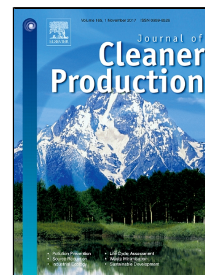


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Special Issue on *Experimentation for Climate Change Solutions* Editorial: The search for climate change and sustainability solutions: the promise and the pitfalls of experimentation



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Special Issue on *Experimentation for Climate Change Solutions*

Editorial: The search for climate change and sustainability solutions: the promise and the pitfalls of experimentation

Mikael Hildén, Andrew Jordan and Dave Huitema

Abstract

This editorial highlights the diversity in studies of experimentation that aims for solutions to climate change and wider sustainability challenges. The diversity is reflected in the theoretical underpinnings, the agency behind experiments, the niches in which experimentation occurs, in the governance of the experiments and in experiments with governance, in the way experiments contribute to learning and sharing of knowledge across levels and scales. This implies that experimentation and experiments can contribute to transitions in very different ways and that experimentation also runs the risks of merely becoming a distraction that maintains status quo instead of contributing to transformative change. In moving forward research should explore the diversity even more, and critically evaluate and discuss the possible contributions to policy and polycentric governance.

Keywords: Experimentation, Climate Change, Sustainability, Governance, Transition, Niche management

Introduction

There is something inherently appealing about experiments. They sound dynamic and exciting. They are often assumed to deliver positive outcomes: innovation, learning and possibly even the radical renewal of governance. They dovetail with the equally appealing idea of reflexive governance, with experimentation being part of a wider search for more strategic action (Voß and Kemp, 2006). Experiments are also closely related to other terms that are in very good currency, notably evidence based policy making, localisation, polycentricity (Jordan et al., 2018b) and climate policy innovation (Jordan and Huitema, 2014; Jordan et al., 2015). Experiments and experimentation have been seen as tools for obtaining new knowledge, developing new practices, creating networks and setting good examples for local, national and even international bodies to emulate (Seyfang and Smith, 2007; Brown and Vergragt, 2008; Schot and Geels, 2008; Hoffmann, 2011; Bulkeley et al., 2012; Bulkeley and Castán Broto, 2013; McFadgen and Huitema, 2017).

In practice experiments are thought of as making something new and concrete that is tried out or tested in a restricted environment in terms of time, space, scope and/or actors while at the same time focusing on providing proofs of principle. The knowledge and experiences gained through experiments could subsequently become widely applied and relevant for general societal development through various up-scaling mechanisms. This fits in with some of the core themes of polycentric thinking (Ostrom, 2010). Experiments and experimentation can play a key part in understanding and governing societal transitions (Voß and Kemp, 2006, p. 18). Experimentation can be seen as a means to facilitate the democratisation of 'post-normal science' that is needed when the policy stakes are high but fundamental scientific uncertainties cannot be removed (Funtowicz and Ravetz, 1993). Experiments are thus a means to encourage trans-disciplinarity, because they are more iterative and more participatory, reflecting both long-term goal formulation and interactive strategy development. It is therefore not surprising that experimentation has received such extensive buy in from researchers, policy makers and civil society activists alike.

Despite the appeal of experiments and experimentation, there are, however, many unresolved questions. For example, although there is agreement that experiments can provide innovative, participatory approaches to climate governance, questions arise on why and how they emerge, who the agents are and what the experiments actually achieve.

Experiments are often seen as a way to bypass obstacles that stand in the way of traditional policy development by creating niches in which new ideas for local but also national and even international climate policy development can be explored. But do experiments actually pave the way for the diffusion of innovations or are they mere distractions or, more worryingly, a means to delay more fundamental changes? What is the relationship between experimentation, niche management, transition theory and legal theories such as reflexive law? What is their true effectiveness compared with traditional ways of developing climate change mitigation/adaptation measures? How can the transformative power of experiments be evaluated? Do experiments reveal causal relationships that are important for policy development? How do experiments fit into existing governance systems and sectorised patterns of policymaking? Do they encourage and enable root and branch reform, or are they themselves confined to niches? In short, do they facilitate reflexive governance or do they simply help to perpetuate the status quo?

