INSIGHTS INTO THE TRANSITION TOWARDS SUSTAINABLE URBAN MOBILITY

Providing a basis for discussion on the socio-technical transformation of urban passenger mobility for theory and practice

DYNAMO

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DynaMo Project Description

The research group DynaMo: Mobility Energy Dynamics in Urban Spaces, deals with interdisciplinary and trandisciplinary research in the field of urban passenger mobility, and receives funding as part of the 'Social-Ecological Research' [Sozial-ökologische Forschung; SÖF] funding priority of the German Federal Ministry of Education [Bundesministeriums für Bildung und Forschung; BMBF] (funding reference: 01UU1605). Research projects have been started in Münster and Stuttgart in the fields of political science, sociology and city planning. DynaMo conducts research into current transformation processes as well as into the future potential for transformation in the field of urban passenger mobility. In this respect, the focus has been placed on sustainable transformations which are researched particularly with regard to the fields of car-centrist lifestyles, governance of digital parking space management, bicycle activism, translation of mobility standards in the multi-level system, and structuring of space by means of digital mobility options. On the basis of the research results and their interdisciplinary integration, problem-specific insights have been developed, in close exchange with real-world actors, with respect to sustainable passenger mobility in cities: by applying these insights, DynaMo aims to illustrate the paths to transformation in the mobility debate.

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Insights into the transition towards sustainable transport – A process of integration

The DynaMo research group hopes to utilise the package of insights offered in this document to offer an overview of the core elements, possible turning points and success factors which have emerged over the course of research in relation to the sustainable transformation of urban passenger mobility.

The following assumptions have been made in view of the fact that a transformation of the transport sector is necessary in order to achieve climate protection targets in Germany, as well as beyond our borders. In the EU, transport accounts for almost one third of CO_2 emissions, of which 72% is attributed to road transport.[1] In Germany, transport accounted for over 20% of greenhouse gas emissions in 2019, whereby this figure has continued to rise with respect to previous years due to a growing number of vehicles, despite vehicles being more economical than ever before. In Germany, the total share of all emissions due to private motor vehicles within the transport sector was greater than 60% in 2017.[2] In contrast to other sectors which are associated with a significant climate burden, such as the electricity sector, hardly any progress has been made here with regard to climate protection targets; the pressure for sustainable changes to be implemented in the transport sector has therefore not relented, and remains intense.

We understand transport as accomplishing journeys, i.e. a physical change of location, and the associated technical and infrastructural conditions and requirements for achieving this. The concept of mobility, on the other hand, refers to the needs, intentions and capacities that are behind these physical changes in location; as such, mobility also refers to larger social contexts, such as competition for land, environmental protection, safety, health, social inequality, and others.

Given this broad variety of fields covered, the concept of mobility is appropriate for mapping out the challenges and opportunities to be found in cities, whereby it is these very aspects that will increasingly determine (local) political agendas through processes of urbanisation and climate change. The following aspects should be highlighted here: the limited space in the city, and the different stakeholders within this space, such as cyclists, pedestrians, and those travelling by car, stationary traffic, air pollution, along with other pollution (e.g. due to noise and light), the victims of traffic accidents, issues of sealing and heat accumulation, issues of connectivity and accessibility, and finally, but particularly important, the theme of a city that can provide a pleasant, green space for humans to live in.

Against the backdrop of this understanding of mobility and the great diversity of associated themes, the transformation of mobility systems represents a change in the socio-technological sense for the Dynamo research group, whereby the focus of interest is placed on the interactions and mutual influence of technology and society with and on each other. In our understanding, transformation of the mobility system is not merely adapting transport, but is rather also a social change. The way in which we move around is inextricably linked to the question of what type of society we (would like to) live in.

We assume that for lasting and robust changes to be achieved in mobility behaviours, the way mobility is perceived, presented and learnt about must also change. This socio-cultural view of mobility must not evade the significance of motorised individual transport. As such, the following insights touch on the paradigm of car-based mobility and its implications for the wider topic, despite this aspect not being explicitly mentioned in all areas. In this way, the discussion of how cars predominate is set out, either implicitly or explicitly, with regard to a sustainable transformation of urban passenger mobility.

In our understanding, a sustainable transformation can only be achieved by applying a 'strong' understanding of sustainability[3], i.e. taking into account ethical and socio-political issues. When we refer to 'strong sustainability', we mean development that does not subordinate social and environmental aspects to economic aspects. As such, it follows that toposes of social justice and environmental protection are considered of crucial importance in our understanding. In this sense, practices in mobility transformation may represent a potential for change that can lead to societal changes that encompass far more than a mere reorganisation of the transport system. This includes lifestyles that do not primarily rely on a car-dependent organisation of activities

of daily living. Of particular importance in this respect is to ensure equal access of different social groups to different means of transport, and participation of citizens in the design of any transformations to mobility, including equal access to these participation processes.

