Urban transport experimentation – a network or hybrid governance process?

Emilia Smeds

Division of Urban and Regional Studies, KTH Royal Institute of Technology, Stockholm, Sweden

emisme@kth.se. ORCID: 0000-0002-8968-3500.

Innovative sustainable transport policies are often tested through experiments or pilots. This chapter focuses on how urban transport experimentation is governed, in today's context where collaboration and partnerships beyond government are often posited as the key to policy innovation. It critically discusses whether experimentation can be understood as a 'network governance' process. First, it analyses the claim that the future role of municipal government is to primarily govern by 'enabling' activities led by civil society and private actors. Second, it analyses whether voluntary experiment partnerships based on shared normative sustainability goals are particularly effective for co-creating policy innovations. These two propositions are examined against findings from empirical research on 108 sustainable transport experiments implemented in Bristol and New York City between 1996 and 2016. While non-state involvement and network partnerships were in many cases important for realising transformative impacts from experimentation, they were by no means a precondition. Rather than urban transport experimentation being a network governance process per se, we suggest it reflects 'hybrid governance' with multiple co-existing governance modes.

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Introduction

Calls for innovation within transport policymaking have become prominent in the context of societal goals for climate change mitigation and social equity. This chapter focuses on the implementation of innovative policies through 'experiments', often referred to as 'pilots' or 'demonstrations', that involve physical intervention in urban transport systems.[1] Following a first generation of sustainable transport policy strategies in the wake of Local Agenda 21, a second generation of urban transport governance has increasingly focused on such experimentation 'on the ground': real-life testing of policies under conditions of uncertainty (Bulkeley and Castán Broto, 2013). Urban experiments with low-carbon policies facilitated by city networks have proliferated since the 2000s (Smeds and Acuto, 2018), and recently, the COVID-19 pandemic ushered in a new wave of experiments with street space (Smeds and Papa, 2023). Partly, urban experimentation has been driven by the emphasis of the European Union and UK and US governments on pilot projects within their innovation funding programmes (Godenhjelm et al. 2015; Dilger, 2015).

This chapter examines how urban transport experimentation is governed. Within transport studies, experiments with innovative policies have been understood as a way to develop implementation roadmaps (Marsden, 2011) and overcome barriers of low public acceptability (Marsden et al., 2020). Within sustainability transitions research, the focus has been on whether experiments are resulting in 'upscaling' or mainstreaming of new institutional arrangements (Kivimaa et al., 2017; Bertolini, 2020). There has been less focus on how experimentation is governed, for example: What does the proliferation of these temporary pilot partnerships mean for transport governance?

In governance terms, urban experiments can be understood as temporary partnerships: they are, by definition, interventions undertaken at limited temporal scale (Turnheim et

[1] This chapter adopts the concept of 'urban experimentation' developed at the intersection of urban studies, transitions research, and transport studies (Bulkeley and Castán Broto, 2013; Schwanen, 2015). Here, an experiment is defined as "an intervention in an urban mobility system with the aim of tentatively exploring a socio-material configuration that is novel in the context of that system, including testing and/or demonstration" (Smeds, 2021: 327).

al., 2018) and often involve partnerships between municipal governments and non-state actors (Bulkeley and Castán Broto, 2013). The governance question has started to be addressed in relation to how transport innovation policy – that increasingly promotes experimentation within 'living laboratories' focused on 'smart mobility' – is reconfiguring the traditional role of municipalities in transport governance (Oldbury et al., 2022; see also Mukhtar-Landgren this volume). Yet there has been little systematic investigation of experimental governance outside the curated organisational settings of these 'labs' (Hodson et al., 2017), including experiments whereby municipalities, as part of their everyday work on making progress on transport policy priorities, pursue innovation in street design or public transport, for example.

This chapter interrogates the notion that urban transport experimentation should be understood as a network governance process. In the literature on sustainability transitions (Schot and Geels, 2008; Loorbach et al., 2021), experimentation is understood as a process where public, private, and civil society actors come together in a governance network or 'open innovation ecosystem' to co-create new solutions (Puerari et al., 2018; Marvin et al., 2018). The coordination between actors is imagined as fluid, agile and informal (*ibid.*), and the motivation behind the formation of partnerships as based on shared normative goals to solve sustainability challenges (Sengers et al., 2019). Due to the complexity of these challenges and the need for radical innovations to address them, government is understood as unable to govern sustainable transport on its own; rather, the role of municipalities is envisioned as governing by 'enabling' activities led by non-state actors (Geels et al., 2015; Swilling and Hajer, 2017). Two propositions can be derived from this existing literature:

Proposition 1. Progress on sustainable transport innovation depends on a shift from government to governance: as the capacity of municipalities to govern on their own has decreased, their role is to enable experimentation led by non-state actors.

Proposition 2. Effective partnerships for urban transport experimentation involve network governance coordination motivated by shared normative goals.

This chapter examines the validity of these propositions conceptually in relation to state-of-the-art debates, and empirically against the findings of a recent study. The next section provides a review of the literature on different governance modes as discussed

in public policy, urban studies, and transport studies fields. The third section presents a conceptual framework for analysing the governance arrangements involved in urban transport experimentation. Fourth, we present findings from a research project (Smeds, 2021) on the governance of 108 experiments with cycling, bus services, street space, and reconfiguring automobility that were implemented in Bristol (UK) and New York City (US) between 1996 and 2016. While non-state involvement and network partnerships were in many cases important for realising transformative impacts from experimentation, they were by no means a precondition. The final section of the chapter discusses the implications of this for future research on urban transport governance, including how experimentation may reflect a 'hybrid', rather than only network, mode of governance.

