* 2009).

The ongoing policy processes in The Netherlands had drawn international attention and KSI’s efforts to expand transnationally connected with earlier efforts to bring together international research on shaping socio-technical change. The German Research Ministry, for example, as part of an initiative to develop infrastructures of social-ecological research funded a series of international workshops on shaping sustainable transformation in 2001-2003 (Voß *et al.* 2006a), a workshop on the governance of sustainable development in 2004 (Newig *et al.* 2007), and another series on system innovation for sustainable development in 2006-2007, which took up Dutch policy concepts and experiences (Voß *et al.* 2009, Smith *et al.* 2010). The latter series was co-funded by the KSI network.

In parallel with the Dutch policy experiment, there thus emerged a transnational research community around socio-technical transitions and sustainable development. Dutch transition policy provided a key exemplar and was exploited for data generation, even if the model and its implementation were critically debated (e.g. Shove and Walker 2007, Rotmans and Kemp 2008).

Some particular points of critique were: (1) a managerial approach of establishing a new social order that is implicit in transition management, ignoring a diversity of publicly relevant views, values and concerns (Shove and Walker 2007, Walker and Shove 2007), (2) the simplicity and selectivity of the general framing of socio-technical change and sustainability that underlie the model of transition management (Smith *et al.* 2005, Smith and Stirling 2007, Smith and Stirling 2010), (3) a democratic deficit in conceptualising and conducting the policy (Hendriks and Grin 2007, Hendriks 2008, Hendriks 2009), (4) naivety with respect to the politics of learning and experimenting for socio-technical change (Meadowcroft 2005, Meadowcroft 2007, Meadowcroft 2009, Smith and Stirling 2010, Voß and Bornemann 2011) and a neglect of political dynamics that interfere with the process of policy design and implementation (Kern and Smith 2008, Kern and Howlett 2009, Voß *et al.* 2009), and (5), especially with regard to the Dutch energy transition, a widespread critical

assessment referring to capture by incumbent industrial interests and a competing neo-liberal discourse coalition (Kern and Smith 2008, Smith and Kern 2009).

Nevertheless, protagonists of the transition management model worked hard to uphold the Dutch energy transition as “an example of how transition management could be operationalized” (Loorbach, 2007:47-48). They claimed that the experiment demonstrates a “shift from transition management as an experimental idea to transition management as a more or less institutionalized practice” (Loorbach, 2007:285) and, beyond that, that the model was “successfully implemented and tested in a selective amount of cases” (Loorbach, 2007:286). While they conceded that “we cannot as yet (and perhaps only will in decades) prove that transition management works, a lot of indicators seem to suggest that it certainly does” (Loorbach, 2007:289). What counted was that it “motivated individuals to do things differently: in terms of research where nowadays dozens of researchers from different disciplinary backgrounds operate in transition research projects, and in terms of practice, where hundreds of professionals are involved” (Loorbach, 2007:282). Such remarks at least hint at a shifting trajectory of research and policy practices. Dedicated organisations like DRIFT, but also more distributed investments in personal skills and careers, and newly established positions of expertise gave it momentum and worked towards its realisation. This included efforts to expand the constituency of the model and to establish and police professional standards in doing transition management: “only a handful of people have a thorough knowledge concerning implementation of the complete transition management approach (...) It is therefore also necessary to engage in critical debate between practitioners and researchers about what is considered to be transition management and what is not” (Loorbach, 2007:288). A guiding vision was “an inventory of ‘best practices’, some sort of quality control and a community of transition professionals. These professionals need to be educated in the transition (management) approach, in theory and in practice” (Loorbach, 2007:288).

While the development of TM was centred on The Netherlands, it was clearly oriented towards international expansion. The KSI grant explicitly demanded international networking and efforts to build a transnational research community (Grin *et al.* 2010). In 2009, on the occasion of the first International Sustainability Transitions Conference (IST), an international Sustainability Transitions Research Network (STRN) was launched on the basis of a research agenda jointly articulated by research partners from different disciplinary and national backgrounds (<http://www.transitionsnetwork.org/>). STRN continued to organise IST conferences on an annual basis. In 2011, the network founded its own journal, the Journal of Environmental Innovation and Societal Transitions (EIST). In 2014, it comprised more than 800 members who jointly developed project proposals and conducted research aligned with a shared agenda and funded by various national agencies and the European Union.