Our insights aim to elucidate the paths to transformation in the debate around mobility. It is our aim to initiate a dialogue between those implementing and planning the projects, the researchers, and the politicians, and to bring visibility to the issues in question. In doing so, it is certainly not our intention to blame individual actors for barriers to implementation to particular individual actors: rather, we would be delighted to see the following insights be used as support for argumentation, and to contribute to high-quality discussions, since ultimately these theories represent an attempt to enrich the vocabulary for our mobility transformation.

1 cf. European Parliament 2019: CO2emissions from cars (facts and figures). Available at: www.europarl.europa.eu/news/de/headlines/society/20190313STO31218/co2-emissionen-von-autos-zahlen-undfakten-infografik. Last accessed on 13/07/2021

2 cf. Research Information System 2021: Air and environmental pollution due to freight transport. Available at: Luft- und Klimabelastung durch Güterverkehr [Air and environmental pollution due to freight transport] (forschungsinformationssystem.de). Last accessed on 13/07/2021

3 cf. e.g.: Lorek, Sylvia; Fuchs, Doris 2013: Strong sustainable consumption governance – precondition for a degrowth path? In: Journal of Cleaner Production 38, 36 – 43, and Davies, George R., 2013: Appraising Weak and Strong Sustainability: Searching for a Middle Ground. In: Consilience 10(1), 111-124. See also: Dynamo Werkstattbericht I [Workshop Report I] (April 2018): Knowledge integration – an inter- and transdisciplinary perspective on the sustainable design of personal mobility in urban areas

INSIGHT 1: The knowledge required to design sustainable urban mobility solutions is often existent: the challenge is knowledge integration.

Complex challenges, such as the sustainable design of urban mobility systems, require a broad knowledge base for the development of robust and viable solutions. In this context, the most disparate of knowledge bases, such as scientific experience, practical expertise, implicit everyday knowledge etc., all become relevant. The central challenge here is to achieve a goal-orientated integration of these different knowledge bases in order to render them useful in a practical setting.

Whereas it was previously considered sufficient to ensure smooth and cost-effective (car-based) mobility, modern transport systems must now also meet comprehensive requirements relating to ecological sustainability, quality of life, public health, and ultimately social acceptability. The knowledge required to design appropriate mobility solutions is often existent, but is not available to the relevant actors, or cannot be identified as such and/or translated into practical solutions. In the main, this relates to the fact that integrating different knowledge bases to form feasible solutions for given problems is a complex task, requiring involvement of entirely different actors, each with their own respective knowledge. In this context, knowledge can take many different forms. In principle, a distinction can be made between specialist knowledge (i.e. the expert knowledge of transport planners or designers, etc., and scientific knowledge from different academic disziplines) and everyday knowledge (i.e. experience-based knowledge derived from everyday experiences of transport passengers). In most cases, however, only speciaist knowledge is considered as 'true' knowledge: as a result, only this knowledge is considered relevant and is recognised as such. The various knowledge bases are also available in different forms and formats (e.g. anecdotal accounts, mathematical formulas, curves, diagrams, legal documents, practical expertise). Consequently, knowledge must be made available in each case, and 'translated' in various different ways so that it can be integrated with other relevant bodies of knowledge. For example, it is often difficult to combine knowledge from the social sciences with knowledge derived from the natural sciences or engineering.

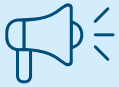
It is even more difficult to integrate scientific findings with everyday experiences and feedback from potential users of different means of transport, or from those affected by mobility-related changes or problems. Moreover, matters become further complicated by the fact that the various knowledge carriers are also actors with different interests, ways of thinking, and working habits (scientists, experts in the area of economy, administration and civil society, potential users, residents, etc.). As such, it is not simply a matter of "bringing all the relevant persons together" as this does not mean that they are capable of dialogue "on an equal footing", or that their knowledge can be integrated into real solutions to the problems at hand. The systematic integration of the different knowledge bases is therefore a crucial aspect. In other words, the question arises as to how different knowledge bases can be effectively interrelated such that a multi-perspective solution can be developed with as few 'blind spots' as possible. In this respect, the following aspects are of pivotal importance:

KNOWLEDGE INTEGRATION

This term describes a process whereby different actors share their knowledge and attempt to amalgamate their respective knowledge to form a solution to a given problem. Knowledge integration is therefore one of the key challenges for transdisciplinary problem solving. A distinction can be made between three relevant dimensions of knowledge integration:

1. Cognitive and/or content-based (knowledge bases and opportunities for links);
2. Organisational (practical coordination of activities and interests); and
3. Communicative (establishing of a common protocol for communication).