Modes of governing through urban experimentation

Theoretical debates on governance modes

In a basic sense, governance refers to the increased involvement of non-state actors in governing: the private sector and civil society being active in public decision-making and service delivery, alongside government (Stoker, 1998). Some scholars argued this was driven by the complexity of new collective action challenges that no single actor could tackle independently, e.g. sustainable development as a 'wicked problem' (Lupova-Henry and Dotti, 2009). Others took a more political perspective in arguing that governments' responsibilities for addressing societal challenges and providing public services became blurred and redefined as part of neoliberal 'hollowing out' of state capacity (Jessop, 1997; Geddes, 2006). Early research argued that actors were interacting in governance networks that operated autonomously without external coordination, and that a shift from 'governance to government' had taken place with such networks more-or-less overtaking government in importance (Torfing, 2005). Today, there is broad consensus that governance never really replaced government: even where non-state networks play a prominent role, the role of the state remains important, albeit transformed (Sørensen and Torfing, 2018; Jordan et al., 2005). Thus, the first part of *Proposition 1* has been proven false.

Yet the debate regarding the effectiveness of traditional modes of government versus new modes of network governance continues. A typology of hierarchical, market, and

network modes of governance is shown in Table 1; this is such a classic framework that little elaboration is required here (see Evans, 2012 and Rydin, 2010 for an accessible introduction.). It is acknowledged that the hierarchical mode continues to be significant (see Van Geet & Busscher this volume), but all three governance modes are understood to co-exist within different policy sectors (Capano et al., 2014). As described in the Introduction, current literature on urban sustainability experimentation argues that the network mode is particularly effective (*Proposition 2*).

Table 1. Hierarchy-market-network typology of governance modes.

Characteristics	**Hierarchical governance**	**Market governance**	**Network governance**
Driving force for actor relations	State authority	Financial transactions, exchange of services, client-provider, profit motive	Desire to collaborate based on shared goals, trust, complementary strengths
Style of actor interactions	Formal and bureaucratic, legally codified roles and responsibilities	Contractually negotiated, precisely calculated roles and responsibilities	Informal relationships, open-ended and negotiated roles and responsibilities
Flexibility and conduciveness to innovation	Low	High	Medium
Empirical markers – examples	Statutory partnerships, bureaucratic procedures, hierarchical forms of organising	Contracts, tendering and procurement (outsourced delivery of municipal services)	Personal relationships between individuals, voluntary partnerships, formal network organisations

Source: Smeds (2021: 87-88) adapted from Powell (2003), Lowndes and Skelcher (1998), Evans (2012), and Rydin (2010).

The comparison of the modes' flexibility and conduciveness to innovation is particularly relevant to experimentation. As shown in Table 1, governance theories posit that efficiency in hierarchical coordination is achieved through the development of bureaucratic routines, however, this feature of the hierarchical modes comes with a "reduction in flexibility and innovation because of a tendency to formalization and routinization" (Lowndes and Skelcher, 1998: 318). Within the market mode, actors are not dependent on each other and are highly flexible in their choice to participate based on prevailing prices and costs; whereas the network mode is posited as more flexible than the hierarchical mode because in the absence of legally bound interaction, it "can be more responsive to emerging needs and opportunities" (Evans, 2012). This literature

thus lends some support for *Proposition 2*: that experiment partnerships characterized by network coordination between actors are effective in supporting experimentation.

The shifting nature of urban transport governance

To contextualize the debates discussed above, this section discusses the shifting modes of urban transport governance in the UK and US, focusing on cycling and bus services.

In an influential article, Bulkeley and Kern (2006: 2242) examined municipal government capacity to govern climate change against the backdrop of outsourcing public service delivery, identifying four modes of governance:

- *self-governing*, "the capacity of local government to govern its own activities"
- *governing by authority*, "the use of traditional forms of authority such as regulation and direction which persist despite [local government] reforms"
- *governing by provision*, "through the [local government] delivery of particular forms of service and resource"
- *governing through enabling*, "the role of local government in facilitating, co-ordinating and encouraging action through partnership"

Bulkeley and Kern's (2006) typology is a useful complement to the hierarchy-market-network typology in the way that it captures the relations between municipal government and non-state actors. The three first modes are defined as municipalities largely acting alone through hierarchical governance, whereas governing by enabling involves non-state actors and network coordination. For their UK and German case study cities, Bulkeley and Kern found that public transport provision and authoritative governance (e.g. road pricing) had declined, and given way to self-governing activities such as greening municipal fleets, and enabling activities such as 'safer routes to school' initiatives, 'green travel plans' for encouraging sustainable commuting among private sector staff, and 'quality partnerships' with private providers of public transport.