As the model expanded and gained momentum, its constituency came to incorporate a broader and more diverse set of epistemic and political practices from across different research traditions and policy contexts. TM-related research broadened conceptually and empirically (Smith *et al.* 2010). The model community acquired a dynamic of its own. Research on complex systems, business strategy, economic modelling and other approaches of an emerging “science of sustainability” were linked up with transition research and management. In an attempt to incorporate wider areas of innovation research and policy, scholars modified and extended the transition studies beyond its roots in quasi-evolutionary

theories of socio-technical change (Markard and Truffer 2008, Rotmans and Loorbach 2009, Markard *et al.* 2012, Safarzynska *et al.* 2012). The synthesis of evolutionary, interactive-relational and discursive dimensions of socio-technical change that had constituted the epistemic foundation for transition studies up to 2000 (e.g. van den Belt and Rip 1987, Rip 1992a, Rip 1992b) gradually moved out of view; it was explicitly left when it was re-articulated as separate theoretical study programmes with distinct policy, management and research implications (Garud and Gehman 2012).

By around 2010 it seemed that a basic vocabulary of niche, regime, landscape, vision and experiment plus a few iconic figures, like a depiction of multi-level transition dynamics from (Geels 2002b), provided the anchoring of an epistemically and politically rather diverse field. In this loose fashion as “boundary objects” which are flexibly interpreted in different epistemic and political contexts (Star and Griesemer 1989), the multi-level perspective and TM spread quickly and came to figure centrally as policy proposals for sustainable development and innovation, for example, in Germany (WBGU 2011: 99-100)(<http://www.fona.de/en/10011>), in the United Kingdom, in Finland (Heiskanen *et al.* 2009), in the European Union (<http://www.visionrd4sd.eu/>) and the United Nations (<http://www.unep.org/resourcepanel>). A conference at the University of Tokyo, in February 2010, was entitled “Transition Management for Sustainable Society – European Experience and Japanese Context” (http://pari.u-tokyo.ac.jp/event/smp100213_info.html) and stated the aim to explore the transfer of the transition management model to Japanese policy contexts.

The constituency seeking to realise TM as a model of governance rapidly expanded between 2009 and 2014, but at the same time it became less discernible in epistemic and political terms. It may be argued that it lost the characteristics of a specific programme as it interacted with various policy contexts, in a process that resembles “epistemic drift” (Elzinga 1997), and has become an “umbrella term” in a broader discourse of grand challenges (cf. Rip and Voß 2013). While the development of SNM and TM was, in the beginning, characterised by a close entanglement of epistemic and political practices for a consistent and mutually productive programme, the model became increasingly frayed on both the science and the policy side, as new research fields and policy movements were incorporated.

Conclusion

The story of transition management shows the co-production of knowledge in policy studies with a new reality of public policy. Transition management was realised in two ways. First, the model was established as collective knowledge, a widely perceived reality of governance. That does not mean that there is no difference in specific understandings and no controversy about its meaning. Academic debate is ongoing as to how transition management can and should describe actual processes of innovation governance. But transition management has become a phenomenon that can be referred to, some thing on which there is a literature. Conceptual and empirical investigations can be referenced; several review articles can be cited. Transition management exists in the form of a burgeoning field of sustainability transitions research with specialised research institutes, an international association, a dedicated journal and several large international research projects. Second, transition management has become established as a pattern in social practice, a specific configuration

of doings, a new material reality of governance. The model has become public policy, it can interactively be engaged with, practices can be observed, actors interviewed, programmes and organisations studied, and emerging networks, discourses and institutions analysed. Transition management can be empirically studied. The practical realisation of the model is ongoing, and as it is lived and expands it continues to change shape. Of course, we may debate how deep and how far practices are aligned with each other and how these patterns resemble the model. In any case, however, there are material activities and products that bear an imprint of the model and which are constitutively related with it. So transition management is real. It has been realised.

