What are suitable traffic measures for creating livable inner cities? Lessons learned from a case study in Berlin, Germany

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Project Overview VMo4Orte

Livable and climate-friendly mobility for the city and surrounding area

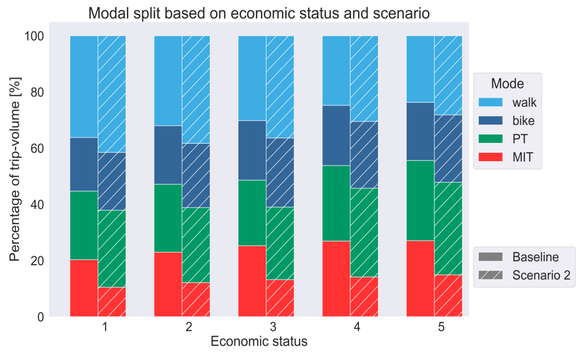
In the quest to **create sustainable transportation systems** and drive the mobility transformation in urban areas, innovative mobility and logistics concepts are being implemented, often accompanied by a redesign of public spaces. However, **due to the novelty of these approaches, empirical data on their effectiveness is often lacking**. **A-priori impact assessments play a crucial role in estimating the outcomes of these changes, helping us evaluate alternatives before implementation** and verify actual effects afterward.
The VMo4Orte project focuses on conducting **comprehensive impact analyses of various mobility and logistics concepts across diverse scenarios**. **Utilizing a range of methods**—such as microscopic traffic and noise modeling, logistics analysis, and the simulation of integrating new vehicle concepts—we explore how these innovations can shape urban environments. Our contributions highlight the breadth of our findings and their relevance, particularly through collaborations with practical partners in Berlin and the district Friedrichshain-Kreuzberg.
The collaboration consisted of **regular workshops with stakeholders from the logistics and transport industry, municipal administrations and research to develop scenarios and assess existing concepts**. The results were discussed iteratively with the stakeholders to achieve an iterative and transdisciplinary research process.

Modelling the effects of street redesign measures

To support local mobility transitions, cities are redesigning traffic areas. Before implementing such measures, it's crucial to assess their **expected impacts on residents, mobility patterns, and traffic noise**. We develop tools which can estimate impacts of measures and help planners make well-informed decisions. In collaboration with the Berlin district of Friedrichshain-Kreuzberg, this project **simulated and evaluated two planning scenarios which aimed at traffic calming within an inner-city housing area** around Lausitzer Platz as an example for the application of such tools. The scenarios include measures such as modal filters, pedestrian zones, school zones, bus-only streets, speed reductions, protected bike lanes and one-way streets.

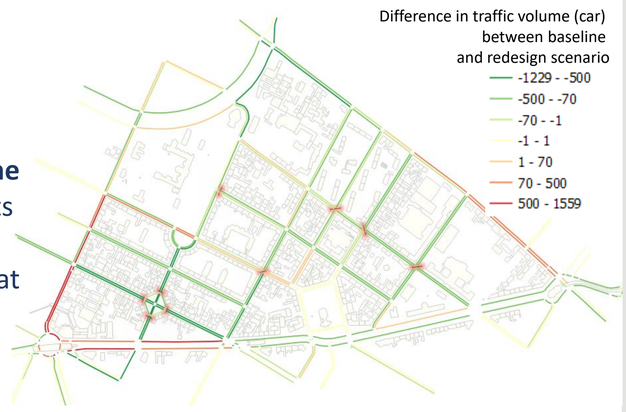
Results for travel demand – socio-economic groups

The employed **agent-based travel demand model** TAPAS predicts a **reduction in car usage** and an **increase in trips by environmentally friendly modes** (walking, cycling, public transport).
The analysis of socio-economic groups (age, gender, economic status, etc.) reveals that **no single group is disproportionately impacted**, although disadvantaged groups show higher rates of walking.



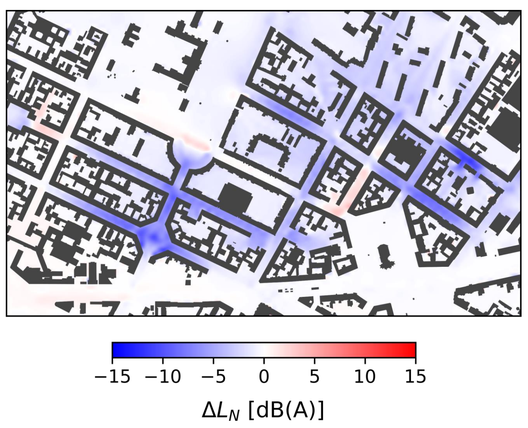
Traffic flow

Using the **microscopic traffic flow simulation** SUMO we found that as wished and anticipated, the **calming and blocking measures reduce the number of private vehicles passing the area**, resulting in lower traffic amounts within the area.
As a consequence, the traffic volume at the areas' borders is increased, yet using roads with a higher capacity.