- **Case-specific and context-specific methods for knowledge integration:** Depending on the problem to be solved, different knowledge bases and approaches to problem-solving are required, such that no single method for knowledge integration can exist. As a result, the procedure to follow is always both case-specific and context-specific. However, it is necessary to establish a common understanding of the problem at hand between all parties involved as part of the initial step in all cases.
- **Relevance of 'translation services' and finding a common language:** Since different actors share their knowledge in different ways, it is important to find a common language level for all those involved. In this respect, 'translation services' are needed time and time again. For example, it may be necessary to convert anecdotal, everyday experiences into formal, abstract categorisations in order to make them available for use within the framework of scientific methodologies. Conversely, it can also be important to present complex facts and scientific findings in a clear and understandable format so that they can be understood and useful even for those actors who lack the extensive prior knowledge and corresponding specialist knowledge.
- **Ensuring awareness of all actors involved of the heterogeneity of knowledge bases:** Since all forms of knowledge are potentially relevant when designing sustainable mobility solutions, mutual recognition of the relevance of the respective different knowledge bases is essential. This is the only way to establish a dialogue on an equal footing, whereby solutions to problems can be worked out in a collaborative effort, with no parties being systematically excluded.
- **Willingness to experiment with solutions to problems:** Given that scientific knowledge is generally subject to uncertainty in relation to complex problems and the actual sustainability of solutions to problems only becomes apparent following practical implementation, real-world experimentation is essential (e.g. in the setting of real-world laboratories). This makes it possible to directly experience solutions and to evaluate for any weak points and potential areas for optimisation.



NO SOCIALLY-VIABLE MOBILITY SOLUTIONS WITHOUT KNOWLEDGE INTEGRATION

Designing sustainable urban mobility necessitates integration of different knowledge bases on an equal footing. The process of knowledge integration is time-consuming and must be carefully designed in order to be successful. Successful knowledge integration, however, forms the basis for implementing sustainable mobility solutions.

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INSIGHT 2: Sustainable urban mobility can only be achieved by applying a holistic understanding of social justice.

Do city-centre driving bans represent a violation of fundamental rights? Do driving bans particularly affect those from a poorer socio-economic background? Do grants for purchasing cargo bikes or electric cars not just benefit those who can already invest more money in their mobility? These issues are discussed over the course of many debates on mobility policy, whereby the core of the matter essentially relates to what kind of mobility can be defined as just on a societal and social level. How can these issues be negotiated politically? What challenges do they pose to local actors? And, what is required from other political levels to support them?

Ongoing injustices experienced by specific social groups, on the basis of gender, age, or a particular ethnicity, for example, demonstrate that unequal power structures are at play. For example, if bike rental stations are not constructed in areas with a predominantly non-white population (e.g. New York City), or if participation procedures for traffic planning are designed in such a way that people with disabilities or care obligations cannot participate, then different injustices interact with each other, and mutually stabilise each other. A future-oriented mobility policy should therefore develop a comprehensive awareness of the issues of justice in mobility systems, and add these issues to the specification of success criteria.

Existing planning practices within the public administration (and beyond) need to be revisited for this reason. Local authorities, such as social and environmental departments, need to improve and increase their communications and cooperation with each other. As part of mobility transformation policy, it must be possible to articulate, weigh up and incorporate such demands for social justice. This can be achieved, for example, by collecting data on inequalities and making them available to the wider public. In this way, the issue of who mobility is planned for, and with which stakeholders, can be entirely recast.

In connection with this point, we are faced with the challenge of operationalising certain (in)justices for planning practice. Only if strong criteria for socially-just mobility have been formulated can these be actively and purposefully pursued. Long-standing demands for improved justice, with regard to car-based mobility, for example, as well as processes and structures that contribute to these demands being propagated (e.g. subsidies such as 'company car benefits', or free/cheap parking spaces) are scrutinised with this type of contemplation of social equity.

In the (social) scientific literature, there has long been an argument that mobility (and any mobility transformation) cannot be considered without a regard to social justice. Accordingly, mobility from an equity perspective should also be understood relationally as a "means to an end", facilitating justice in other contexts (access to education, participation processes, care activities). Inequalities with regard to mobility exist, particularly where access to mobility is unevenly distributed, people are unequally

ENVIRONMENTAL JUSTICE

The concept of environmental justice has been established as a fixed concept as part of the scientific sustainability debate since the 1970s. Based on the civil rights activist movements in the US in response to various environmental disasters, the concept has found its way into political practice, even outside the United States. In Germany, for example, the so-called "precautionary principle" must be mentioned as part of (environmentally-oriented) political decisions; the principle states that investigation of the effects of any measures implemented should form an integral part of political decision-making and planning processes. According to the 'Polluter Pay' principle, those actors who set up injustices through their actions should also be held accountable.

INTERSECTIONALITY

This term relates to an attempt to pay even more attention to the interrelationships and reciprocal associations of instances of discrimination. In the mid-2000s, this concept from the field of gender research on the critical trias of race, class & gender**. In addition to these categories of injustice, consideration can be also made for dynamics with respect to disability or demographic factors, (establishing a common communications practice).**

affected by the external forces of planning, or where they are not even considered as a stakeholder group in the first instance.

As part of research, a distinction is made between three interrelated dimensions of justice: *Inequality of distribution* critically examines both the unequal distribution of public transport services and the severe consternation as a result of traffic-related air pollution, and relates to both injustices caused by external factors as well as due to mobility that is impossible to implement.

Procedural justice critically addresses the idea that people are not involved in certain processes, or that the processes themselves do not correlate with the demands of citizen participation. Finally, the third dimension of equality is the *recognition of specific justice-related demands*:

POLITICAL & SOCIAL NORMS

A specific understanding of justice as established by society is incorporated into social norms, in laws or political programs, for example. These manifest as what is considered to be fair or even 'normal'. The translation of these norms across political spaces, for example from the international level to the local level, is a key area of research in the political sciences.

