



## Passenger delay propagation in metro systems and their causes

### Problem description

Metro operations are subject to recurrent disturbances. Facilitated by the availability of smartcard data, public transport operators increasingly shift into measuring delay from passengers' perspective. Based on tap-in and tap-out records, the operator can estimate the delay experienced on each trip. In previous work, we have estimated the delay associated with each network element. However, the characteristics of these delays and their propagation is still largely unknown. How do delays propagate in time and space? Which passengers are affected by a disruption at a certain station? Are there typical recurring patterns of passenger delays? Can disruptions be automatically detected from the data? Can we attribute observed delays to individual incidents or disruptions? Answering these questions will support planners and operators in prioritizing investments/mitigation measures.

### Objectives and assignment

Related master thesis topics involve analysing the characteristics of passenger delays using a large database consisting of passenger, train and disruption data for the Washington DC metro system. Thereafter, developing a model for capturing passenger delay patterns and applying it to the data from Washington DC. The model should co-relate causes and durations of disruptions with spill-over effects, i.e. a pass-delay propagation model, possibly also looking into the recovery time.

### Candidate background

T&P or TIL Students who have knowledge and interest in public transport operations, and have affinity with data analysis and mathematical modelling.

### Research group

Transport & Planning Department

Supervisors: Dr. Oded Cats and Dr. Panchamy Krishnakumari or Dr. Menno Yap

### External support

The project is performed in cooperation with the Rail group in Washington Metropolitan Area Transit Authority (WMATA), a government agency that operates transit service in the Washington Metropolitan Area in the US.

### Information

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