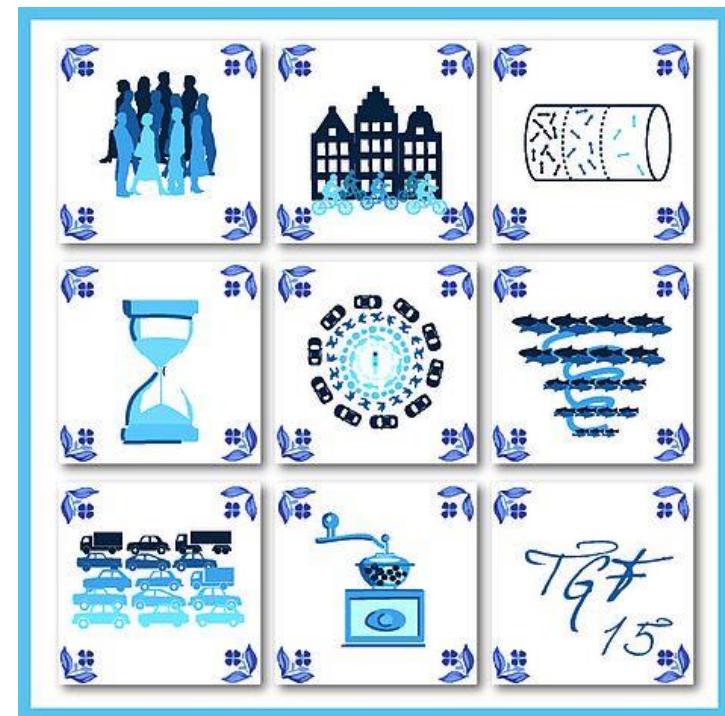


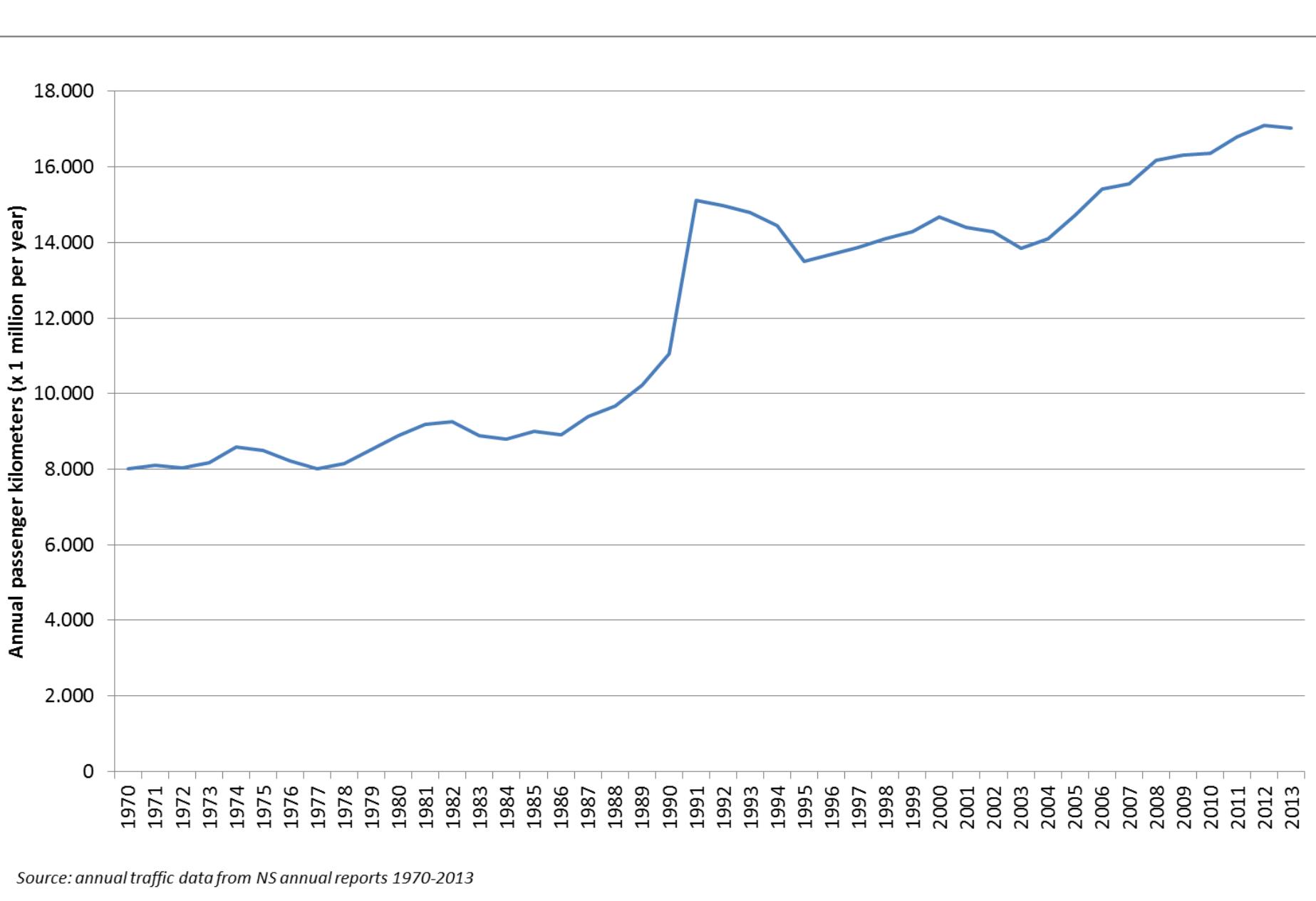
Advances in measuring pedestrians at Dutch train stations using Bluetooth, WiFi and Infrared technology