Experimentation may in particular offer new ways of tackling the grand challenges of climate change and sustainable development. In the absence of blueprints for transitions, which are currently only guided by highly ambitious goals such as those found in the Paris Climate Agreement or the 17 Sustainable Developmental Goals, experiments may provide a way forward. The goals and objectives thus lead to the question of how experimentation is used and what role experiments do play in innovative climate change policy development and governance, and more widely, sustainable development. This broad question guides this special issue that reports on work undertaken in COST Action IS1309 “Innovations in Climate Governance” (INOGOV) and in particular papers delivered at a workshop on Experiments for Climate Governance and their Evaluation. That workshop (held in Helsinki, March 12-13 2015) brought together research focusing on experiments that aim at reducing societal dependence on fossil carbon and/or increase resilience and adaptive capacity. Some of the papers were discussed at the workshop but a number of others were submitted afterwards to a general call for papers issued by the Journal of Cleaner Production.

Neither the workshop nor the open call for papers defined experiments or experimentation in detail. In fact, INOGOV’s approach was to analyse what could be gained by engaging in ‘experimentation to understand experimentation’. Diversity was seen as a way to gain new insight into experimental activities and to deepen understanding of how experiments and experimentation have in the past contributed – and might in the future contribute - to the governance of climate change and sustainable development. This line of thinking was developed further in one of the contributions (Laakso et al., this issue) which demonstrates that the experiments presented at the workshop could be understood as serving four

different functions, i.e. testing, influencing, multiplying influence and eventually promoting systemic change. The actual goals and functions of experiments is something that is problematized in the typology developed by Kivimaa et al. (this issue).

The focus on wide goals and spontaneous bottom-up activities, largely excluded papers covering strictly designed experiments with statistical methods and modeling (Heckman and Smith, 1995) from this special issue. However, Weiland et al. (this issue) and Caniglia et al. (this issue) do refer to classical Baconian experimentation as a point of reference in developing a somewhat broader view of experiments. So called natural experiments (Dunning, 2008; Gerber and Green, 2011; Keele and Titiunik, 2016) are also missing although some of the cases presented come close to them by viewing experiments retrospectively.

In this, our editorial paper we present the papers according to the following logic. First of all, we present papers that address the theoretical underpinnings of experimentation and the critical question of agency in experimentation. This leads to a second group of papers that examine the governance of experiments and also experiments with governance, and papers that deal with experiments in particular niches. From there we turn to consider the role of learning in and from experiments, including the sharing and use of knowledge across scales and levels of governance. The papers that discuss the relationship between experimentation and wider transitions reflect one of the central motivations for this special issue. We conclude with a discussion of new ways to move forward in research and policy on the relationship between experiments and experimentation.

Experimentation: its theoretical underpinnings

The existing literature on experiments and experimentation has not yet produced a single, unified definition of what experiments are, except that they are initiatives that deviate from currently normalized practices. Different disciplines have highlighted various aspects of experimentation and experiments. This shows that an “experimental society” and a “culture of experiments” that echo ideas of Dewey (VanderVeen, 2011) cannot build on or be analysed from a single approach.

Research on experimental governance (Jowell, 2003; Sabel and Zeitlin, 2011) focus largely on incremental reforms of governance. Incremental change through experimentation is also emphasised in legal studies that explore how laws can accommodate and even support

experimentation in order for societies to respond adequately to changing conditions of regulatory implementation (Teubner, 1983; Zumbansen, 2008; Ruhl, 2011; Cumming, 2013). The function of experimentation in these accounts is to consider the precision of law, the flexibility and hence predictability legal rules. Greater transformative changes are explicitly aimed for in socio-technical experimentation analysed by scholars of sustainability transitions focusing on technological innovations and markets (Kemp et al., 1998; Schot and Geels, 2008). Research analysing “living laboratories” (Bulkeley and Castán Broto, 2013; Evans, 2011) is also interested in the potential for experiments to deliver transformative change.

The richness of these approaches is fully reflected in the contributions to this special issue. It includes several papers that discuss the conceptual and theoretical underpinnings of the notions of experiments and experimentation. Kivimaa et al. (this issue) show that by examining the output and outcome of experiments in relation to contextual variables it is possible to categorise experiments and their potential contribution to transitions. Weiland et al. (this issue) outline what they consider to be the essence of “sustainability experiments”, and put them in the historical perspective of classical experimentation by paying attention to how knowledge is generated, what roles the experimenters play and how uncertain the eventual outcomes are. Caniglia et al. (this issue) argue that interventions and the aim to produce some form of empirical evidence are common to all experiments and these features distinguish experiments and experimentation from other activities.