My claim is that neither the knowledge nor the actual policy of transition management came about independently. The knowledge did not come first and then policy that learned to apply it in practice, or to use it for legitimisation. Nor was policy first, creating a new reality and then having been followed by a dedicated strand of policy studies to observe, analyse and explain it. I argue that they gradually developed in conjunction with each other. They propelled each other into being. A new science of governance and a new ordering of practice were co-produced (Jasanoff 2004). They constitute each other and are actually two dimensions of the same process of collective ordering (cf. Foucault 1980). Accordingly, the relevant interactions are not between science and policy as separate worlds (or systems) that trade knowledge (research reports, expert reviews and testimony...) for political support (public recognition of relevance, funding, institutional protection...) as resources. Rather than science-policy *interaction* there is *co-action*: epistemic and political practices imply and build on each other as both are part of a web of entanglements that has dynamically built up in a joint history (cf. the concept of 'agencement' or 'assemblage' in Marcus and Saka 2006, Phillips 2006, Callon 2007, Irwin 2008, Chilvers and Evans 2009).

My account of the transition management case attempts to sketch a particular form of 'knowing governance'. It is based on active participation in the emerging research field, on interactions related to the making of science and policy, on the observation of settings, circulating metaphors and storylines, analytical tools and emerging practices, and, of course, on the reading of academic literature and policy documents. Yet I did not from the outset aim to report on transition management as an emerging reality of governance. My account lacks detailed empirical accounts of the distributed activities that shape and sustain it in places which I did not happen to encounter and which are not reported on in the accounts of others. Clearly, there is more to do in taking up and developing the research perspective outlined in this paper. This would require ethnographic study in different sites of knowledge production and policy-making with a view to following circulating symbols and objects that connect them and shape a space of 'knowing governance' (cf. Marcus 1995, Keller 2005: 260-261, Barry 2006, Feldman 2011, Peck and Theodore 2012).

I will end with a few words on the dynamics of 'realising' as a mode of governance. While modes of governance, like hierarchy, market, network or community, are conventionally understood as arrangements of certain rules of behaviour, that is, as institutions in terms of shared expectations of what *ought* to be done, the mode of governance that is connected with the co-productive realisation of a model in epistemic and political practice is understood to work through the collective knowing of reality and the collective enactment of that reality.

Governance works here as the intertwined building of science and order. Realising does not produce collective order through institutionalised relations of command, exchange, negotiation or solidarity, but through collective ordering that takes place in real world experiments (Krohn and Weyer 1990, Muniesa and Callon 2007). Policy studies take part in this kind of governance, just like public administrations, corporations, professionals, citizens do, but in a specific way, by making models and engaging in experimentation. They contribute to create the reality that they describe. Apparently there is a connection between realising as a mode of governance and approaches such as “experimentalist governance”, which aim to discover functioning arrangements through trials in practice (Sabel and Zeitlin 2012). They usually assume reality and functions of governance as given, however. Realising in contrast, traces the construction of specific realities in the course of the experimentation process, together with the establishment of epistemic-political constituencies that sustain them (Voß and Simons 2014). Realising governance thus studies the design, installation and evaluation of experiments in governance as a particular type of politics rather than a neutral, objective process of learning.