The privatisation of public transport services has indeed been a key shift in urban transport governance, with widespread implementation during the 1980s and 1990s (Docherty et al., 2004). For the UK, Sørensen and Gudmundsson (2010) analyse the governance restructuring of Manchester's bus system between 1986 and 2007 by applying the framework of hierarchical, market, and network governance. The authors

argue that with the privatisation of bus services from 1985, there was a shift from hierarchical to market governance as the dominant mode. With the 2000 Transport Act, central government introduced partnerships between local authorities and private bus operators as a new governance instrument, which Bulkeley and Kern (2006) noted with reference to governing by enabling. Sørensen and Gudmundsson (2010) argue that the partnership approach signalled the emergence of a network mode since it was based on collaboration between local authorities and private operators in the absence of formal hierarchical power. Evidence suggests that this UK network governance arrangement of voluntary bus partnerships has not been effective (Taylor and Sloman, 2016) in achieving mode shift from private car to bus use (Davison and Knowles, 2006) nor integrated public transport ticketing (see McTigue et al. this volume). In the US, the Reagan administration also pushed for the privatisation of urban public transport systems (Black, 1991). However, in many large cities including Seattle, Portland, Denver, Chicago, Boston, and NYC, services continue to be provided by public transport agencies that are controlled by municipal or state governments. A study of several of the same US cities found that bus service innovation was advanced through close partnerships between municipal and public transport agencies, with informal relationships between agency staff and leadership playing a crucial role (Ray and Higashide, 2018). Evidence from the US thus suggests that network governance can bear fruit for bus experimentation.

A second transport governance shift relates to outsourcing or contracting-out public sector functions, which can be understood as a market mode of governance (Farneti and Young, 2008). Aldred (2012) has argued that UK cycling policy reflects an 'outsourced cycling state', where responsibility for policy implementation has been contracted out to civil society organisations (e.g. Sustrans), and policy formulation contracted to private sector consultancies (citing Steer Davies Gleave, in the case of Bristol). Aldred associates this with a broader weakening of municipal capacity for spatial and transport planning that Higgins and Allmendinger (1999) observed had affected the majority of UK local authorities by the late 1990s; a recent review finds that lack of municipal expertise remains a barrier to investment in cycling within the UK (Aldred et al., 2019). With reference to Sustrans, Aldred's (2012) argument is that partnerships between municipal government and professionalized civil society can also be characterized by outsourcing – not just municipalities contracting the private sector – and thus can

perpetuate the ‘hollowing out’ of state capacity. While outsourcing of public service delivery to both for-profit and non-profit sectors has been widespread among US municipalities (Warner and Hefetz, 2012) and civil society organisations have played a prominent role in urban cycling policy development (Pucher et al., 2011), there is no evidence to suggest that Aldred’s argument applies to transport governance in US cities.

Third, the emergence of new markets for electric and ‘smart’ mobility (e.g. shared mobility services) has begun to reorganize transport governance (see Mukhtar-Landgren this volume). There is a widespread observation that municipalities have ‘lost control’ over urban transport systems with the rise-to-power of digital platform companies (Stehlin et al., 2020). Municipalities are seeking to partner with private providers to ensure the creation of public value: increasingly, the need for regulation of private services (hierarchical governance) that goes beyond voluntary collaboration (network governance) is being emphasized (Docherty et al., 2018). However, there is also a potential role for municipalities in strategically nurturing the growth of market ‘niches’ for innovative mobility technologies and services, as discussed within socio-technical transitions literature (Hoogma et al., 2002; Geels et al., 2012).

In summary, the transport governance literature lends considerable support for *Proposition 1*: beyond sub-systems like public transport that have been privatised for a long time, established policy areas like cycling and new policy areas like shared mobility have become governed in partnership with – and in many ways reliant on – non-state actors. Regarding *Proposition 2,* the evidence is mixed: network governance has been effective in some contexts (US) and not in others (UK) and with differences between policy areas (cycling vs. bus services vs. shared mobility).

Based on this discussion, Bulkeley and Kern’s (2006) framework can be updated to reflect the latest knowledge on urban transport experimentation (Table 2). Their (*ibid.*: 2249) definition of ‘governing by enabling’ encompasses partnerships that are very different, including activities like information provision (enabling citizens), bringing new stakeholders on board (collaboration), and more broadly “enabling other actors, in the voluntary and private sectors and at the community level, to act for public purpose”. Here it is argued that the term ‘enabling’ risks being misleading if used to describe partnerships that reflect ‘hollowing out’ of state capacity. Acknowledging the political dimension of governance requires distinguishing between municipalities partnering with

civil society organisations to contract-out transport planning vs. municipalities enabling civil society to undertake their own experiments; and between municipalities partnering with private companies to deliver public services because of national government-imposed privatisation vs. partnering with a company to enable it to pursue R&D experimentation that is additional to public service delivery. Thus, Table 2 distinguishes between partnerships to provide public services as 'co-provision', and partnership that seeks to 'enable' non-state actors to undertake experiments based on their priorities. Based on the literature on public support for innovative mobility service markets developed by non-state providers, 'market creation' is added as a mode.

Table 2. Framework for analysing the modes through which experimentation is governed.

Governance mode	**Municipal government governing through…**
Self-governing	Experiments with its own activities (functions and staff)
Authority	Experiments with regulation
Provision	Experiments with direct provision of public services and infrastructure
Co-provision	Experiments with provision of public services in partnership with non-municipal actors
Enabling	Enabling experiments initiated by non-profit actors based on their own priorities
Market creation	Enabling experiments initiated by non-state actors to support the creation of new markets

Source: Smeds (2021: 87, 348) adapted from Bulkeley and Kern (2006).

Actor coordination within temporary partnerships

The discussion above relates to the overall patterns of state and non-state involvement in governing urban transport sub-systems. A different conceptual perspective is required to understand actor coordination in relation to individual experiments, i.e. within temporary partnership/project organisations (Lundin and Söderholm, 1995).