RECOGNITION OF KNOWLEDGE

Debates around what constitutes 'just' mobility necessitate the recognition and amalgamation of various different knowledge bases. This should be understood in an interdisciplinary sense, given that different dimensions of justice are processed and "managed" by different actors. A combination of different types of knowledge is also required in a transdisciplinary sense. In this case, it is often necessary to translate implicit knowledge bases, e.g. from citizens, but also from scientific sources. The result of this process must then be assessed according to an understanding of justice that has been accepted by society.

Is (in)equality being recognised as such? What societal understanding, be it just or unjust, has become established?

In times where municipal resources are scarce and there is increasing pressure to act, a description of mobility meeting the demands of both ecological sustainability and environmental justice, seems particularly difficult to formulate (cf. THEORY 4). But there are indeed positive examples. What they have in common is a focus on the social and environmental roles of mobility whilst ensuring scrutiny of various forms of transport in the sense of being an end unto themselves. By way of illustration, experience accumulated on the concept of *sustainable urban mobility planning* by the countries most affected by the sovereign debt crisis (Greece, Italy, Spain) may be invaluable. Such experience shows that equality in mobility in its various dimensions is by no means a fallacy, but rather can have positive effects for holistic urban development.

A FAIR MOBILITY POLICY MUST BE A "MATTER OF NEGOTIATION"

Different experiences and perceptions of (in)justice will clash as part of public debate, forcing political decision-makers and practitioners to face up to the task of weighing up what indeed 'justice' means. Actors in (urban) mobility policy are called upon to facilitate debates on these issues, and to ensure a high level of transparency.
The question of what constitutes a just mobility policy is therefore closely linked to questions of communication and (mutual) learning. The path towards this type of understanding of justice starts out on a small scale, e.g. when designing participation formats, or providing information contributing to improved understanding; this makes it possible to evaluate mobility policy and the performance of the mobility system.

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INSIGHT 3: After decades of cars dominating, inequalities in the constructed elements of our cities have come to light which can only be overcome with concerted effort.

Urban structures dominated by cars have brought with them a wide range of spatial inequalities in cities; for example, these relate to: 1) the distribution of space in the public realm for different uses; 2) path dependencies, which demonstrate the dominance of the car in such spaces, for example through traffic rules, usage regulations, or traffic control systems; 3) external transport factors (such as emissions and noise) which are unevenly distributed spatially; and 4) unequal access to alternative options for mobility. Critical evaluation of these inequalities is necessary for the sustainable transformation of urban mobility – both to bring about change, and to shape future developments, and thereby overcome inequalities.

The dominance of cars in urban areas is becoming a growing problem: an ever-increasing number of ways which must be managed during our daily activities are distributed within a fixed designated area, and this area is reaching its capacity limits. Urban space is a limited resource. The growing number of cyclists, pedestrians, buses and trains, as well as additional mobility services such as car sharing and shared e-scooter services are competing with traditional car traffic for space. The question of how much public space should be assigned to which forms of mobility and types of use is currently undergoing a process of re-politicisation, which can be well illustrated by the increasingly popular cycling movements, calling for a redistribution of road space. The reason behind this is that transport infrastructure continues to focus heavily on cars, and their use. The dominance of car traffic on road surfaces results in a structurally-defined discrimination against other forms of transport and vehicles, particularly in cities.

However, this dominance is not only evident on the roads, although it is in this space that the "System of Automobility" (Urry 2004) is most visible: Constructed infrastructure results in *path dependencies* and *lock-in effects* which further stabilise the dominance of the car. Key aspects worthy of mention, amongst many others, include: traffic management by means of traffic lights and signs; and priority over other means of transport through explicit traffic rules and laws, and space usage and consumption (e.g. for parking spaces).

Beyond the surface area itself, the quality of the space is also important: a cycle lane that is unsafe due to having too little space becomes just as problematic as housing constructed along a main traffic route. Both the surface area distribution itself as well as the quality of spaces due to the impact of cars are not equitable, and therefore not fairly distributed. For example, pedestrians and cyclists (who contribute to environmentally-friendly transport in the city) are often disadvantaged or marginalised.

In addition to quality, access to mobility is a further resource that is unevenly distributed in terms of space. Public transport connections, or new mobility services show a great deal of variety from one place of residence to another.

The possibility of choosing between different means of transport and thereby participate in mobility ultimately depends to a large extent on the infrastructure systems created for this purpose: adopting a broader understanding of the issues, aspects such as affordable housing also come into play here. How the distribution of a limited resource,

PATH DEPENDENCY

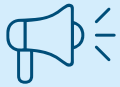
describes how an innovation becoming established will lead to further, related developments and therefore limits the degree of variation for new innovations. As a result, developments must always be regarded as historically grown and interconnected.

LOCK-IN EFFECTS

occur when, as a result of path dependencies, a certain (not necessarily superior) technology becomes established, and due to the complexity of the interrelated (technical) developments, a changeover to alternatives is either impeded or entirely prevented.

space, can be implemented in a more equitable and more sustainable manner by creating mobility infrastructure is therefore of paramount importance for the sustainable transformation of urban mobility systems.