The productive potential of realising as a mode of governance is that it includes the articulation and probing of designs for collective order in the secluded and protected spaces of science, in laboratories in the widest sense. When laboratory constructions have been locally tested and stabilised they are gradually released as ‘scientific findings’, imbued with epistemic authority. It thus allows radical innovations to be nurtured, innovations that would otherwise be pulverised in political debate or dismissed against a background of established regimes of governing practice. By assigning the design of new forms of order to science, participation in their negotiation can initially be limited to a selected research collective. It depoliticises governance and effectively reduces its complexity. This allows for the articulation of a coherent model rationality that can later be explored and further negotiated in wider public debate and practically tested in specific political contexts. Even if political projects fail it may strengthen the model as it provides data and lessons on how to improve ‘implementation’. On a broader level, it may be argued that the governance of modern society widely works through such a scienticised mode (Ezrahi 1990, Ezrahi 2003). As specific examples one may refer to the realisation of social groups through statistics (Desrosières 1998), the making of financial markets through option pricing theory (MacKenzie 2006), the creation of public opinion through practices of polling (Osborne and Rose 1999) or the construction of citizens by methods of public participation (Irwin 2001, Lezaun and Soneryd 2007, Laurent 2011).

Just like other modes of governance, realising has particular problems. It appears that its main strength is also an important weakness. Depoliticising the design of governance through scientific modelling and laboratorisation do not just pragmatically simplify the process of coming up with an initial proposal for collective action. A key aspect is that laboratory constructions are presented as facts, as scientific and, by implication, neutral and objective representations of a given reality of governance. The scientific configuration of governance models invokes epistemic authority with regard to necessities and possibilities of governing in order to make proposed orders publicly accepted. The value and power implications of particular reductions of the model are concealed. The order composed in the laboratory is immunised against political critique: knowledge claims are not debatable in

terms of worldviews, values and opinion. They need to be challenged as facts and this excludes the possibility for contestation by lay people; it requires engagement in expert discourse and leaves out democracy (Callon *et al.* 2009). Epistemic authority thus displaces politics. Governing by realising has a technocratic tendency. Even if it does not seek to objectify substantial assessment and the decision of policy issues, it does objectify of the design of governance arrangements and procedures for arriving at political decisions.

Lastly, a self-undermining dynamic may become apparent in the long term. As collaborations between science and politics can boost the productivity of epistemic and political agendas, the effect may be reflected on and strategically used for competitive struggles in epistemic and political fields. Epistemic and political coalitions may shape their agendas with a view to making a good match with powerful partners. The intertwining of scientific and political developments may not be emerge occasionally, but become a strategic orientation of scientific and political practice. Governance would become an innovation race between powerful epistemic-political coalitions. That would favour an oligopoly of strong actors while small and independent initiatives in science and politics that lose the epistemic-political arms race are effectively marginalised (Voß 2013). Apart from a loss of epistemic and political diversity and thus a reduced capacity for societal adaptation and self-renewal, such a dynamic could also undermine the very basis of its initial productivity. If epistemic and political projects are no longer publicly seen as distinct and independent ventures, the cultural basis of epistemic and political authority is undermined, and they lose the capacity to support each other. If public policy relies on scientifically established necessities and functions, it loses its ability to perform a representation of human collectives as willing subjects with common values and interests (Latour 2013: 127-135). Likewise, if science comes to rely on politically established criteria of relevance and political support to build its experimental apparatus it loses its ability to perform a neutral representation of objectively given reality. This also undermines their ability to support each other (Ezrahi 1990). Initially this may trigger even closer relations and a mutual clinging of science and politics as they seek to compensate for their dwindling authority (cf. the account of an increasing scientification of politics and politicization of science in Weingart 2004, Maasen and Weingart 2005). This would further accelerate the dynamic and effectively undermine their capacity to co-produce collective order. The effectiveness of realising as a mode of governance could undermine itself, if it was anticipated and became a visible strategic orientation that shaped the understanding of scientific and political effectiveness in public.

As with any bit of history there is no inevitability to these dynamics, even if the diagnosis was valid. The dynamics of science and politics and their interactive trajectories are embedded in broader changing contexts with shifting conditions and opportunities. More importantly, however, the dynamics and patterns of governance are a result of ongoing practices. For various reasons they may be resisted or transformed. One reason may be the anticipation of long-term consequences and their uptake in public debate. This would require a model that makes it possible to recognise them. The exploration in this paper, of a performative approach to studying policy studies in its relation with policy-making can be seen as an attempt in this direction.

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