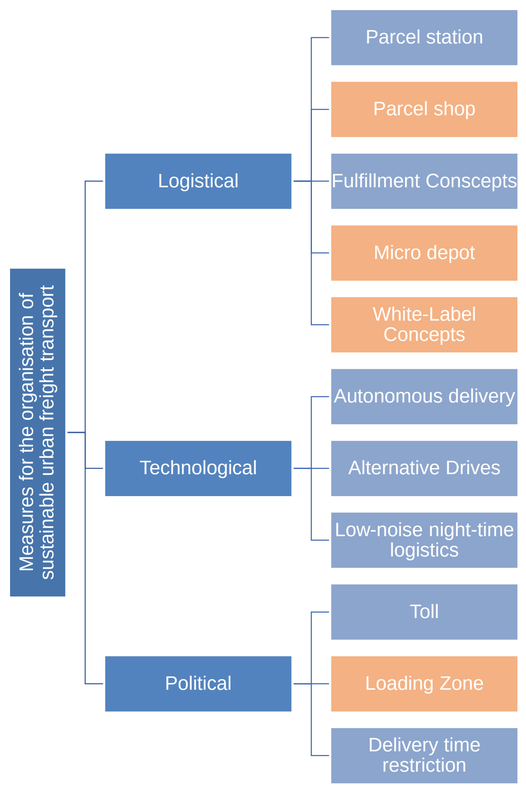
Impact on the traffic noise

The effects of the selected traffic measures on the noise pollution have been investigated by means of **time-resolved noise maps through noise emission and propagation modelling**. These show a **significant noise reduction of up to 11 dB**, which means that the perceived noise level is about halved. Only very few locations show a slight increase of the traffic noise, which can be attributed to locally increased traffic density at alternative routes.



City logistics

In the area of city logistics, the project **analyzed eco-friendly urban freight concepts with stakeholders to assess potential impacts and identify key implementation requirements**. Using a multi-stakeholder moderation process, **representatives from logistics, transport, municipal administrations, and research** reviewed eleven much-discussed city logistics concepts, identifying challenges and requirements in an iterative process. Stakeholders agreed that private cars on the street are a major challenge in urban freight. Afterwards, **scenarios for four prioritized measures were modeled**, and the results were discussed in workshops to address obstacles and make recommend-dations. While some measures initially increased the number of running vehicles, **all showed positive impacts in the long term. A combined approach is recom-mended** to meet diverse stakeholder needs and maximize the positive effects.



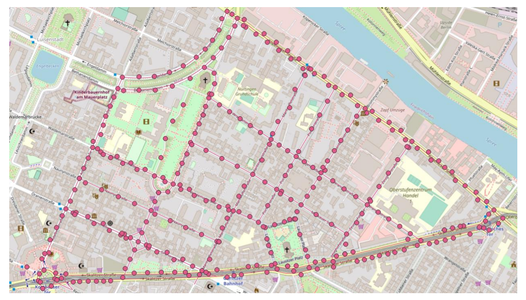
Overview of possible measures for urban delivery traffic.

U-Shift

One of the key concepts in this project is **U-Shift, an autonomous, driverless electric vehicl**e developed by the DLR. U-Shift's modular design separates the driving module from the transport capsule, allowing **flexible configurations for different uses, such as passenger or goods transport and thus a new intermodality**, and enabling new business models.

The U-Shift with the driving module and the interchangeable passenger capsule

Using digital simulation models in the "Migration Toolbox", the project explores **key factors for U-Shift's deployment, including charging infrastructure, financial investment, travel demand, and sensor requirements** for autonomous operations. The toolbox is used t**o study the sensor placement** in the Lausitzer Platz area using GIS-analysis to guarantee the complete coverage and best placement next to stations.



Positions of Sensor Posts to cover the whole neighbourhood of Lausitzer Platz

Learnings

- The work shows that numerous approaches and concepts exist that facilitate modern mobility planning and help to justify decisions, from implementing new mobility concepts to redesigning streets and encouraging behavioral shifts in topical areas like parcel deliveries.
- Data-based methods allow novel analyses for example regarding questions about equity. Here, microscopic modelling can be an important basis for planning processes, as effects on individual groups of people can be derived and assessed.
- However, to fully harness the potential of these works they must be more closely integrated with urban planning processes, easier to use and visualize and communicated more effectively in participatory formats. This alignment is essential to develop effective, sustainable solutions that address the urgent demands of the mobility transition.

Contact us

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"Connected Mobility for Liveable Places (VMo4Orte)" is a project of the German Aerospace Centre (DLR). A total of 19 DLR institutes and organisations are involved in the project.