Leibniz-Institut
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Dresdner Planerforum

Simulation Modelling for Urban Transitions to Sustainable Mobility

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Cities and urban conglomerations have become the centres of the global population and also a major source of local air pollution and greenhouse gas emissions. Fossil-fuel powered transport is one of the most important emissions sources in cities. At the same time, car-based transport in cities causes several other problems including congestion, high requirements for land in densely developed areas with high land prices, separation of poor communities from city life where highways cut off many access routes and a tendency for urban retail and entertainment to migrate to highway based peri-urban developments.
In the innovation literature, the unsustainability of transport is recognised as a 'wicked' problem that requires a 'sustainability transition'. The idea of transitions in socio-technical systems was developed from ideas of long term industrial revolutions (Kondratiev Waves) and the concept of 'Strategic Niche Management'. It is closely related to the idea of 'transformations' of socio-economic systems.

My claim is that up to now, policy in Germany as well as globally has failed to deliver social, technological and economic changes to sustainable urban mobility systems. Therefore, it is necessary to develop visions and plans for sustainable urban mobility and social governance/policy measures to promote transitions. This is a highly complex problem, because mobility behaviour is determined by a combination of personal needs and cultural norms, the structure of the built environment and the available transport systems. In order to provide a basis for the analysis of these issues and propose measures to support change, I argue that quantitative scenario analysis is needed to complement qualitative visions and assessments. However, this is also a tricky problem. Conventional techno-economic models such as the Integrated Assessment Models for climate change policy analysis are not designed to capture the co-evolutionary processes of behavioural, technical and institutional change necessary for a transition to sustainable urban mobility. Therefore, new simulation models that explicitly address these issues are required to extend current models of urban transport systems and mobility. There is a small literature on simulation models for sustainability transitions

I will review the state of the art in transitions modelling, in particular discussing the key features of transitions processes and modelling approaches that can simulate them. I will give an example from my own work of how transitions theory can be implemented in a simulation model to develop transitions 'pathways' to sustainable mobility and discuss possible directions for future research into understanding transitions processes and development of measures to support such processes.

Veranstaltungsort:

Videokonferenz im
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Dr. Ing. Jonathan Köhler ist Senior Scientist am Fraunhofer ISI (Institut für System- und Innovationsforschung). Er arbeitet in der Verkehrsökonomie und ist Experte für Innovationstheorie und langfristigen technologischen Wandel, Makroökonomie und Systemdynamik. Er arbeitete am makroökonometrischen energieumweltökonomischen Modell E3ME für die Cambridge University und war Mitherausgeber einer Sonderausgabe des Energy Journal über den endogenen technischen Wandel in der Modellierung von Energiepolitik. Er hat sich mit Biokraftstoffen im Verkehrssektor und nachhaltigen Innovationen im Verkehrssektor beschäftigt. Derzeit arbeitet er an der nachhaltige Transformationsmodellierung und der Modellierung von Innovationssystemen und -prozessen im Verkehr. Er hat das MATISSE-KK agent-based-model (ABM) über Transformationen in der Mobilität und das MATISSE-SHIP ABM für technologie-Investition in der Seeschifffahrt entwickelt. Er hat Fallstudien zur Nachhaltigkeit im internationalen Verkehr für die Projekte EU GLOBIS und PATHWAYS durchgeführt und ein Projekt für das Bundesverkehrsministerium zum CO2-Handel in der Schifffahrt geleitet. Er ist Mitglied der Steuerungsgruppe des Sustainability Transitions Research Network (STRN) und verantwortlich für die Interesse-Bereich Methodik. Er war Vorsitzender der EU-Expertengruppe für Foresight-Modellierung. Er war Projektleiter der Scoping-Studie zur Modellierung der EU-Umweltpolitik für die EU DG Environment. Er ist leitender Gastredakteur für eine bevorstehende Sonderausgabe der Zeitschrift Technological Forecasting and Social Change über die Dynamik technologischer Innovationssysteme.

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