Jeroen van den Heuvel
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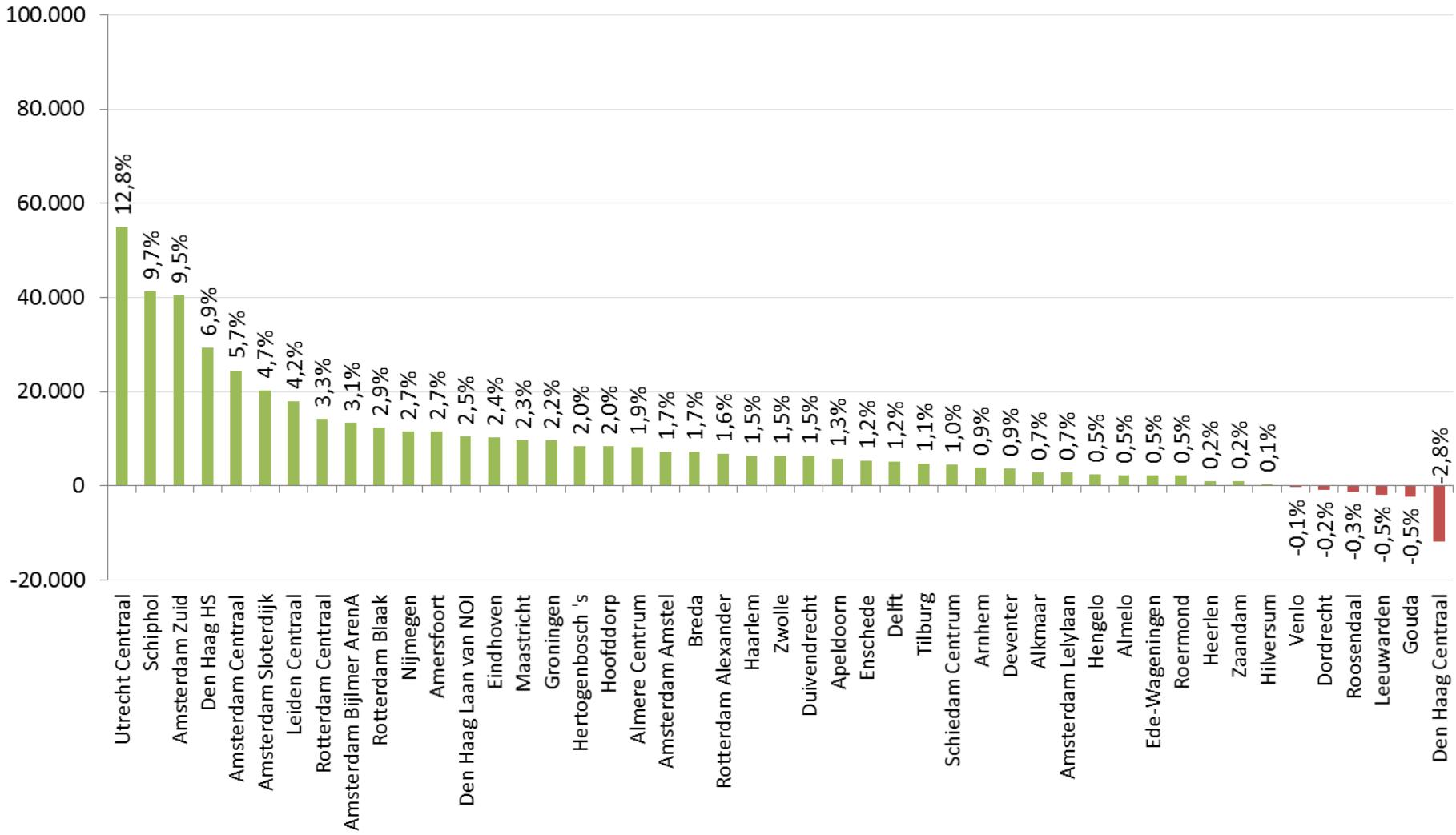
*NS Stations
BLIP Systems
Delft University of Technology*