The role of agency in experimentation

Experimentation is not just about setting up an intervention and collecting evidence. Agency, described as the temporal capacity of individuals to take actions with specific goals in mind (Archer, 1996), is implicit in all forms of governance that sets rules and boundaries for activities. Agency is generally assumed to be important in sustainability transitions (Grin et al., 2011; Fischer and Newig, 2016). As pointed out by Jalas et al. (this issue), experimentation is often aimed at transforming everyday activities. This perspective emphasises the need for a broad understanding of agency and an in-depth examination of what it implies in practice. Matschoss and Heiskanen (this issue) state that intermediary organisations are potentially important agents in experiments by acting as facilitators, brokers, instigators and network builders. They argue that intermediaries are needed to balance diverse demands, such as immediate benefits vs. radical change or societal learning, and thus ensure the experiments remains stable. In this way, they render local climate initiatives ‘more experimental’ i.e. easier to upscale and/or duplicate.

Agency is also a dominant question in the reflection on how private initiatives (such as the voluntary greenhouse gas protocol operated by the World Resources Institute and the World Business Council for Sustainable Development) can develop as a part of a voluntary disclosure process. A key finding is that this kind of a business sector climate governance experiments need to be embedded in a broader regulatory setting (for instance at the international level), which generates the stimulus for corporate action (Hickmann, this issue). The wider international regime thus supports those who experiment. Without such support, the experiment can come to a standstill. But in the long run the experiments and the experimenters may also become agents of change in the development of the international regime.

A very different take on agency is provided by Gugerell and Zuidema (this issue) who show that co-design processes can instigate civic learning. In their paper, the intervention was a 'serious' game that aimed at emulating a real life energy transition. The debriefing of the game development covered a wide range of learning activities, ranging from single loop to triple loop learning. Ambiguity and procedural gaps revealed by the debriefing can force the co-designers to question practises and institutions through confrontation with their real-world experience. Although games are abstractions, the design process can produce empirical observations that are relevant for wider transformational change. Thereby the design of games can fulfill the criteria of experiments (Caniglia et al. this issue).

Experiments in niches

Smith and Raven (2012) argue that niches are a protected space for (initial) shielding, nurturing and empowerment. Many changes in society can be traced back to some form of experimentation in niches that provide the seeds for transition or transformation. This is explicit in evolutionary approaches to socio-technical transitions (van den Bergh et al., 2011) but is also clearly expressed in all approaches that see niches as important sources of novelty and innovations. Therefore, it is important to explore such 'special' cases, which at first sight may appear to have little or even no wider significance.

Niche experiments can, for example, outperform what is normally considered achievable in terms of greenhouse gas reductions. They can become iconic and show what 'could be' by identifying possible, desirable attractors (Avelino and Grin, 2017), without necessarily imposing a particular solution. For example, local experiments have demonstrated an ability

to produce significant cuts of GHG-emissions beyond official policies¹ and experiments have been able to solve problems of adaptation more efficiently than steered actions (Cloutier et al., 2015). The Feldheim community analysed by Young and Brans (this issue) provides a good case in point. In addition to showing what is possible, it also demonstrates the importance of governance and empowerment at a local level. It does not mean that this particular experiment can be easily duplicated, but it highlights how the success of an experiment depends on many interacting factors. Similar features are evident in the smallest scale activities such the experiment to get a few people to give up their cars. This micro-level experiment helps in identifying processes of de- and re-routinisation that depend on multiple structural and individual factors reinforcing each other (Laakso, this issue). In a similar vein Järvensivu (this issue) finds that experimenting with changes in the material arrangements of energy, food and transportation reconfigures meanings and competences at a very personal level. Thereby experimentation showed that transitioning to a post-fossil fuel society is not only a technical matter but has deep cultural underpinnings.

However, niches are not limited to the very small scale. The analysis of Schøyen and Steger-Jensen (this issue) illustrates how a highly technical niche such as nuclear energy propulsion in shipping is dependent on broad political shielding and nurturing. Their paper also shows that some of the innovations for a low carbon future may be so demanding that they can become relevant only when the political support is strong enough to maintain a permanent and institutionalised protective niche.