In a foundational article, Lowndes and Skelcher (1998: 314) examine partnerships for UK urban regeneration projects, and underline that:

> "partnership as an organizational structure is analytically distinct from network as a mode of governance… The creation of a partnership board does not imply that relations between actors are conducted on the basis of mutual benefit, trust

> and reciprocity – the characteristics of the network mode of governance. Rather, partnerships are associated with a variety of forms of social co-ordination – including network, hierarchy and market".

This distinction between partnerships as a form of organising actors, and governance modes as related to the coordination between those actors, is helpful for analytical precision concerning *Proposition 1* and *2*: just because experiments involve municipal partnership with other actors, this does not equal the presence of network coordination.

Lowndes and Skelcher (1998) analyse what mix of hierarchy, network, and market modes featured in actor coordination within four different stages of partnership 'life cycles'. For example, they found that the pre-partnership stage was predominately characterized by a network mode based on informal relations, trust, and shared goals, whereas the delivery stage was characterized by a market mode of tendering and contracts with lower levels of collaboration. In relation to *Proposition 2*, this suggests that even if an experiment partnership involves network coordination, there may be multiple co-existing modes (including hierarchical and market coordination).

Further, Lowndes and Skelcher analyse the 'termination and succession' stage of partnerships, which draws attention to a critical issue: what happens to the relations between partner organisations after a time-limited experiment is over? For example, Bradford and Bramwell's (2014) analysis of Canadian urban development project partnerships found that they are 'episodic' compared to actor relations within more institutionalized governance networks. This suggests that the nature of collaboration within urban experiment partnerships may not necessarily translate neatly into longer-term governance arrangements.

Finally, Lowndes and Skelcher (1998) distinguish between two theoretical positions on interorganisational partnerships: 1) that actors enter into partnerships because they are dependent on other actors to secure the resources they need to achieve their own goals, vs. 2) that non-interdependent actors desire to collaborate based on the expectation of 'synergistic gains'. They found that the formation of partnerships reflected both theories: driven by a desire for collaboration, but also by a motivation to jointly secure resources within the UK's and EU's intensely competitive funding landscape for urban areas (*ibid.*: 317). In relation to *Proposition 2*, this suggests that even where

partnerships involve collaborative network-style coordination, this is not necessarily (solely) motivated by actors' shared goals (e.g. addressing sustainability challenges).

Conceptual framework for analysing experimental governance

In seeking to make sense of how urban transport innovation is governed, we need to analyse the prevalence of governance arrangements at two levels: 1) transport sub-systems, where there are specific constellations of state and non-state actors involved in governing and overall emergent patterns of actor interaction (or institutional 'regimes', see Geels, 2018; Naess and Vogel, 2012); and 2) experiment partnerships, where specific partner organisations come together temporarily and coordinate on the implementation of an intervention.

This chapter applies such a two-level conceptual framework to analyse bus service, cycling, street space, and automobility sub-systems (Smeds, 2021: 86). The typology presented in Table 2 is used to analyse the dominant governance mode and the types of actors prominently involved in governing each sub-system (self-governing, authority, provision, co-provision, enabling, and market creation). *Proposition 1* is examined in relation to this sub-system level. At the level of experiment partnerships nested within these sub-systems, the typology presented in Table 1 is used to analyse the (mix of) hierarchical, market, and network 'logics' that characterize actor coordination between specific partner organisations. *Proposition 2* is examined in relation to this level.

Urban transport experimentation in Bristol and New York City

To empirically examine whether urban transport experimentation can be understood as a network governance phenomenon the remainder of this chapter discusses the validity of *Proposition 1* and *2* against findings for two case study contexts: the city of Bristol in the UK, and New York City in the US. Both cities are well known for promoting sustainable transport innovation (Lydon and Garcia, 2015). Findings are derived from a research project comparing municipal government capacity for transformative urban transport experimentation, with the rationale for case selection described therein (Smeds, 2021). This chapter focuses on commonalities across the case contexts, rather than comparing differences between them.

108 experiments implemented in Bristol and NYC between 1996 and 2016 were identified through analysis of municipal policy documents and online searches, resulting in one database for each case. In-depth case studies were developed for eight experiments. The study focused on experimentation related to four transport sub-systems: bus services (N=26 experiments), cycling (N=22), street space (N=30), and reconfiguring automobility away from private petrol car use towards smart, shared and electric mobility (N=30).

For all 108 experiments, the short-term outcomes and long-term impacts, as well as the actors and governance modes involved, were established through triangulation between documents (policy reports, media articles), 48 semi-structured interviews, secondary research evidence, government statistics, open geo-referenced data, and Google Street View. Interviews also focused on the evolution of governance arrangements at the level of transport sub-systems. This chapter is necessarily limited to a high-level summary of the research findings; a description of data collection, analysis and the complete chain of source evidence is provided by Smeds (2021).

Actors involved: municipal leadership with a high degree of partnership

We begin by examining findings against *Proposition 1*, specifically that the capacity of municipalities to govern sustainable transport innovation on their own has decreased.

Analysis of the actors involved in the Bristol and NYC experiments (Smeds, 2021: 281) makes clear that the respective municipalities maintained the capacity to introduce transport innovations independently of non-state actors (acting alone in 21% vs. 31% of experiments), but equally pointed to how experimentation was characterized by a high degree of partnership with other actors (64% vs. 69%). Further, 80% of Bristol experiments and 83% of NYC experiments that involved partnership were led by the municipal government. It was rare for non-municipal partners to take a leading role: in Bristol, 13% of experiments were led by civil society actors, whereas in NYC, 7% were led by civil society and 5% by private sector actors.