*Traffic and Granular Flow '15
29 October 2015*

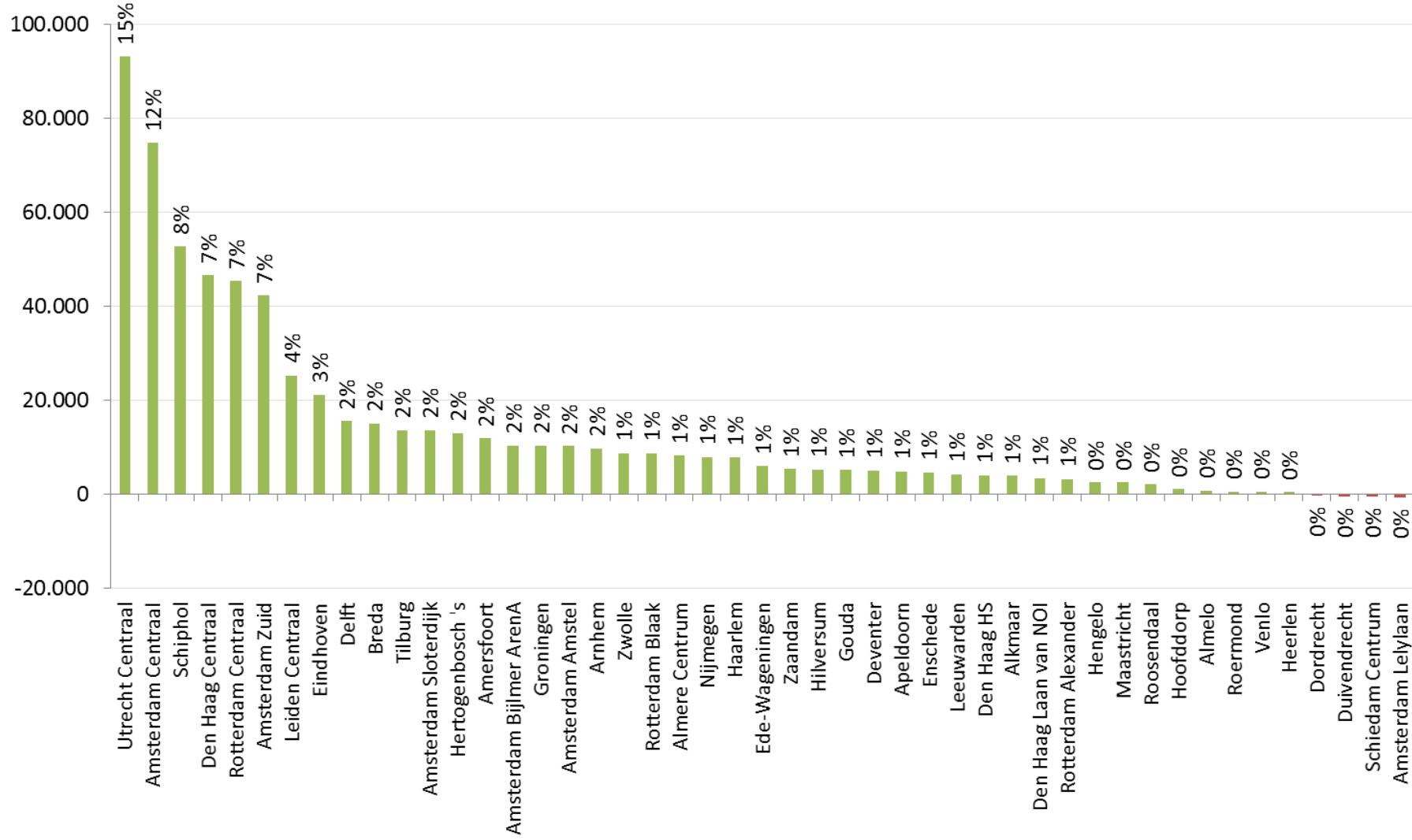


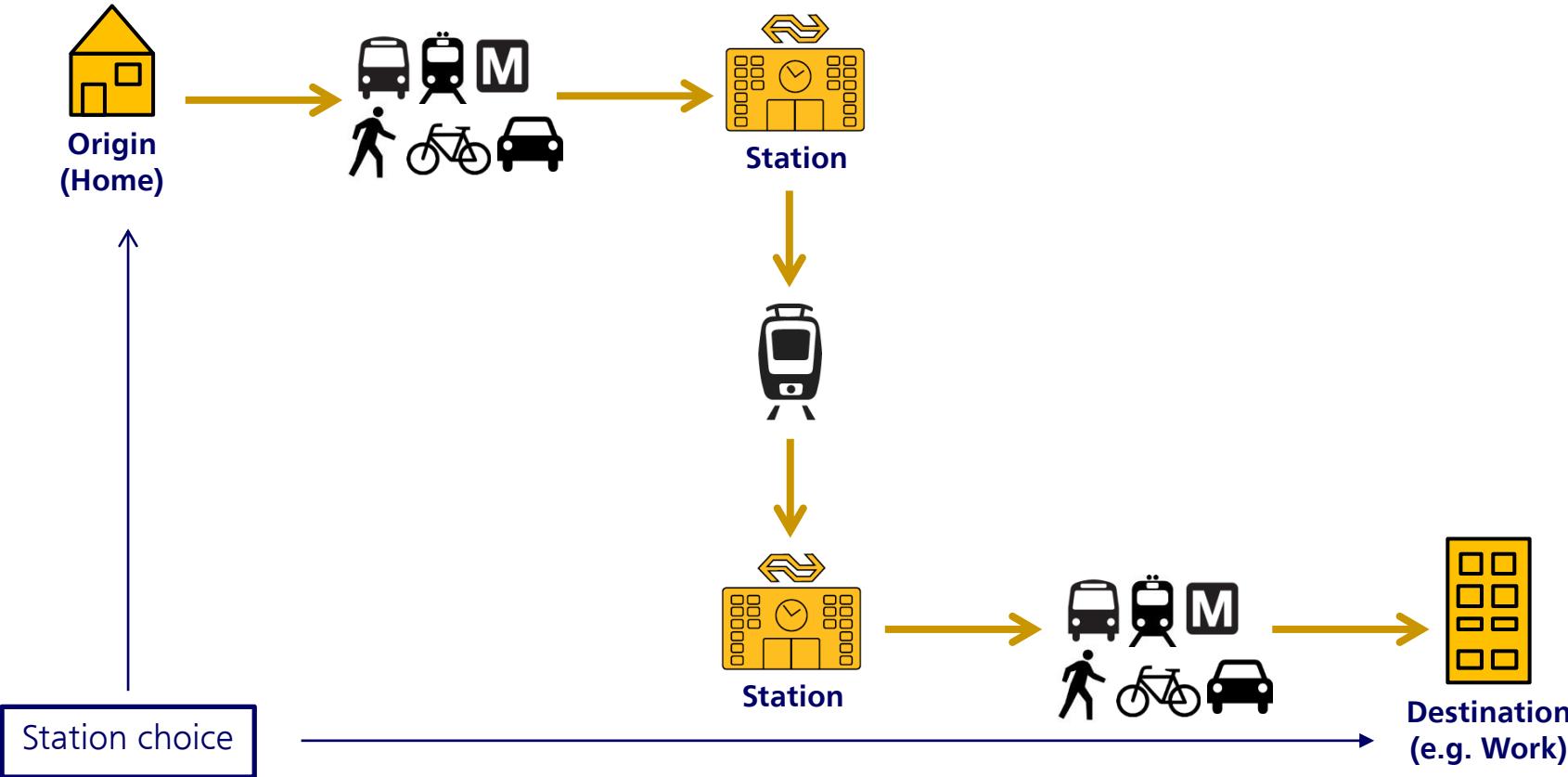


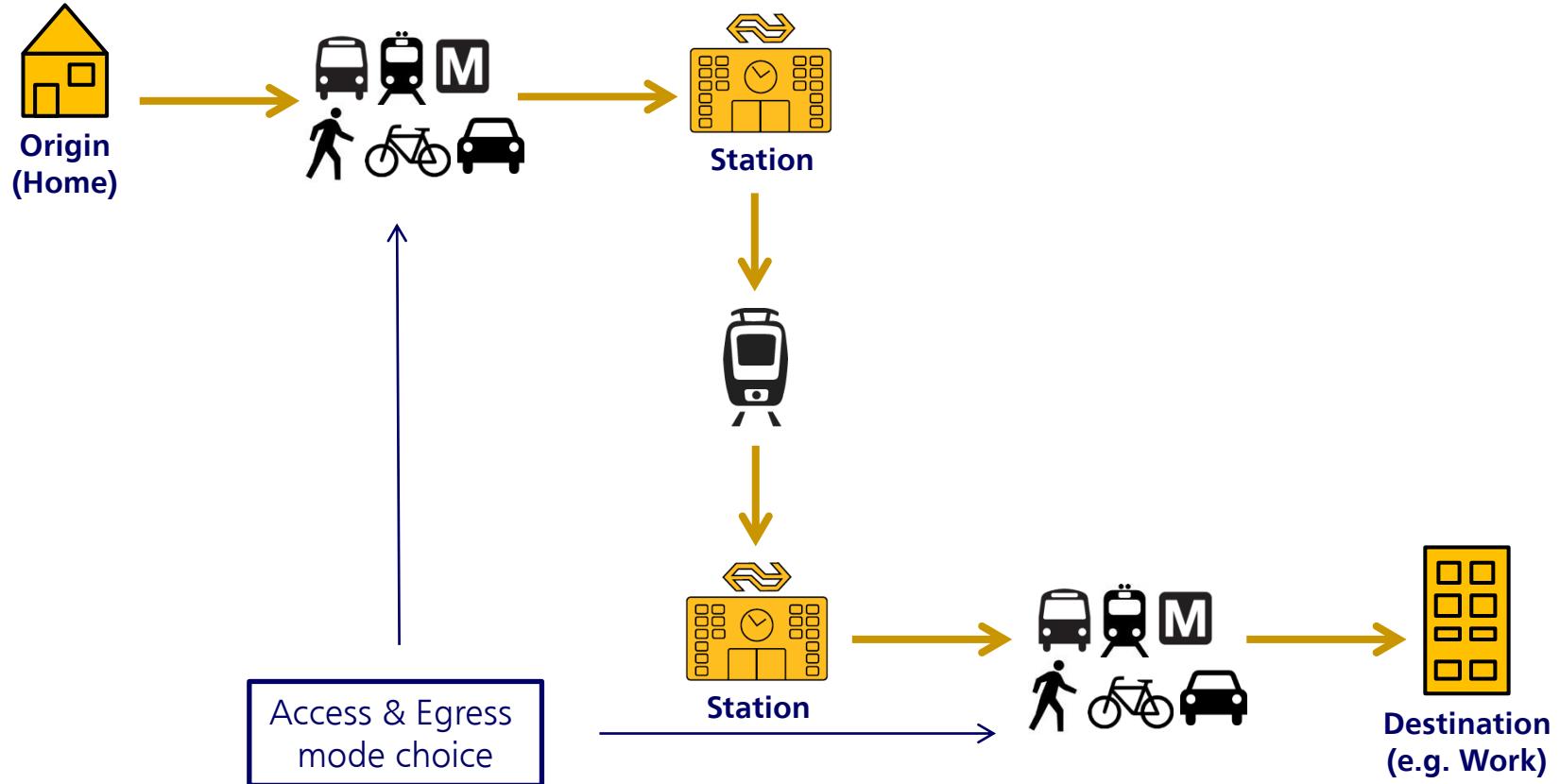
Additional number of departing and arriving passengers per station per average workday for 1992-2011 (100% = 430.000)