The Governance of experiments and experiments with governance

The degree to which the experiments are and can be controlled differs between types of experiments. In sustainability experiments controllability is held to be quite low. Jalas et al. (this issue) show that practice theory helps to better understand the constitution and distributed nature of experimentation, and the enrolment of citizens as active participants in sustainability transitions. Jointly, the broad view of experiments and experimentation leads to the insight that design and governance of sustainability transformation experiments are key factors for successful processes of social change (one could refer to this as the governance of experiments). The focus on governance, including experiments with governance, distinguish sustainability and climate change experiments from more technical experiments that serve, for example, to test new standards in a specific sector. Issues of governance also raise questions about the role of the law. Differences in the legal regimes for

¹ <http://www.dw.de/finnish-towns-offer-road-map-to-carbon-neutrality/a-14836256-1>

experimentation, especially in relation to normative positions, types of legal abilities and permissions, are hugely important for the governance of experiments (Heldeweg, this issue). The legal frame affects critical issues such as precaution, legal certainty and legal equality.

The importance of design is a well-known issue in classical experimentation (Heckman and Smith, 1995). In the literature on sustainability experiments, the governance of the experiments becomes part of the design; it variously affects how the experiments are executed and what can be expected to emerge from them. Laakso et al. (this issue) show that the governance of experiments should, in order to be correctly understood, be examined in the context of the purpose, scale and ambition of the experiment. The purpose and governance of experimentation are also raised as important determinants in the classification of experiments by Kivimaa et al. (this issue) who argue that the outcomes of experiments should be analysed in relation to the purpose and wider objectives of the experiments or clusters of experiments to carry out ex-post evaluations. Such evaluations can provide a basis for learning that helps to overcome also political and institutional difficulties and barriers to low carbon transitions. Heldeweg (this issue) also points out that experimentation (seen as a mechanism for facilitating collective action) provides feedbacks into the innovation of law, governance and technology.

The crucial role of the legal aspects in determining what technically feasible and politically acceptable experiments can be carried out has not been extensively raised in previous studies of sustainability and climate experimentation. The point is brought out by the very special case of nuclear propulsion (Schøyen and Steger-Jensen, this issue), but can be detected in many other experiments too. More attention will need to be paid to the legal domain if experiments are to play a pivotal role in societal transitions (Heldeweg, this issue).

Experiments that do not challenge existing regulatory regimes may give a far too optimistic picture of the feasibility of transitions. The legal dimension is encountered only when a major upscaling of the experiments is attempted. For example, achieving 100% renewable energy in a small community (Young and Brans, this issue) is also in legal terms quite different from turning the energy system of a whole country to 100 % renewable energy sources. But as Laakso et al. show (this issue), there are already experiments going on with the explicit ambition of achieving such wide ranging changes to the prevailing regime.

Learning from experiments

Experimentation without evaluation is unlikely to inform learning and hence is unlikely to contribute to the transition towards a low-carbon (COM/2011/0112 final) or a sufficiently adapted society (IPCC WGII AR5 SPM 2014). Therefore, it is vital to pay attention to how transition experiments can be evaluated. Luederitz et al. (this issue) take the so-called logical model of evaluation as a starting point and develop it to fit the particular characteristics of transition experiments. Their aim is to provide a broadly applicable, practical and comprehensive framework that can be used to improve the performance of contemporary and future experiments. Their contribution should become a standard reference for the development of evaluation practice for transition experiments. To date, only limited evaluations have been published. Instead, descriptions of individual cases over short time periods tend to dominate the existing literature (Kivimaa et al. this issue).

The experimental literature points towards the crucial importance of learning from multiple experiments (McFadgen and Huitema, 2017). Experiments in cities are interesting from this perspective. Cities share many common characteristics, but also allow for local variation that provides material for systematic statistical analyses even if the set up violates classical experimental designs. Croci et al (this issue) explore the collective experiments compiled and inspired by the Covenant of Mayors Initiative. With more than 5500 actions to examine, it is possible to identify which areas have been seen as most promising for future experimenting in terms of achieving emission reductions. Buildings and the transport sector stand out which is important as emissions from the transport sector have generally turned out to be very difficult to reduce (European Commission, 2016).

