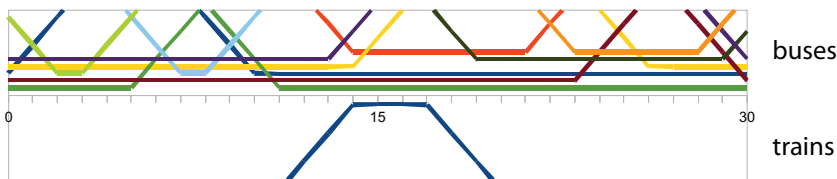


Evaluation of Multimodal Timetable Synchronization in the Randstad

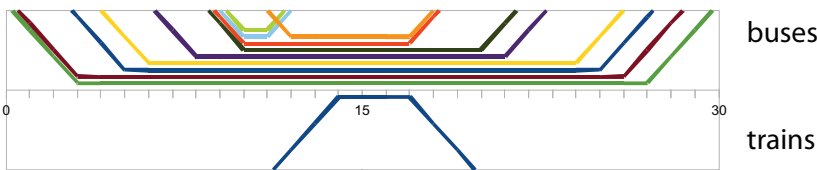
In the Randstad, although many trains, buses and trams operate all day with very high frequencies, there is a low level of synchronization between services of different modes or different operators. Therefore the low-frequency services have a potential to improve door-to-door travel quality and attract more customers by a synchronized timetable.

We assessed the quality of bus-to-train connections in Amsterdam at weekend nights. As buses and trains arrive every 30 minutes, it is possible to improve transfer quality by shifting each bus line schedule in time (variants **1a** & **1b**), even if we take into account optimized vehicle rosters (variants **2a** & **2b**).

It is possible to prioritize bus-to-train (**1a** & **2a**) and train-to-bus (**1b** & **2b**) transfers. We can design an optimal combination if accurate passenger counts are available.



The time-distance diagram of a 30-minute period in the current night timetable at Amsterdam Centraal shows that bus arrivals and departures are distributed evenly in time, regardless of the train timetable.



Timetable variant **1a** shows that it is possible to design a slightly different timetable which provides much more attractive transfers for similar operational costs.

The Amsterdam night schedule example shows that in the Randstad, there is a significant potential to offer more integrated services. Synchronizing multimodal and multi-operator timetables is a cost-effective measure to attract more passengers, increasing the profitability and social benefits of public transport.

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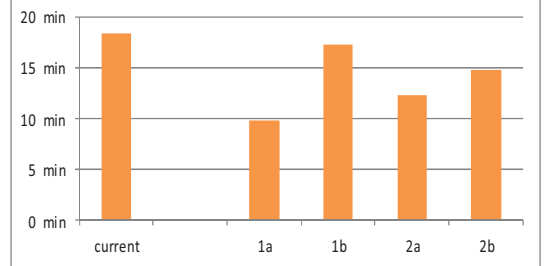
Dr. R.M.P. Goverde daily supervisor

Transport & Planning

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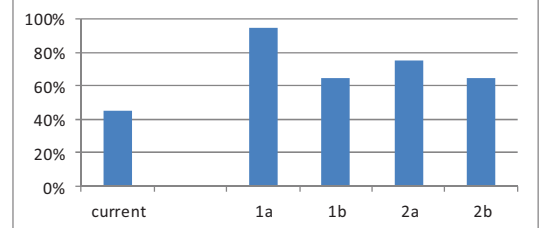
Delft University of Technology

average bus-to-train waiting time



The redesigned timetables significantly reduce waiting times during transfers.

5-15 minute bus-to-train connections



The majority of connections can be offered within an attractive transfer time.

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