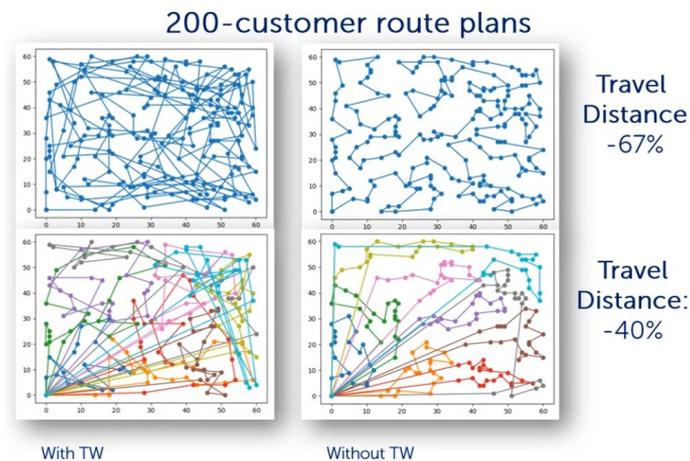


## CDT: Innovative concepts for Sustainable Urban Delivery – 25-5-2021

The workshop started with a presentation by Niels Agatz, assistant professor in transportation and logistics at the Rotterdam School of Management. He presented his research regarding the impact of Green Labels on Time Slot Choice and Operational Sustainability.

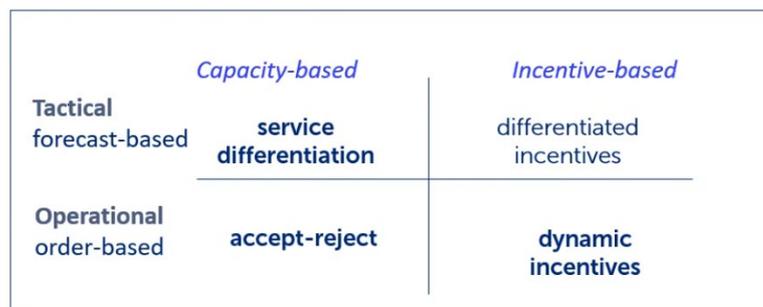
Since customers need to be home to receive goods or services you have to make agreements, for which often time windows are used. Using these time windows, service providers are able to plan vehicle routes in such a way that they serve customers within their time windows. After the route planning the orders are picked, which is still a fairly manual process with less optimization. Research shows that due to the time windows the routing plans get very messy and inefficient, resulting in significantly higher travel distances. So, higher costs for delivery and higher environmental impact due to emissions. Figure 1 shows the difference in travel distance with and without time slots.



*Figure 1: travel distance with and without time windows.*

To improve this, Agatz had the following research question: how to steer customers towards delivery time windows that are more beneficial for the retailer?

To answer this question he came up with a framework to position the different ways of handling the problem, see Figure 2. Capacity-based methods do not offer all different option. For example, only a few time slots per region. By restricting the choice of the customer service providers are able to steer demand.



*Figure 2: framework*

The research focusses on incentive-based, coercive methods, which still offer options but pursue customers to more beneficial options to the provider. Since literature suggested that focussing on intrinsic motivation is more effective than focussing on extrinsic motivating, that is what green labels do.

Agatz's researched the following two possibilities:

1. Incentivizing identical time slots.  
A dynamic way of managing, dependent on already placed orders. Customers who are ordering will see green labels if there are already orders placed in their neighborhood.
2. Incentivizing time slots with different lengths.  
A tactical/static way to pursue customers. Since long time windows are more desirable from logistics/green point of view.

The results showed that green labels work and are more effective than giving a discount, having price incentives and green labels do not synergize and lastly, green labels are especially effective in steering towards inconvenient (longer) time slots.

In the second presentation, Dr. Afonso Sampaio Oliveira, TU/e graduate and working at ASML, presented his research regarding Innovative business-to-consumer last-mile solutions.

He questions whether consumers are prepared to opt-in for environmental friendly labelled e-tailers, taking into account slower shipping. Previous research has shown that when options and environmental impact are shown, shoppers tend to opt for greener, slower shipping.

To deliver the products to customers concepts and technologies like cargo hitching, consolidation centres, collaborative routing, crowd shipping and trunk deliveries are available. The two innovative models for last-mile delivery considered by Oliveira are crowd shipping and trunk delivery.

Crowd shipping uses ordinary people or part-time drivers to fulfil transportation request. It uses a pool of flexible drivers. Its process is displayed in Figure 3.

### Crowd-sourced last-mile service

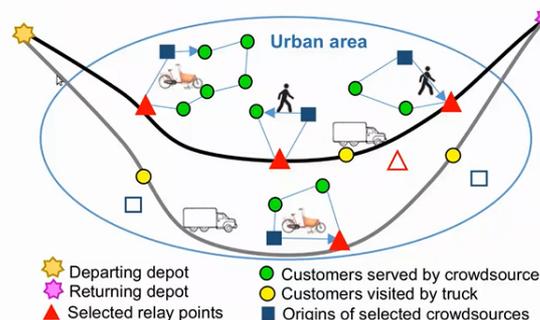


Figure 3: crowd-sourced last-mile service

Trunk delivery uses the trunk of the customer's car for the delivery of packages. This enables the drivers to drop off a package in the absence of the customer. Amazon has been using this delivery method since 2018 and a Dutch start-up called 2Deal is also offering a similar service. Benefit for

customers is convenience, however a concern is trust and privacy. The benefit for drivers is productivity since they do not need to ring the bell. However, a concern for the driver is responsibility. For the logistic service provider benefits are capacity and route efficiency, because trunk delivery enables different, larger, time windows. For example, delivery between 21-7.

To conclude the presentation, he proposes possible future methods for last mile-delivery:

- Autonomous last-mile
- (Electric) Vehicles addressing challenges associated with urban delivery (zero emission when driving, minimal noise pollution, potential fuel and maintenance savings).
- Drones
- Hyperloop