Governance modes associated with transformative experimentation

Proposition 1 contends that municipalities governing by ‘enabling’ non-state actors is crucial to generate significant progress on sustainable transport innovation: here we

refer to such progress as ‘transformative impacts’ resulting from experimentation.

Not all of the 108 experiments studied were made permanent or expanded; some ‘fizzled and dried out’ without leaving a legacy in terms of any follow-up interventions. However, the research also traced ‘trajectories’ of experiments between 1996 and 2016, where experimental interventions became ‘linked’ together in building on and adapting lessons from one another. In both Bristol and NYC, the cumulative long-term impact of some of these trajectories was significant enough by 2016 to be described as transformative (Table 3), that is, resulting in: city-wide spatial expansion of innovations tested in experiments, the emergence of significant new policies or governance arrangements associated with innovations, and/or change in mobility patterns as a result of innovations. In relation to *Proposition 1*, Table 3 shows the governance mode associated with each transformative trajectory of experimentation.

Table 3. Governance modes associated with transformative experimentation.

	Transformative trajectory of experimentation	**City-wide expansion**	**Significant new policies or governance arrangements**	**Change in mobility patterns**	**Governance mode**
BRISTOL	Bus with High Level of Service	X	X	X	Co-provision: “Gradually convince bus operators to assume more formal responsibility”
	Cycle training for children			X	Co-provision: “Contract non-state experts to promote behaviour change”
	Promoting cycling through employers		X	X	
	Play streets	X	X		Enabling: “Empower civil society through state funding”
	Car-sharing	X	X		Market creation: “Nurture the niche”
	20mph speed limits	X		X	Authority: “Moderate the impacts of car use”
	Resident Parking Zones	X			
	EV charging network		X		Co-provision: “Public procurement and management”

NEW YORK CITY	Bus with High Level of Service	X	X		Co-provision: "Build informal relationships with PT authority"
	Cycling infrastructure	X	X	X	Provision: "Build it and they will come"
	Public plazas	X	X		Co-provision: "Engage BIDs to co-fund"
	Temporary car-free streets	X	X		Enabling: "Empower civil society and co-fund"
	Safe travel to school	X	X	X	Authority & Provision: "Government protecting street users"
	Traffic calming	X	X	X	
	Pedestrian safety	X	X	X	

Source: adapted from Smeds (2021: 185, 233, 293).

Experiments with technologies to improve bus services (e.g. bus priority at signalized intersections, real-time information, bus lanes) were launched in Bristol and NYC in the late 1990s to mid-2000s respectively, and were gradually integrated to produce a Bus with High Level of Service (BHLS) configuration that was found to work in each context and expanded through policy programmes for rapid bus services on selected routes (Greater Bristol Bus Network, Select Bus Service in NYC). By 2016, 10 (Bristol) and 12 (NYC) bus routes had been upgraded to BHLS standard. In Bristol, ridership on BHLS routes had increased significantly and there is evidence that this contributed to an overall increase in city-wide bus ridership. These transformative impacts were realized through municipalities governing through co-provision with bus operators: partnership with private bus companies in Bristol, and New York City Transit as a public transport authority operating under the Metropolitan Transportation Authority controlled by New York State government.

Innovations contributed to significantly increasing cycling levels among Bristol and NYC residents. From the early 2000s, experiments in NYC with different cycle lane designs, including the first parking-protected cycle lane in the US, eventually crystallized into a hierarchy of infrastructure design standards codified in the NYC Street Design Manual, and the city-wide expansion of a cycling infrastructure network.

This was achieved through municipal governing by provision, without partnership with non-state actors. Bristol's cycling culture grew as a result of experimentation with behaviour change policies. Early experiments with personalized travel planning eventually garnered strong support from major employers in providing cycling facilities for their staff. Experimentation with different ways to roll-out national programmes for children's cycle training contributed to growth in cycling to school. These trajectories were associated with municipal co-provision, where expansion of behaviour change programmes was contracted-out to non-profit organisation Sustrans and private consultancy Steer Davies Gleave.

Experimentation in NYC launched several city-wide programmes resulting in the reallocation of at least 16 hectares of road space formerly dedicated to cars for new public space and pedestrian uses, between 2007 and 2013 alone. Experiments from the late 1990s led to the launch of a Public Plaza Program that expanded to 72 plazas city-wide by 2016, facilitated by municipal co-provision with Business Improvement Districts and other non-profit organisations, who provided co-funding and maintenance services. City-wide expansion of temporary car-free street events through a long-running Weekend Walks Program amounted to 96 days of street closures annually by 2016, following city government enabling civil society groups to undertake a first round of experiments supported by civic fundraising. In Bristol, a civic-led experiment for residential street closure for 'play streets' that was publicly supported led to the institutionalization of a new municipal 'Temporary Play Street Order' for permitting such events and expansion city-wide.

Both cities saw successful innovations to reduce traffic fatalities and injuries by 2016. In NYC, experiments grew into long-term and city-wide programmes targeting pedestrian safety (for travel to school, elderly citizens) and neighbourhood-level traffic calming; in Bristol, experiments with 20mph speed limits eventually expanded city-wide. These transformative trajectories were associated with governing through municipal authority and provision.