In some cases, it may be possible to get a general indication of the success (or otherwise) of experiments, without addressing individual experiments. Regional analyses that relate emission trends and driving forces can highlight which type of activities seem to contribute to a reduction of emissions. For example, an analysis of the role of actions that promote energy efficiency in offsetting emissions since 2006 in China (Jiang et al. this issue) highlight which kind of experiments are likely to be of particular interest. Their regional analysis shows that policies and measures for energy saving and emission reduction have a great potential in reducing China's carbon intensity and that financial incentives for energy-saving technological transformation are an important source for directed transformative experimentation. Macro-level analyses can thus provide the evidence that local actions are capable of society wide transformations.

Sharing knowledge across levels and scales

The dialogue between the macro level of regions and whole countries and the micro level of local communities or individual cities is important for an appreciation of the challenges that transition experiments face. Comparisons at the micro level are also important, but they obviously provide a different set of lessons. The translation of experiments from one site to another requires great sensitivity to context and through that an ability to decontextualise and re-contextualise the global form in order to achieve successful translation (Williams, this issue). In the end, this may mean that completely new rather than replicated socio-technical systems will emerge from the translation process. The view that context matters for both the emergence and upscaling of experiments, can be condensed in the concept of 'habitats for experimentation' (Heiligenberg et al, this issue). Habitats refer to the configuration of contextual factors, which are mainly locally or regionally embedded. They include the availability of and cooperation in local and regional networks, the specific policy instruments that local and regional governments employ, the institutions and processes that facilitate the dissemination of learning experiences, and the existence of local or regional visions for the future. The factors can be grouped into habitat characteristics and depending on the experiment, their importance differs. Thereby is possible to highlight that, for example, strong regional visions characterise habitats that are particularly favourable for guided and planned technologically oriented experiments (Heiligenberg et al, this issue). Similar findings are presented by Antikainen et al. (this issue) from a very different set of experiments that differ in scale and context suggesting that a culture of experiment can indeed be fostered.

An analysis of habitats can furnish instrumental guidance for regional and local policy makers who wish to increase the likelihood of successful transition experiments. The comparative exploration of factors supporting collaborative capacity (Popering-Verkerk et al., this issue) tells a similar story: experimentation can strengthen collaborative capacity but to achieve desirable impacts a 'bounded' diversity of viewpoints within relative proximity of one another is needed. It can contribute positively to individuals' capacity to reflect and learn. Openness is required for authentic dialogues to develop a sense of reciprocity, mutual understanding and shared meaning (Popering-Verkerk et al., this issue). For upscaling to happen there is a need for active "boundary spanning" between the experimental activities and the formal context to achieve more permanent and institutionalized provisions, that consolidate the legacy of the separate and temporary experiments. In short, governance structures for experimentation require careful attention.

Experimentation and transitions

Experiments that are considered to be successful in achieving their short term goals nonetheless face a challenge of renewal. The role and importance of accumulating experiences from experiments have long been recognised in the work on transition management (Rotmans and Kemp, 2003; Loorbach, 2010), but apart from noting the need for reflexive learning, repetition and upscaling there is not much empirical work on how the experiments actually make a transition happen (Kivimaa et al., this issue). Chang et al. (2017, p. 9) state that strategic niche management and transition management are “inadequate to answer which sustainability experiments can ultimately contribute to a sustainability transition” because it is not possible to know how the context will change as the transition progresses.

Avelino and Grin (2017, p. 21) argue that there is a need for a “fallibilistic process of learning and experimenting, in which experiences are continuously fed back into the understanding of the system *as it could be*.” (emphasis in original). Beerman and Tiewes (this issue) claim that the success (or otherwise) of past experiments, which in their case has made renewable energies an important component of the whole power system, can lead to an experimental lock in. After the initial success, decentralised initiatives have to make their own efforts compatible with the overall energy system transition. This may call for an entirely new type of experiments of a ‘could be’ kind to address not just how one can produce electricity in a decentralised way, but in particular how one can solve challenges related to the horizontal and vertical multi-level coordination and the security of supply (Beerman and Tiewes, this issue).

Moving forwards: future research, future policy

The contributions in this issue provide many insights into the dynamic role of experiments in sustainability and climate transitions. They highlight a crucial but as yet under researched element in the wider process of societal change. The papers underline the important role of the governance of experiments as well as experimental governance. With the accumulation of experiments there is an increasing amount of empirical data to be analysed from a diversity of theoretical angles.