In order to break through the inequalities manifested in constructed structures, solutions are needed that: 1) highlight the injustices; 2) overcome them; and 3) reflect the resulting path dependencies right from the planning stage with regard to justice. In order to resolve the spatial inequalities that have become established along with the dominance of the car, they must first be considered in the context of the path dependencies, both at the level of decision-makers and planners, and as part of social discourse. Examples of implementation including 'parklet' initiatives, or the increasingly common pop-up bike lanes, demonstrate how the redistribution of park and road spaces is fuelling discourse on the potential for using space and on the competition for space, thereby challenging established normalities.



HIGHLIGHT STRUCTURES AND REVEAL OPPORTUNITIES

On the one hand, designing infrastructure systems has the potential to challenge routines and standards over the long term. On the other hand, it also represents a decisive factor for overcoming lock-in effects. Consequently, future measures must be planned in view of the new path dependencies that will inevitably arise. Development paths have to be designed with this in mind, and put into operation today with a clear regard to future possibilities and dependencies. The question that decision-makers must therefore ask themselves is how one-sided dominance can be overcome through corresponding designs and measures in order to facilitate a just mobility transformation.

INFRASTRUCTURE

The concept of infrastructure plays a key role in the urban context. A scientific examination of infrastructures is carried out, for example, as part of the Science and Technology Studies. Infrastructure is understood in those studies as the (generally) material and almost invisible foundations of everyday life. As such, infrastructures stabilise the social order by generating expectations and regularities. Infrastructures also include perceptions of the future, which become established by their persistence.

GOOD PRACTICE & ADDITIONAL LITERATURE

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INSIGHT 4: The complexities involved in managing the mobility transformation forces local actors to re-adjust their roles.

Both politics and science have long recognised that the actions of local actors play a key role in the implementation of sustainable transformations. On the one hand, local communities represent the places where political pressure to act to bring about a mobility transformation is particularly intense. Particular examples of this can be seen in the debates on air pollution, associated thresholds, and measures in response to these, such as driving bans. On the other hand, cities are also considered to be pioneers: the "laboratories" of sustainable change. New developments and approaches to solutions, both technical and social in nature, are being investigated in these arenas. In order to meet this very high demand, local actors are required to re-adjust their roles within complex governance relationships for a sustainable mobility transformation.

Local actors work to design the mobility transformation in new constellations of actors, whereby two dimensions are of key importance:

Increasing the pressure to act within the multi-level political system:
Both regulatory and financial measures at EU, federal or state level must be developed and implemented by local actors according to local conditions and target dimensions. As such, local measures are dependent on processes initiated in non-local political settings, and are associated with complex socio-political target dimensions. The pressure to act to achieve ambitions and commitments made is correspondingly often pushed onto the local authorities (consider, for example, the area of air quality). At the same time, a generally growing willingness of the local population to participate, and a simultaneous politicisation of social and environmental conflicts by municipal actors necessitate a reconciliation of the divergent target dimensions "on the ground", and the corresponding implementation steps to be taken.

Mobility transformation as an interdisciplinary and cross-community problem:
Designing urban mobility systems, which are to be economically and environmentally sustainable, as well as inclusive, represents an interdisciplinary task. Furthermore, processes and decisions at a higher level usually have an impact on planning and transformation processes at the regional or city level. This therefore requires coordination and cooperation within the local communities, as well as a coordinated approach between them with functionally-coupled municipalities and regions.

Both dimensions which have only briefly been outlined here assign municipal actors the task of further developing in line with the challenges in order to influence developments as a driving force, i.e. *to develop political capacity* for action. For example, the transfer of EU directives or financial support programs with respect to local policy and administration requires "agility" and "creativity", as well as an approach to interdisciplinary

MULTI-LEVEL GOVERNANCE

describes a concept from the political sciences which takes into account the way in which political challenges are managed by state and non-state actors on different political levels.

LOCAL (MUNICIPAL) ACTORS

should be understood as the persons and institutions within municipal administrations and politics, who are active both externally as well as within a given local area.
This term, in the sense in which it is used in this text, should allow a distinction to be made with respect to local civil society and private/commercial actors.

issues with "openness", "agility" and a "willingness to cooperate". The municipalities are not, however, well-positioned to meet these demands and to identify and operationalise interdisciplinary strategies. As a result, departmental structures have not grown in tandem with interdisciplinary challenges. In addition, local actors often lack the expertise and resources required to shape planning processes in line with their own priorities, for example with regard to participation (cf. INSIGHTS 1 and 5). Accordingly, *new internal, inter-community and (cross)-regional groupings* are necessary in order to pool resources and to reinforce this agility and creativity for shaping the mobility transformation.