Innovation to reconfigure automobility towards sustainability bore some fruit in Bristol. Experiments to support car-sharing in the late 1990s and subsequent testing of different business models contributed to an established local market by 2016, with multiple private providers and regular financial contributions from private real estate developers

for provision of car club bays. This was a successful instance of market creation by Bristol City Council, which seed-funded experiments. Experimentation with different models of publicly accessible electric vehicle (EV) charging infrastructure enabled the launch of a first-generation Source West charging network in the Bristol city-region, followed by a second-generation Revive network under municipal ownership that was launched in 2016. The Council's strategy was thus proactive co-provision with private providers, through public procurement and management of the local EV ecosystem.

In summary, municipalities were able to make significant progress on sustainable transport innovation by acting independently – without non-state actors – through experimenting with street redesign, traffic calming, cycling infrastructure, speed limits, and parking reform. This is reflected in the proportion of experiments undertaken by municipal government alone, without partnership. Transformative experimentation with these policy areas was associated with 'traditional' modes of municipal provision and authority. Equally, transformative trajectories frequently involved municipal co-provision with private, non-profit, and other public actors, and to a lesser extent municipalities governing by enabling civil society and by market creation with private companies. This is reflected in the proportion of experiments undertaken by municipal governments in partnership with non-state actors. Thus, in relation to *Proposition 1*, the findings show that the capacity of municipalities to govern on their own did not necessarily diminish, yet to a significant extent, promoting transport innovation depended on the ability to form partnerships.

Diversification of governance modes: driven by innovation, beyond 'hollowing out'

Experimentation also reconfigured urban transport governance in Bristol and NYC. Table 4 contrasts the governance mode(s) that pre-existed at a transport sub-system level in 1996, with the mode(s) that characterized transformative trajectories of experimentation up until 2016 (described in the previous section).[2] Progress on sustainable transport innovation involved no decisive shift from traditional modes of

[2] Discussion of cycling innovation and governance in NYC does not consider the Citi Bike bike-sharing system, which was introduced in 2013 through a large-scale launch with 332 stations, following an explicit decision not to adopt a pilot approach to implementation.

government in 1996 (provision, authority) to new modes of governance (co-provision, enabling, market creation) by 2016. Instead, there was a diversification of governance modes over time: the latter modes associated with experimentation were more diverse than the pre-existing modes, in that multiple modes co-existed to a greater extent than before. Co-provision, enabling, and market creation expanded, but alongside municipal provision and authority.

Table 4. Change in transport governance modes.

Transport sub-system	**Predominant transport governance modes**			
	Bristol		**New York City**	
	Pre-existing (1996)	**Experimentation (1996-2016)**	**Pre-existing (1996)**	**Experimentation (1996-2016)**
Bus services	Provision Limited co-provision	Expanded co-provision	Provision Limited co-provision	Expanded co-provision
Cycling	Provision Co-provision	Co-provision	Provision	Provision
Street space	Provision	Enabling	Co-provision	Expanded co-provision Enabling
Automobility	Authority Provision	Authority Market creation Co-provision	Authority Provision	Authority Provision

Source: adapted from Smeds (2021: 157, 202).

One could jump to the conclusion that the expanded non-state involvement associated with experimentation was driven by the 'hollowing out' of state capacity through neoliberal reforms. In 1996, co-provision of transport services and infrastructures between municipal government and non-state actors already existed for bus services (Bristol and NYC), cycling infrastructure (Bristol), and street space (NYC). This was partly the result of preceding 'hollowing out' of municipal capacity, but not entirely. Bristol bus governance arrangements did indeed reflect privatisation that had been driven by neoliberal ideology, and in NYC, co-provision of public space maintenance with Business Improvement Districts had its roots in 1970s municipal austerity cuts. However, co-provision of Bristol cycling infrastructure with Sustrans largely reflected the lack of importance afforded to cycling within national and local policymaking, and co-provision of NYC bus services was not privatized but in partnership with New York City Transit (NYCT) as a public transport agency. To some extent, experimentation conformed with and expanded these pre-existing governance modes, reflecting the path-

dependency of institutional change rather than neoliberal restructuring.

Furthermore, the findings suggest that innovation through experiments may in itself drive the diversification of urban transport governance. By introducing contextually novel innovations into urban transport systems, experimentation prompted the introduction of new modes for governing those innovations, and thus an increase in the number of co-existing modes. Diversification of governance modes began with the launch of new policy strategies: the 2000 Local Transport Plan in Bristol and 2007 PlaNYC sustainability strategy. These outlined a range of innovations that municipalities wanted to introduce, yet experimenting with them lay outside existing expertise and budgets: thus, municipalities needed to form partnerships with other actors to draw on their resources. Partnerships became essential, as municipalities expanded their policy ambitions to areas over which they had limited existing control and knowledge, e.g. bus services, behaviour change programmes, and public space (e.g. NYC DOT's Public Plaza Program).

Network coordination as an asset, rather than a precondition, for experimentation

Zooming in on the level of temporary partnerships, we turn to examine *Proposition 2: Effective partnerships for urban transport experimentation involve network governance coordination motivated by shared normative goals.* Did all the transformative innovation described above originate with specific experiments that featured network-style collaboration between participating actors? We note five findings that apply across all experiments implemented in Bristol and NYC; for brevity, they are illustrated here with reference to cycling and bus service experimentation only.