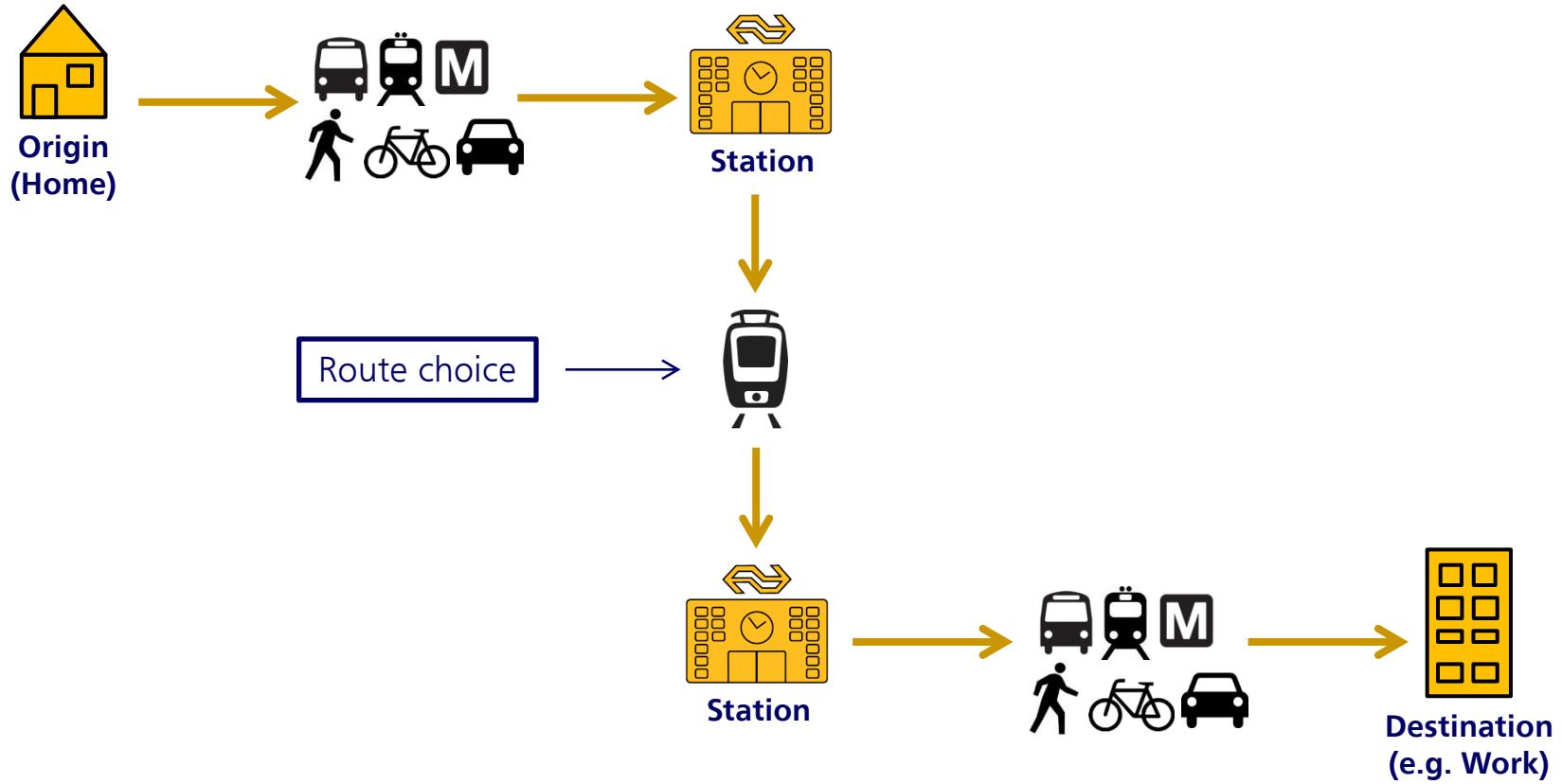


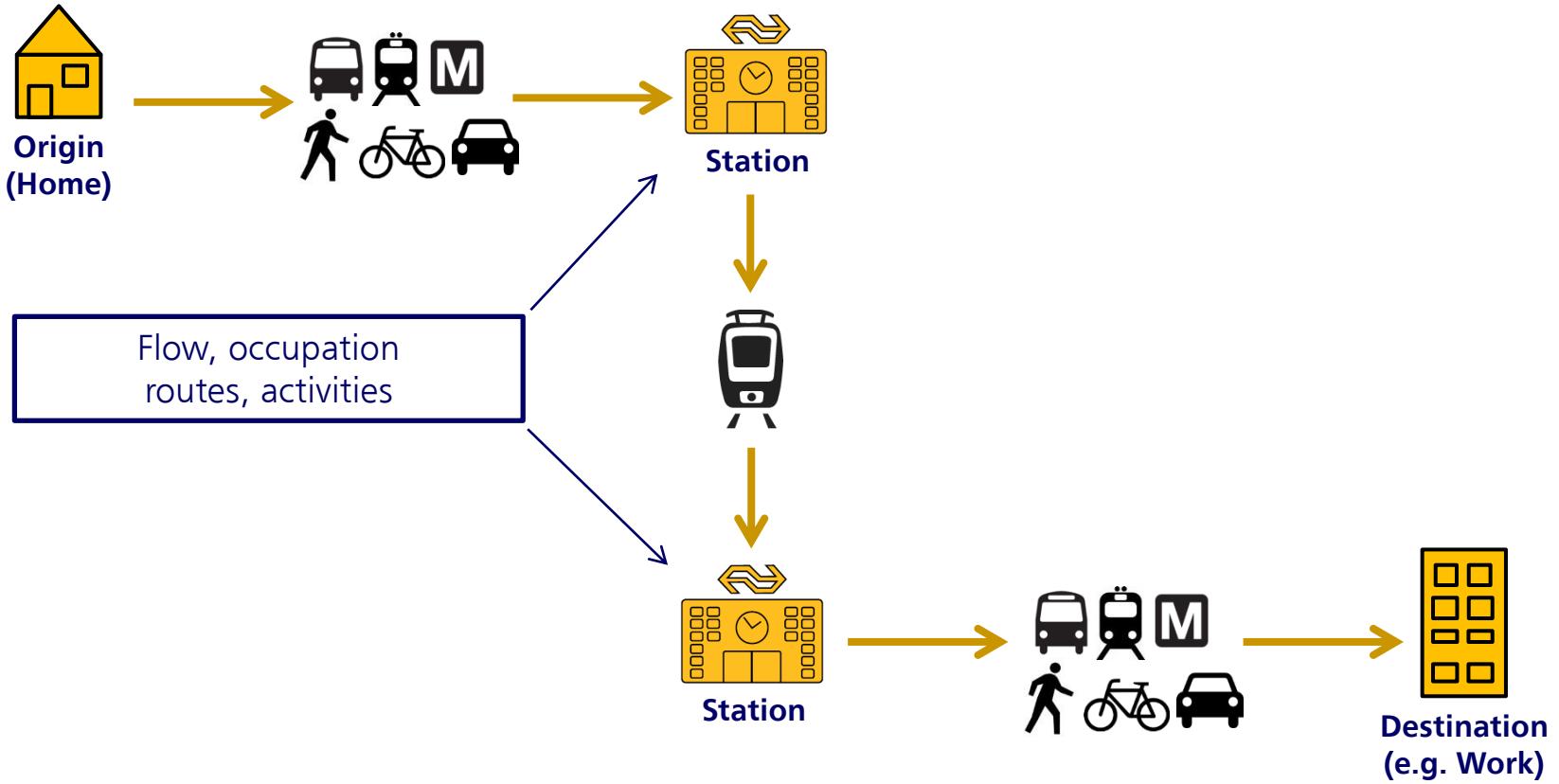
Additional number of departing and arriving passengers per station per average workday for 2011-2030_{max} (100% = 630.000)