Four good examples of these types of cooperation grouping are outlined in the following:

As of today, the Europe-wide *Eurocities city network* comprises 190 cities in 39 European countries. The aim of Eurocities is to facilitate knowledge transfer between municipalities through intercommunity working groups and training courses, as well as to coordinate joint tendering for proposals and projects within the EU's funding instruments. In addition, the network considers itself to be a representative of the interests of cities vis-a-vis the EU institutions. Urban mobility is a central sphere of activity in the network: Eurocities was involved in (further) developing concepts such as the Sustainable Urban Mobility Plans (SUMPs) and has facilitated successful collaborations between municipalities as well as actors in the scientific and private sectors. Constructing these types of networks can be used as an instrument which municipalities can wield to proactively influence political developments, and tap into resources external to municipal administrative structures and competences.

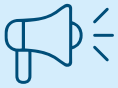
AGILITY OF MUNICIPALITIES

in our understanding, refers to the capacity of administrative structures and processes to constantly adapt to evolving challenges as well as to technical and social innovations.

The state of Hesse's Centre for Sustainable Urban Mobility (FZ-NUM), has created a *competence-oriented point of contact* for municipalities with regard to planning urban mobility. The FZ-NUM provides a space for exchange between local authorities, as well as offering training courses in related topics for local practitioners. It also advises municipalities on concrete planning processes and offers support, for example, when applying for funding from the EU or Federal authorities. As such, the FZ-NUM provides resources that local authorities cannot raise from within their own structures given their context of limited resources and competences. Creating (cross-)regional competence centres for intercommunity and interpolitical cooperation therefore increases the capacity of municipalities to act due to provision of resources by other political levels as part of a network. The platform also provides as starting point for intercommunity exchange and the consequent processes of knowledge exchange and integration.

In Stuttgart, the "Strategic Planning and Sustainable Mobility" unit was started for the purpose of *organisation and cooperation within the community* in the field of mobility. As a staff unit consisting of eleven employees, the unit is located directly within the scope of operations of the local mayor. The core task at hand is the coordination and management of issues relating to the areas of strategy, mobility and climate in the city of Stuttgart. In this context, the focus is on coordinated cooperation between the administrative heads, the municipal council, and the classical administrative authorities, such as the Civil Engineering Office, and the Office for Environmental Protection, in order to tackle interdisciplinary themes and questions together within the corresponding interdisciplinary settings. By means of this type of re-organisation within the administration, municipal actors can create free space and free up resources that were previously tied up. Knowledge integration allows for new perspectives on complex problems to be opened up, and conflicts of competence to be avoided.

C*ommunity-based and interdisciplinary mobility management* as a cross-sectional task within the municipality addresses interdisciplinary topics relating to mobility ranging from cycling and pedestrian traffic, to public transport and motorised private vehicle traffic. Community mobility management is implemented in line with an overarching strategy operating at a higher level, which is developed following the involvement of actors with different disciplinary backgrounds. This makes it possible to marry up the topic of mobility planning with other urban development processes, such as land management, or issues of recommunalisation. In this content, the municipal actor plays a central role as the coordinating and controlling body.



ACHIEVING GOALS TOGETHER

Readjusting the role of municipalities in shaping the sustainable mobility transformation depends predominantly on whether cities can provide the necessary resources. In this respect, it is not only the municipalities that need to adapt their internal structures and processes. It is particularly when resources are provided and challenges are jointly addressed through efficient organisational structures and in cooperation with other political levels that the municipalities can become more "agile". Inter-community networks, (trans)regional competence centres and modified intra-community structures are examples of how this can be achieved in political and planning practice.

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INSIGHT 5: The motivation of citizens to actively participate in designing mobility opens up possibilities for co-creation, whereby experimental spaces can be created for sustainable mobility design.

Increasing numbers of urban residents want to take control over mobility design for their own cities. This is evident, for example, in the German Movement for Deciding in Favour of Cycling [Radentscheid-Bewegung], whereby citizens collect signatures in order to promote cycling, and have cycling-related provisions set down in the legislature. Particularly in the context of collaborative and interactive (= co-creative) participation processes, the increasingly palpable will of the citizens to participate in design in the context of transport policy issues could be exploited in a productive manner, potentially leading to innovative and locally-adapted solutions.

The world of traffic is "on the move". On the one hand, protests against diesel bans and the 'Fridays for Hubraum' movement [Fridays for Big Motors - a counter movement to 'Fridays for Future'] show that many citizens are committed to maintaining the car-focused status quo. On the other hand, initiatives are also being developed demanding a sustainable transformation of urban mobility as well as an improved quality of life in cities thanks to redistribution of space, as well as urban and traffic planning that is designed with people at the centre: Cycling demonstrations such as Critical and Kidical Mass, local initiatives for car-free neighbourhoods, and referenda relating to environmentally-friendly transport policy and bicycle infrastructure (cf. box "cycling decisions") are just a few examples. In the latter example, we see people who want to take action themselves, to participate in decision-making, and to actively participate in shaping their city. The emphasis on the growing desire from citizens to shape mobility is being felt in the context of a general trend that citizens are not participating in the established institutions of parliamentary democracy, such as elections or parties, but rather are exploring and demanding new forms of participation (in politics). This will to shape policy and participate in it can particularly be linked to co-creative participation processes.