First, not all experiment partnerships featured a network governance logic, in line with the argument that organisational partnerships and network governance should be understood as distinct (Lowndes and Skelcher, 1998). Many experiments involved public-private partnerships with transactional market logics, for example where a municipality was tendering the services of a private contractor to test an innovation.

Second, for partnerships that did involve network coordination, this was effective in supporting partner organisations to test and 'tinker' with innovations in flexible ways and refine them to develop configurations (designs, standards, etc.) that 'worked' and could be expanded. Network logics were thus especially conducive to supporting

experimentation at the early stages of a trajectory. For example, a voluntary partnership agreement between Bristol City Council and a bus operator enabled a first successful experiment with a 'Showcase' BHLS configuration. The experiment that first tested the novel Select Bus Service configuration on the Bx12 route involved creative, flexible, and informal collaboration between staff at NYC DOT and NYCT. An interviewee's anecdote illustrates this: Bx12 riders needed to be able to pay on-street before boarding the bus using both coins and MetroCard and while NYCT staff could easily reprogram the MetroCard machines used in subway stations, they did not have an existing machine that accepted coins and could be placed at bus stops. NYC DOT staff had access to parking meters that accepted coins and drove over a truck full of these to NYCT staff, who then repurposed these meters to print bus payment receipts.

However, third, network coordination was not a precondition for transformative innovation. There were transformative trajectories that were kickstarted by experiments without a network logic: for example, the experiment with NYC's first parking-protected cycle lane along Manhattan's Ninth Avenue was a municipal hierarchical intervention. Equally, there were experiments involving network coordination that did not generate significant impacts. Actors' willingness to partner on experiments based on shared strategic goals and develop close collaboration did not necessarily translate into the expansion of an experimental configuration. For example, in testing a new model of cycle parking for social housing tenants, Bristol City Council staff collaborated closely with housing associations, exploring their individual needs and designing bespoke infrastructure solutions. Yet this network collaboration did not result in the model being expanded; municipal austerity cuts were cited as the key reason for why it was shelved, highlighting how political factors may trump the best intentions for collaboration.

Fourth, after a temporary experiment partnership was terminated and experimental configurations were expanded and/or institutionalized, there was a tendency for coordination between municipalities and other actors to become formalized, with a shift from network collaboration towards hierarchical or market relations. For example, once an experiment with cycling promotion through large employers involving a network partnership between Bristol City Council and Sustrans had ended, the voluntary collaboration was regularized as a market partnership for expanding behaviour change policy delivery with contracting-out to Steer Davies Gleave.

Finally, fifth, network partnerships co-existed with hierarchical relations during the post-experiment phase of trajectories. Expansion of Showcase BHLS services through the Greater Bristol Bus Network programme involved a shift to statutory Quality Partnership Scheme agreements between the local bus operator and the City Council: a change from a previous network partnership to hierarchical relations. While these agreements only covered a limited set of routes and different forms of voluntary partnerships continued to feature until 2016, this marked a significant shift towards greater municipal authority over bus services, as only six such statutory Quality Partnership Schemes had been introduced in Britain by 2015. The partnership on Select Bus Service continued to be characterized by network collaboration after the initial Bx12 experiment; however, the post-experiment trajectory also illustrates the fragile nature of network logics. After tensions between New York state government and NYC city government over the MTA's financing crisis escalated from 2016 onwards, NYCT announced it was halting expansion of Select Bus Service. This disrupted the carefully nurtured network collaboration between municipal and transport authority staff and illustrates the extent to which NYCT remained a highly politicized organisation under the State Governor's control. These examples raise questions regarding the long-term effectiveness and political fragility of network governance, beyond initial experiments.

For *Proposition 2*, the findings thus suggest that although network coordination can be effective in supporting innovation at the early 'tinkering' stages of experimentation trajectories, it is not a precondition for the realisation of transformative impacts and has less clear value for the later expansion phase of trajectories. We found no evidence that network coordination was more effective in supporting transformative experimentation than hierarchical or market coordination, across different transport sub-systems.

Discussion and implications for future research

The empirical research presented speaks both for and against *Proposition 1*. Municipalities in Bristol and NYC retained capacities to promote sustainable transport innovation independently of non-state actors, generating significant progress in policy areas like active travel, traffic calming and safety, and parking. However, experimentation was also associated with a shift towards greater non-state involvement in governing urban transport, over time.

For urban transport, our findings temper existing arguments regarding the decreasing prevalence of municipal provision and authority in the context of 'hollowed out' state capacity (Bulkeley and Kern, 2006). We have shown that the role of municipal government most certainly goes beyond enabling non-state actors in Bulkeley and Kern's original meaning – in particular, increased municipal co-provision with such actors was central to much transformative experimentation (Table 3). Experiments did often adopt pre-existing governance modes rooted in neoliberal reforms. However, co-provision was sometimes very effective. For example, in contrast to Aldred's (2012) arguments, we found that innovation that grew Bristol's cycling culture was supported, rather than inhibited, by contracting-out. Furthermore, beyond its historical roots, co-provision as a governance arrangement signified pragmatic municipal responses to the need to govern transport innovations that were entirely novel in the context of respective cities and thus necessitated 'outside' resources, like in the case of NYC plazas. This also applies to transformative innovation that was associated with enabling citizen initiatives and market creation to support private mobility providers, which require creativity and entrepreneurial skills that are not core to municipalities as bureaucratic organisations. It is crucial that these non-state-centric governance modes are incorporated in future research, as we have sought to do with our updated version of Bulkeley and Kern's (2006) typology (Table 2). We can reformulate *Proposition 1* as: *Progress on sustainable transport innovation depends on continued municipal government provision and authority, yet transformative experimentation will often require governing by co-provision, enabling, and market creation in partnership with non-state actors to share expertise and resources.*