Objective:
To know where
passengers wait and walk

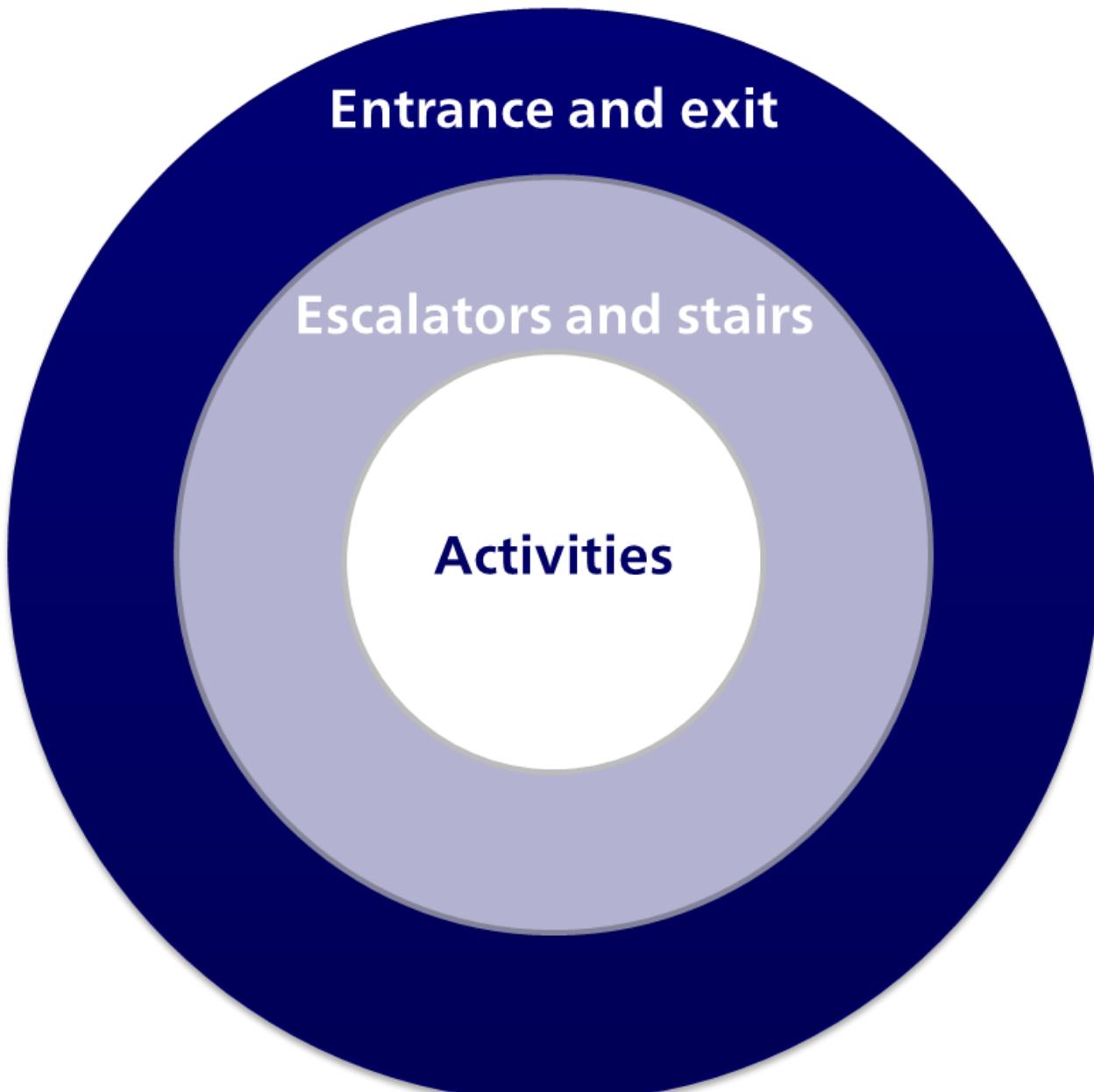
data filtering & analysis

Counting



Tracking



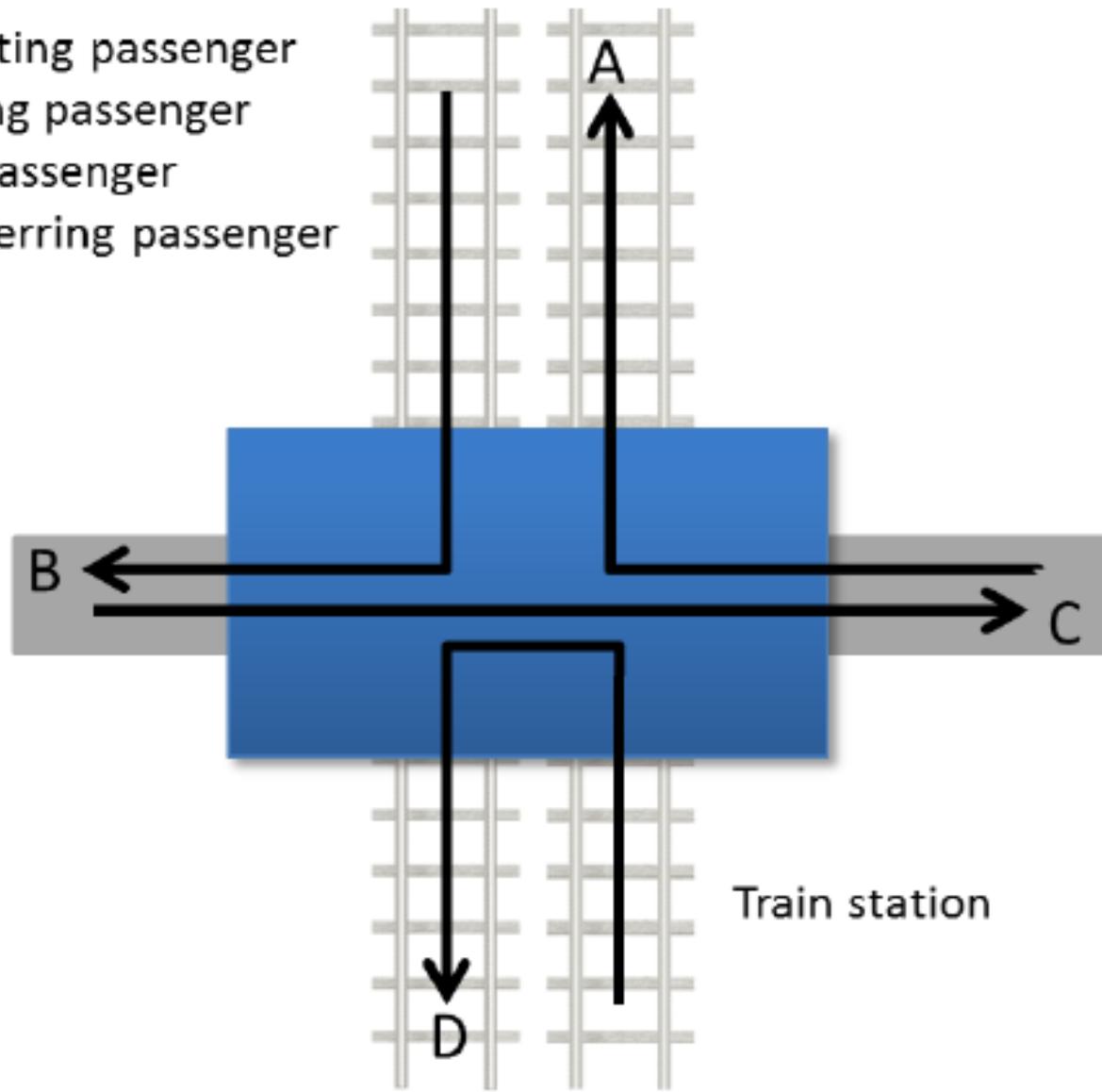


Entrance and exit

Escalators and stairs

Activities