Co-creation is understood as an innovative format for process design, which can unleash the potential for development of location-appropriate, demand-specific and target-group-specific individualised solutions and comprehensive strategies.

The added value of co-creative processes can be found in their interactive elements. Citizens are not confronted with prefabricated proposals, but rather should ideally be involved from an early stage, systematically participating in the design of any given project or decision. They can have a direct influence on the important issues, and collaborate with others right down to the specifics. Co-creation can therefore contribute to facilitating citizens' voices being heard and their participation in the development and designing process. In this way, public decision-making can come to benefit from greater legitimacy and acceptance. As such, co-creation can lead to innovative solutions and promote social cohesion, social learning, and a sense of personal responsibility.

CO-CREATION

is an interactive form of citizen participation whereby citizens play an active role and are involved in the development, design and implementation of public services, decisions, measures or projects. They collaborate on work to develop innovative and shared solutions to complex problems by bringing their specific skills, ideas and knowledge to the table. Services that were previously defined as purely public tasks see this collaboration by citizens as part of co-creative processes, i.e. the users of these services collaborating in their design.

CYCLING REFERENDA IN GERMANY

In more and more cities in Germany, citizens are joining forces to support initiatives to promote cycling in their cities by means of popular votes or local referenda. There are now 45 initiatives for pro-cycling decisions in Germany (as of March 2021). The "Volksentscheid Fahrrad Berlin" [Berlin Cycling Referendum] played a pioneering role in cycling decisions, with the Berlin Mobility Act (Berliner Mobilitätsgesetz; MobG) emerging from the movement. An example of the co-creative process can be seen in the advent of the Berlin MobG (2017 – 2018). It has also been referred to as a "collaborative drafting of the law" since representatives from civil society (e.g. groups such as "Volksentscheid Fahrrad" [Bike Referendum], ADFC and BUND) were involved in the legislative process from the very beginning, being in a position to express their demands. Negotiations on the MobG certainly saw some instances of conflict. Despite this, however, the process is seen as a shining example of collaborative development of the law with involvement of players from the administration, politics and civil society.

In practice, however, procedures designed for civic participation often deviate from this ideal, prototypical model: the co-creative processes outlined above are often hampered by a lack of inclusiveness since only those citizens with the necessary time, cognitive, social and financial resources tend to participate. Co-creation is therefore condemned to expressing a certain level of selectivity, and cannot always stand up to aspirations of inclusiveness in participation procedures on practical implementation. It is for this reason that co-creation is not to be considered a panacea, or some type of magic bullet. Notwithstanding the aforementioned, co-creative processes can create experimental spaces for citizens. This is particularly promising at a time when the interest expressed by citizens in shaping urban mobility is becoming more and more palpable.

For experimental co-creative processes, framework conditions should be established that ensure the most representative number of citizens can be involved in political processes at an early stage in order to promote new local engagement and cooperation. The following aspects are of particular importance:

- "Enabling" measures which put citizens in a position to participate in co-creative processes. Possible options could include compensation for expenses, exemption from work, and childcare services for children. Although co-creation will always remain selective to a certain extent, efforts should always be invested in maintaining a low threshold for accessing these procedures and to enable local actors to participate.
- Experimental spaces in which broad social debate on mobility problems and solutions can take place, and ideas can be tested as part of a 'trial and error' procedure. Potential failures should be considered as part of a journey towards a solution.
- Awareness and understanding of the new roles and opportunities for citizens and public institutions. When users become designers, there has to be a rebalancing between public management and setting down of a framework which is required, on the one hand, and design wishes as expressed by civil society on the other.
- Transparency by means of access to and exchange of information. Transparency creates credibility, prevents misunderstandings, and reduces distrust.
- Concrete activities and pilot projects to be implemented. Co-creative procedures should not be blocked at a purely planning and conceptualising level. Ensuring practical possibilities for implementation of the ideas and visions developed should be an important feature of co-creation.
- Evaluation over duration of processes. Continuous monitoring should be implemented over the course of the participation process, verifying and evaluating it.

DRAW ON THE WILL OF LOCAL RESIDENTS TO CREATE AND IMPLEMENT NEEDS-SPECIFIC MOBILITY SOLUTIONS IN A CO-CREATIVE PROCESS

Interest in active participation on the part of increasing numbers of engaged urban residents with respect to shaping mobility should be fostered within the framework of co-creative participation processes. There is a great need for innovative mobility solutions, as well as their implementation. In this respect, co-creation can offer a dedicated space to ensure productive use of the everyday practical knowledge and locally-oriented experiences of citizens who express a desire to effect change and implement solutions, thereby launching solutions developed from the collaborative process. However, since co-creation cannot be understood as a 'magic bullet', continuous critical evaluation and further development of co-creative processes are of vital importance.

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INSIGHT 6: Individual and social disruptions can be productive opportunities for (mobility) transformations.

There are moments and developments that can lead to a disruption in our habits, and turn our long-rehearsed processes upside down. A situation which tends to bring uncertainty and anger (and rightly so), and frequently also additional cost, can also represent an opportunity, or even an obligation to try something new. There is no question that disruptions can have serious consequences, but yet they do also offer a space for experimentation. Unattractive alternatives and unlikely solutions can be seen in a different light, leaving us a space for learning, something which presents itself only rarely within the confines of everyday life.

