

Denne artikel er udgivet i det elektroniske tidsskrift  
**Artikler fra Trafikdage på Aalborg Universitet**  
(Proceedings from the Annual Transport Conference  
at Aalborg University)  
ISSN 1603-9696  
<https://journals.aau.dk/index.php/td>

# Boosting bike-commuting through active co-design

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## Abstract & Motivation

In Kolding, the Mobility Plan 2023-2025 aims to lower the use of cars within a 5 km city centre range from 52% to 34% and similarly for the 10 km range. As more bicycle paths and recreational pedestrian corridors are not enough to ensure a significant reduction of shorter car trips, much of the reduction needs to come from citizen's behaviour change.

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## MOBILITY & BEHAVIOUR CHANGE

Until now, urban mobility policies and behaviour change initiatives have failed in creating the required change for achieving the set carbon reduction targets (Axsen, 2020; Welch, 2016). In traffic research there is an increasing awareness that more bicycle paths and restrictive traffic infrastructure doesn't do it alone.

Mobility is more than movement of bodies (Jensen, 2022). Unlike policy and legislation, mobility does not adhere to municipal and regional borders (Martin & Christensen, 2021). In transport and planning, the movement of physical matter is the focus: Lowering cost, energy, and resources.

Sustainability transitions require the capacity and capability to act as individuals and collectively to bring about the needed changes (Huttunen, 2021). Inadequate attention to human behaviour and agency is a constant critique of the socio-technical system transition thinking (Pesch, 2015, Fischer & Newig, 2016; de Haan & Rotmans, 2018; Bögel & Upham, 2018; Upham, Bögel & Dütschke, 2020).

There is therefore a need for a holistic understanding of mobility practices. **"The new mobilities turn"** asks how mobilities change the way we see ourselves, our social others, and the physical world (Jensen, 2022, 2023). While the design field has embraced the practice of designing interventions for affecting behaviour (Cash et al., 2020; Khadilkar & Cash, 2020) most of existing approaches rely on influencing behaviours on an individual level (Niedderer et al., 2016) by "nudging" (Hargreaves, 2011; Hoolohan & Browne, 2020; Niedderer et al., 2014) rather than empowering communities of citizens in transitioning towards more sustainable practices.

Subsequently, when designing interventions (Gabrielli et al., 2014; Kuijer and Bakker, 2015; Nielsen et al., 2021) there is a lack in addressing the social aspect of people's behaviours.

## CITIZEN PARTICIPATION

Most existing approaches to urban mobility policies and behaviour change ignore the role of civic engagement and participation in designing relevant behavioural interventions. In the sustainability transitions context, local knowledge often relates to knowledge about sustainable lifestyles as citizens are the experts on their everyday lives and daily practices (Becker & Rudolf, 2018, Kaljonen et al, 2019). Consecutive practices that are part of a daily sequential personal routine are highly interlocked (Breadzel, Eon & Morrison, 2019:6). There is a need to understand how both the **current and desired** practices are constituted in people's lives. Citizen participation is required in generating that understanding.

Kythreotis et al (2019) find evidence of governments and municipalities working better to include local knowledge, but that more work is needed to further integrate citizen action and climate policymaking. They propose Citizen Social Science as a way of increasing civic engagement at different scales of governance that "move beyond tokenistic forms of citizen participation". Hutunen et al (2022) identify four key forms of citizen engagement in transitions research: (1) envisioning sustainable futures; (2) local transition implementation; (3) revealing public perceptions; and (4) developing participatory methods to facilitate transitions. There is an opportunity for genuine citizen participation to support behaviour change.

Participatory design (Simonsen & Robertson 2013) plays a particular role here, as a method that can disentangle uncertain, 'wicked problems' through design interventions and help co-create potential solutions with citizens.

## DATA PHYSICALIZATION

Khot et al. (2014) find that by viewing and handling 3D-printed objects of their own physical activity data, people gain a better sense of this data and a stronger emotional connection than when being provided with visualizations. Datacrafting (Vladis, Hopkins & Satyanarayan, 2020), Datagifts (Karyda et al. 2020) and lo-fi data physicalization tools have been proposed as methods for both individual and collaborative (data)sensemaking, as well as improving data literacy, sense of agency and sense of empowerment among participants through "playful engagement" and finding "meaning through delight" (Daneshzand et al., 2022).

## METHODS & DATA

Engagement with real-time GPS data presents an obvious avenue towards behaviour change for sustainable mobility choices, as tracking human activity patterns becomes more ubiquitous. However, tracking data in visual form does not invite the quality of engagement that data physicalizations afford.

Ethnographic data provides a level of nuance that only numbers and coordinates cannot convey.

In this blended method experiment, we have studied bike-commuter habits by combining **data tracking**, **ethnographic studies** and **data physicalization**.

We invited 12 everyday bicycle commuters to track their mobility patterns through an app, to be video shadowed on their daily commute, and finally to engage in workshops with different data physicalizations based on the personal mobility data collected.

## RESULTS

### HOW MAY COMMUTER-HABITS SUPPORT NON-BICYCLISTS IN MODALITY-SHIFTING?

The results of the study clearly demonstrate potential for engaging local communities in reflecting on their day to day mobility choices through active engagement with data physicalizations. The study also demonstrates active co-design as a method for designing site-specific and low-cost interventions.

#### Actionable insights - > Co-designed interventions:

- Mastering -> Landing facilities
- Gearing up -> bike-commuter starter package
- Scenic routes and shortcuts -> Co-design mapping
- Bikepride & car-shaming -> CO2 measuring

**I will discuss the most important and actionable insights we gained on bike-commuting behaviour as well as the co-designed interventions.**

## Acknowledgements

The local bike-commuters eagerly participated in the study, the traffic planners of Kolding Kommune for supporting the study, and the graduate design students of the IT Product Design programme, University of Southern Denmark, for putting an effort into designing the data physicalizations used in the study.

This article is a part of Industrial PhD “Sustainable Mobilities in Smaller Cities” - a collaboration between the Department of Design, Media and Educational Science, University of Southern Denmark and Kolding Kommune, Trafik, Vej & Park. Funded by Innovations fund Denmark and Kolding Kommune.

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