- A: Departing passenger
- B: Arriving passenger
- C: Non-passenger
- D: Transferring passenger





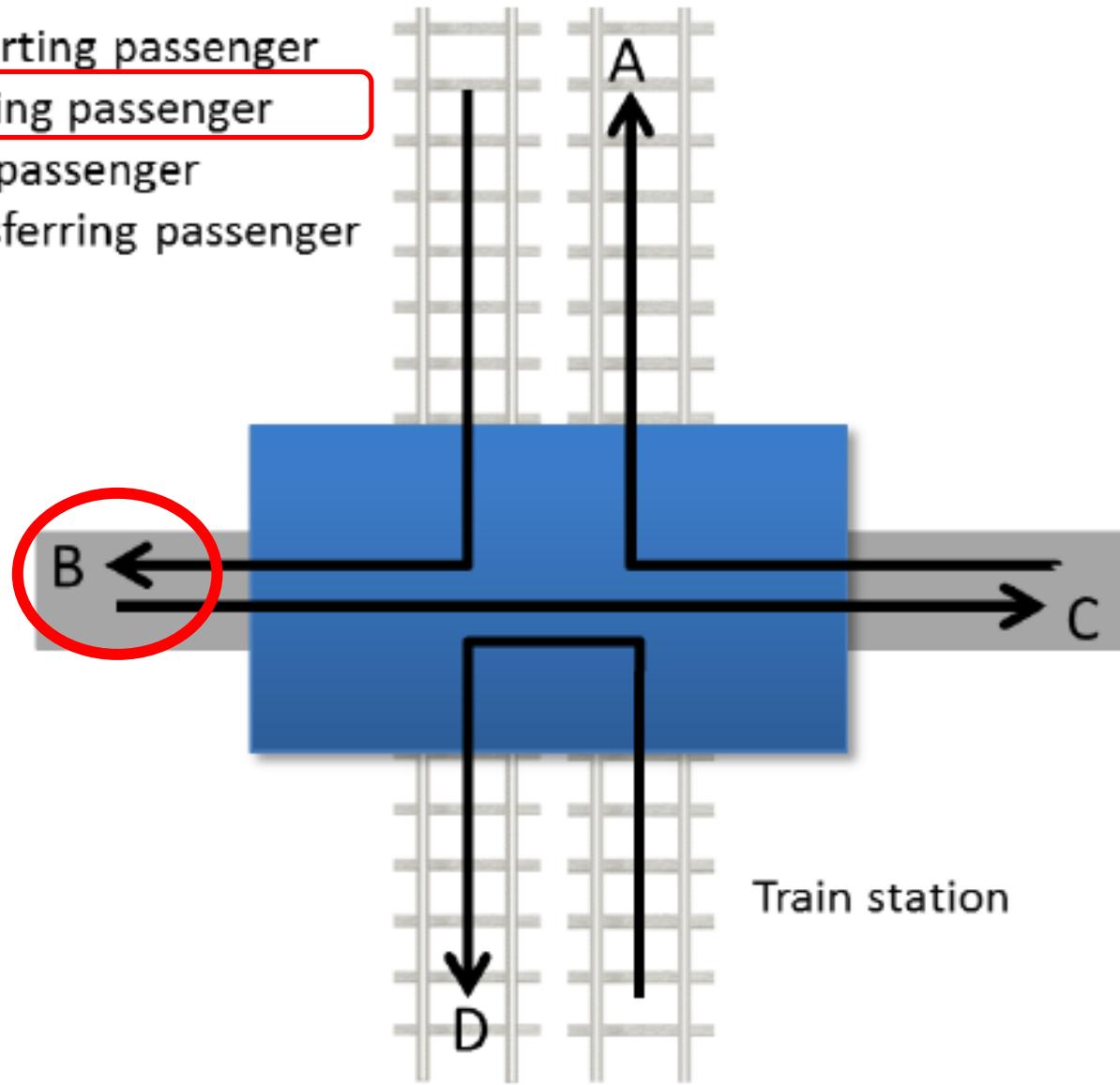
- 1 Utrecht Centraal**
- 5 Leiden Centraal**
- 6 Schiphol**
- 2 Amsterdam Centraal**
- 8 Amsterdam Zuid**