The proliferation of experiments is also likely to increasingly encourage experiments that are planned and designed by policy makers to achieve societal transitions. Such top-down experiments focusing on promoting systemic change (Laakso et al, this issue) at the level of central government are all but missing from this issue, which has mainly focused on local and regional experiments and experimentation. However, the large n-analysis of, for example, experimentation in cities or the study of experiments in regions also pave the way for more rigorously planned experiments that combine modelling with statistical design for the execution of the experiments. A greater interest in ‘natural experiments’ can also be foreseen in the area of climate change. The growing interest in polycentric modes of governance (Jordan et al, 2018) also opens up opportunities to looking at natural experiments in specific localities (Keele and Titiunik, 2016).

Bridging the gap between top-down and bottom-up experiments is both a research task and a way to potentially increase the policy relevance of experimentation (Zavestoski and Swarnakar, 2017). If experiments are to make a difference they need to be able to influence the highest political level, but the high political levels also need to become more receptive to experimentation. This constant interaction is also embedded in a polycentric view of governance (Jordan et al. 2018).

Evaluation research can provide an instrumental frame (Luederitz et al., this issue) to deliver knowledge of what has been achieved through experiments and experimentation.

Evaluations can fruitfully explore practice research, which has been a base for many of the contributions to this issue. Such a combination of theories and tools is essential for a deeper analysis of the actual processes that place experiments in the context of wider societal transitions. Replication and upscaling is referred to and examined in some of the papers, but further in-depth analyses of replication and upscaling of experiments within a polycentric governance framework are likely to bring new insights into how experiments ‘travel’ and how they can change the discourses on transitions and the actual paths that the transitions take. In addition contributions to this issue have highlighted the need to examine how transitions affect the evolution of experiments. This perspective will gain increasing importance if and when climate and sustainability transitions gain momentum.

High level policy statements have recognized the need for transformative changes to deal with climate change. The Paris agreement is increasingly reflected in policy documents and policy discourses. For example, in 2016 the European Political Strategy Centre (EPSC), the European Commission’s in-house think tank organized “The Energy Union and Climate Change Policy: A Transformative Agenda for the Modernisation of the Economy” (European

Political Strategy Centre, 2016). And in 2017 the Commission boldly announced that “Europe's energy transition is well underway” (European Commission, 2017). Despite the progress in mitigation climate change it is very clear that current paths will not fulfill the ambitions of the Paris agreement. Adaptation to climate change is also far from complete, with important vulnerabilities remaining (EEA, 2017). Thus, there is an ever-increasing need for innovative solutions.

Those who strongly speak for experimentation hope is that it will help to pave the road for the transitions that respond to the challenges. However, experimentation is only gradually making it to the political discourse. For example, the roadmap for moving to a competitive low carbon economy in 2050, presented by the European Commission in 2011, stressed innovation, but did not explicitly mention experimentation (European Commission, 2011). In contrast, the Presidency of the Council of the European Union stated in a note on “Future Proof Regulation” that “experiments may also help in assessing to what extent the existing regulatory practice needs to be modified to allow for innovative practices.” (Presidency, Council of the EU, 2016, p. 5). But experiments are not silver bullets. The interest in them raises an important question: what kind of experiments should be conducted and how should they contribute to future policy making? Such a discussion also fits with wider research on polycentric governance (Jordan et al., 2018a).

The papers in this special issue enrich the scientific discussion of experiments. The diversity that the contributions highlight both in the experiments themselves and in the approaches used to analyse them underline the evolutionary nature of experimental governance. The contributions also open routes for future explorations of the role of experiments both in terms of societal transitions and polycentric governance. In summary, the contributions to this special issue suggest that many current policies are in theory flexible enough to allow for experimentation, so long as the experiments and the niches are sufficiently restricted. An acceptance of the value of experimentation can be seen as an endorsement of the need for pluralism in the policy process (Acemoglu and Robinson, 2013, p. 430). But the pluralism also introduces uncertainty and ambiguity. Experimentation can both facilitate reflexive governance and perpetuate the status quo. The transformative power of experimentation is tested in the legal and political issues that arise when attempts are made to repeat and/or upscale experiments. This is the stage where detailed evaluations are needed of the merit and worth of the experiments. Policies supporting experimentation therefore also need to ensure evaluations that provide a base for policy learning. This is likely to be as challenging as the experiments themselves. The interpretations of the outcomes of experiments and the inferences about their wider consequences can be deeply political. But by ensuring a

transparent documentation of what is at stake in policy making, experiments may at least allow for a richer democratic debate.

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