On the whole, our findings speak against *Proposition 2*. We confirmed that network coordination involving informal relations and flexible collaboration was effective in supporting experimentation at the early stages of transformative trajectories, in line with the predictions of theory regarding the conduciveness of network governance for innovation (Table 1). Scholars could explore how municipalities can develop as ambidextrous organisations combining bureaucratic functions and skills needed for multi-actor experimentation (Smith and Urman, 2015). It was the style of joint working within partnerships that facilitated innovation, not (solely) a desire to collaborate based normative commitment to collective learning about solutions to sustainability challenges (cf. Sengers et al., 2019). This latter notion diverts attention

from the political factors explaining when and why temporary partnerships are sustained or abandoned. Our findings support the theoretical position (Lowndes and Skelcher, 1998) that the formation of voluntary network partnerships is not necessarily motivated by actors' shared goals, but also pragmatic necessity and resource interdependencies. We need a less romantic imaginary of experimental network governance because it is no panacea. Our findings support the existing consensus that reliance on voluntary public-private partnerships in the context of the UK's dysfunctional bus market is insufficient for promoting innovation (Taylor and Sloman, 2016). Even under NYC's more favourable framework conditions of public-public partnership where network coordination between city government and a public transport authority was effective (in line with Ray and Higashide, 2018), the lack of formally codified responsibilities for public service innovation was a source of fragility in the long run. It is clear that the effectiveness of informal institutions for transport governance is context-specific (cf. Rye et al., 2018 for public transport).

Network coordination appeared to be less effective at the latter expansion stage of an experimentation trajectory, giving way to more formalized hierarchical or market relations. Governance theory posits that hierarchical modes of governance are made efficient through the development of bureaucratic routines, with formalized relations that are less conducive to innovation (Table 1). Our research suggests that the formalization of actor coordination may be an important factor for realising transformative impacts from experimentation in the long term, because establishing routine hierarchical rules or market partnerships allows municipalities to expand transport innovations efficiently, as opposed to the 'collaboration fatigue' that can stem from resource-intensive coordination of complex informal networks. The tendency towards formalization raises questions regarding the possibility of sustained 'open innovation', which is how experimentation tends to be characterized in sustainability transitions literature (e.g. Puerari et al., 2018). We suggest that the im/permanence, exceptionality/standardisation, and in/formality of coordination between municipalities and other actors may be critical tensions for transformative experimentation. Our findings resonate with those of other scholars who have emphasized the temporal and longitudinal analysis of urban partnerships (Lowndes and Skelcher, 1998; Bradford and Bramwell, 2014). In summary, we can reformulate *Proposition 2* as: *Network governance coordination within multi-actor partnerships is an asset for supporting transformative urban transport experimentation, but is less conducive to sustaining the*

expansion of innovations within post-experiment trajectories, which may need to rely on more formalized coordination in order to achieve greater resource efficiency.

Lastly, future research on urban transport experimentation can productively engage with recent debates regarding 'hybrid governance' that has moved beyond the hierarchical-market-network typology (see Hodson et al., 2017). This chapter has shown that urban transport experimentation involving multi-actor partnerships cannot be equated with a network governance process per se, but is in important ways a hybrid governance process. Following Gross (2016), hybrid governance can refer to 1) how multiple governance modes co-exist and overlap with respect to different policy areas or within different partnerships (e.g. as shown by Lowndes and Skelcher, 1998), and 2) the emergence of new institutionalized and permanent hybrid modes that do not fit easily into existing typologies (e.g. as suggested by Hodson et al., 2017). Our research clearly points to the hybridity of urban transport experimentation in the first sense above, as we found that multiple governance modes and logics co-existed with respect to different transport sub-systems and experimentation trajectories as they unfolded over time. The reformulated *Propositions 1* and *2* point to the hybridity of experimentation, in acknowledging the need for a mix of multiple modes that we showed were effective in different contexts and at different stages of innovation. As some of the hybrid governance literature seems rather apolitical and descriptive (Lupova-Henry and Dotti, 2019), the key challenge appears to be uncovering the politics of 'what works where' in terms of a hybridity of modes for advancing sustainable urban transport innovation. Gross (2016) suggests that attention is needed to hybridization as a process involving diversification of urban governance arrangements. We have shown how innovation efforts drove a diversification of governance modes in Bristol and NYC (Table 4), which suggests that experimentation may be reshaping urban transport governance through hybridization. Future research can explore whether this means that contemporary transport governance can be characterised using existing typologies of governance, or whether new hybrid modes have emerged in the second sense identified by Gross. The basic challenge in this 'age of experimentation' is to maintain a 'helicopter view' of the complex mosaic of governance arrangements across a plethora of temporary partnerships and more slowly changing patterns across different urban transport sub-systems, as our conceptual framework sought to capture.

This chapter has bridged between different perspectives that are often disconnected: the

state-centric perspective that all we need is municipalities using the power to push through implementation of policies such as tactical street space reallocation, and the notion that municipalities need to take the back seat and let civic and business entrepreneurs get on with creating the mobility and public transport services of tomorrow, which is ignorant of the state's role. Progress on sustainable transport innovation requires both government and governance.

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