A: Departing passenger

B: Arriving passenger

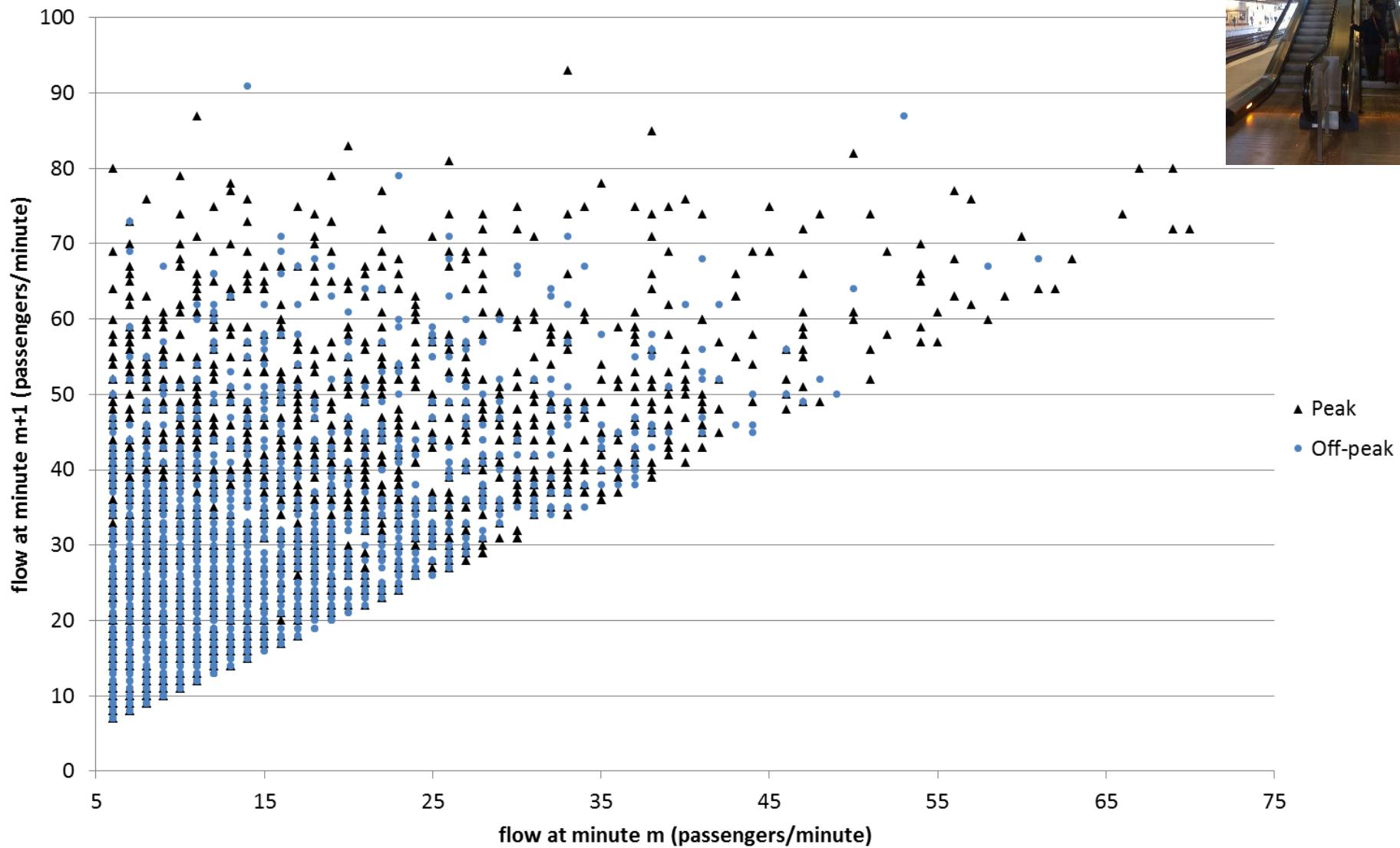
C: Non-passenger

D: Transferring passenger





Escalator flows at Utrecht Central station in upward direction

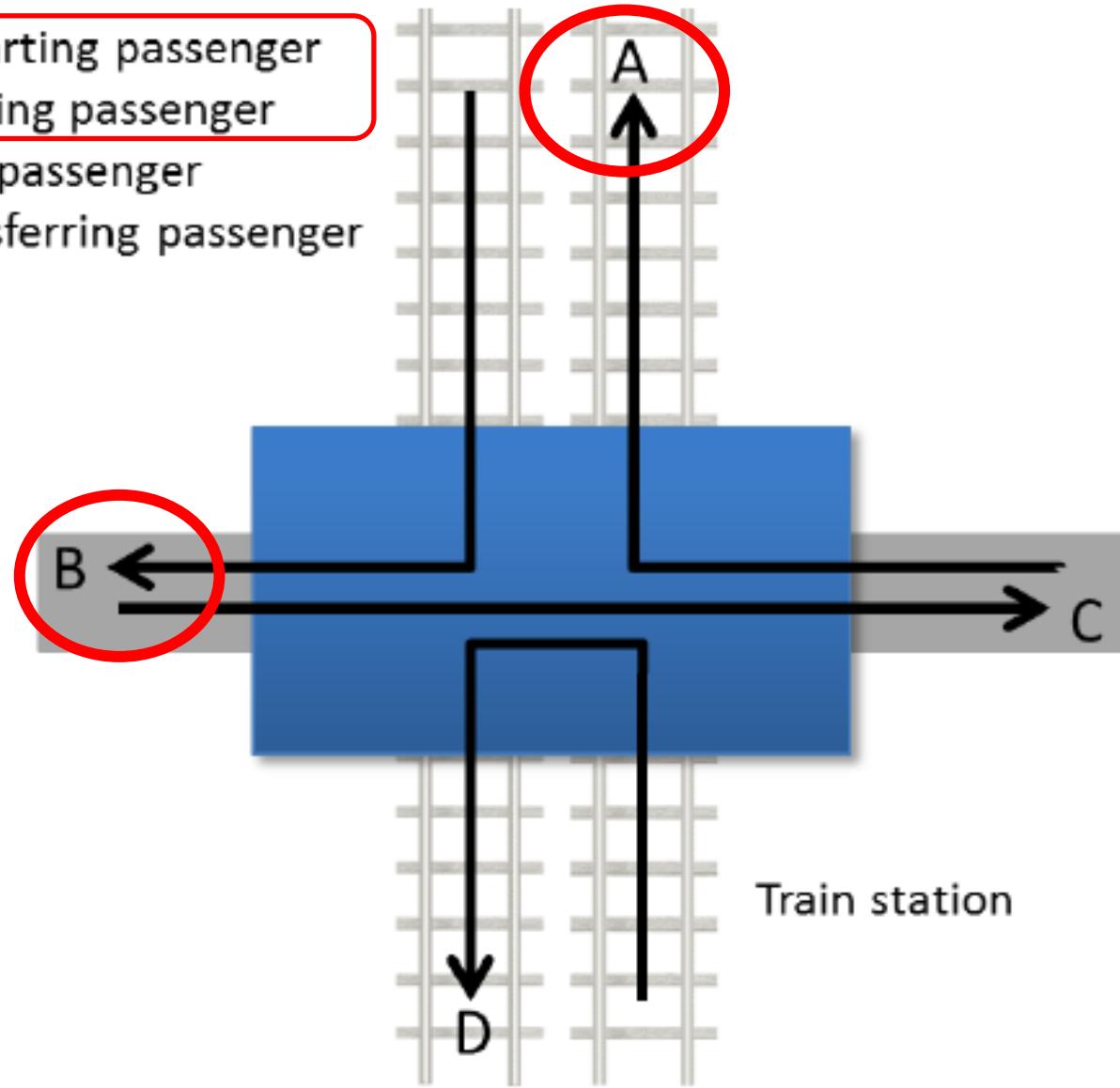