The increasingly apparent need for a social and ecological transformation will inevitably entail a profound change in everyday life. Everyday life is primarily characterised by predictable features and stability, or to be more precise, routines which oppose these type of change by their very nature. Taking this perspective, we can see how these decisive moments can open up a portal to addressing everyday actions, which would otherwise remain closed. The daily commute to work, how we go about shopping, getting the children to school and back: we accomplish all of these activities to a greater or lesser extent in our usual everyday lives. Things can appear rather different when we are forced out of our tried-and-tested routines. For example, when we are drawn to another city by a job offer, the family may grow or get smaller, and we have to work out our routines again from scratch. Even when kindergartens are temporarily closed, everything can seem to be in total disarray, and our activities of daily living cannot generally proceed as normal. However, even minor disruptions, such as a blocked road or a railway line going offline require flexible management that works outside of the constraints of established procedures. It is in this sense that scientists refer to the concept of crisis, or crisis actions. Whenever our routines are thrown off course, moments of crisis can open up a fresh perspective on our actions. Indeed the COVID-19 pandemic has clearly demonstrated this, both on an individual and a societal level. Institutionalised and bureaucratic processes that are often regarded as set-in-stone without further questioning, now require a justification.

Given that the structures we have become accustomed to are not functional either in the short or long term, alternative solutions must be sought. These situations of upheaval follow the same cyclical logic of problem solving: it is always necessary to react to any change, to challenge previously implicit structures and thought patterns, to seek out new solutions, to identify them and to test them until everyday life can take its usual course once again. Not every single aspect in this scenario has to be new, and pre-existing alternatives can also be used, i.e. solutions that were not 'in sight' of those actors in control. In many ways, it is precisely this time window that can be seen as an opportunity to drive mobility transformation forwards in a productive manner. Research has shown that whilst this "window of opportunity" remains open, a (long-term) change in our own behaviours is more likely to occur, provided that suitable alternatives are available, i.e.

WINDOWS OF OPPORTUNITY

describe the (often short) period of time during which a change to established patterns of action or procedures is possible or acceptable, or at least open to discussion. Windows of opportunity often present themselves during crisis situations. They can have a significant impact on political programs and agendas.

LOCK-INS/PERSISTENCE

refers to the actions, habits, problems or even norms and knowledge bases that have become so entrenched over time that they have become inflexible with respect to any changes, or appear initially as having no available alternative in the case of lock-ins.

DISRUPTIVE VERSUS INCREMENTAL CHANGE

Any changes, such as innovations, can be sudden and unforeseen changes (disruptive) or gradually-occurring changes (incremental).

sustainable options when considering the case of a social and environmental transformation. The example of changing our workplace can therefore present as an opportunity to switch to using a bicycle, especially when there are suddenly no free parking spaces available.

The birth of a child can show us how a temporary home office is a workable alternative, provided that digitisation and employers allow it. The sweeping changes to our daily lives brought about by the pandemic have also cast a different light over a broad range of options. Video conferencing, for example, replaced countless business trips. Our social and environmental surroundings have become more important. When it is not possible to access leisure activities that are some distance away, the playground located around the corner becomes more important. Social and environmental issues, such as the "15-minutes-City" (Paris), have therefore seen an increase in their scope and reach.

FROM A SOCIAL-SCIENCES PERSPECTIVE,

there are various different approaches to research/investigation into/as part of so-called 'crises'. They are important for the cycles seen in the economic sciences, or for formation of identity in discourse theory. The sociological theory of practice (e.g. Reckwitz 2002) understands crises as 'action crises', which by their very nature force changes or readjustments to be made to practices that are embedded in our everyday lives.

These types of change have been referred to in the political sciences as the "policy window" (Kingdon 1984), known in everyday language as the "window of opportunity". It describes the modified composition of themes, which in turn describe new possibilities for designing agendas ("agenda setting").

With regard to transitions, e.g development toward more sustainable mobility, crises can have both positive and negative effects. A clear example can be seen here in the COVID-19 pandemic with the increased use of the car for safety reasons, or the increase of cycling - both generally at the expense of public transport.

HARNESS THE POTENTIAL OF CHANGE TO DESIGN TRANSFORMATIONS IN A TARGET-ORIENTED MANNER

What is ultimately decisive in this respect is how such a potential for transformation can be productively exploited, and development can be managed as part of a sustainable mobility policy, without reinforcing persistence, re-establishing old locks-ins, or producing new social exclusions. As such, what is needed are sustainable proposals and a politics that actively supports solutions to the issues arising as part of these crises and highlights paths to establishing socially and environmentally-friendly solutions. This could be measures that make it more difficult to return to old habits, by enshrining certain aspects in Law, for example. This may conversely, however, take the form of an incentive to choose alternatives to "sweeten the deal": these include financial incentives, such as discounted tickets for public transport, or indirect incentives, such as developing safe cycling routes, or even campaigns promoting the behaviours desired by society.

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