A: Departing passenger

B: Arriving passenger

C: Non-passenger

D: Transferring passenger

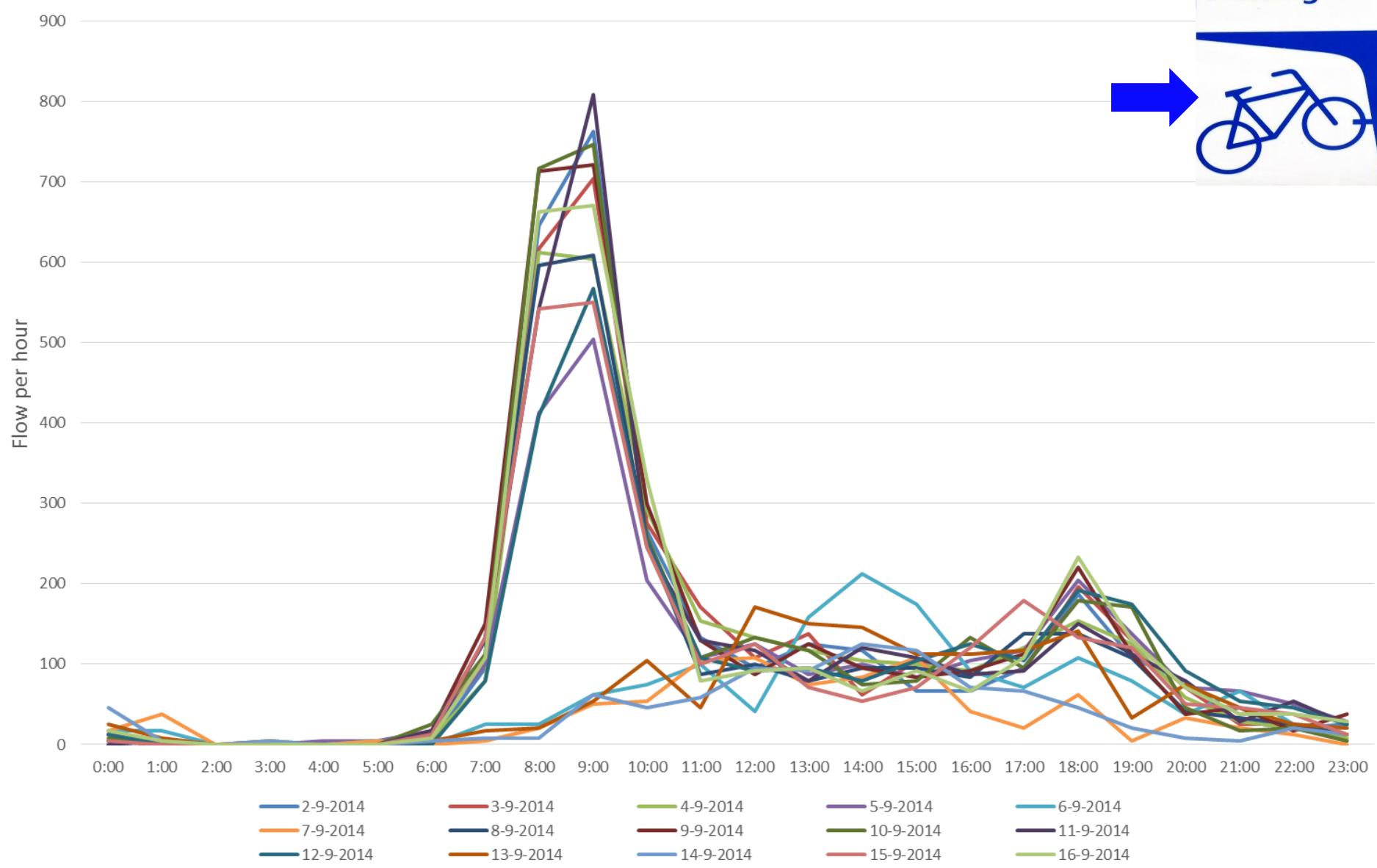


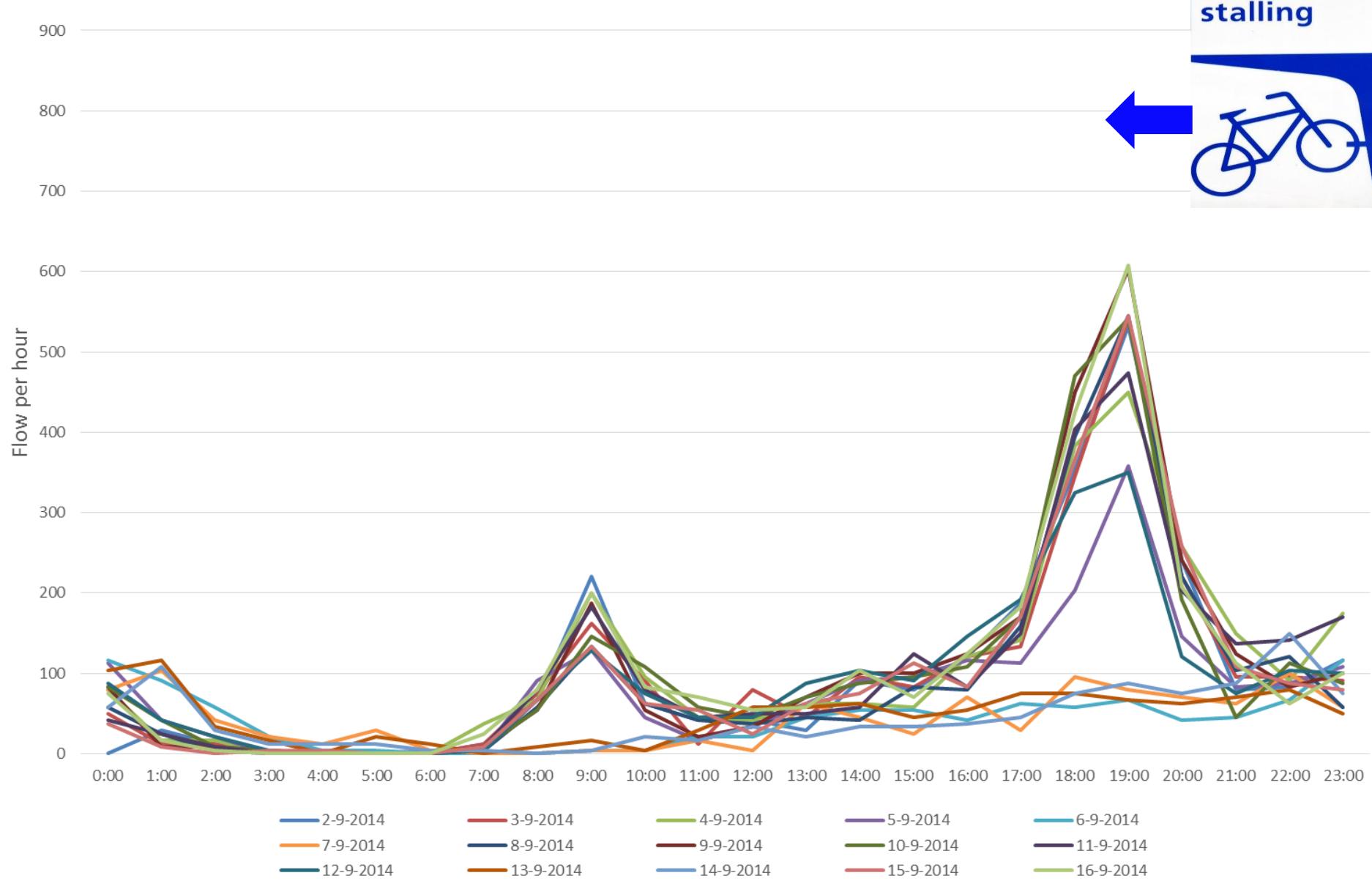
← Uitgang
voetgangers

← Rij 32
← 33

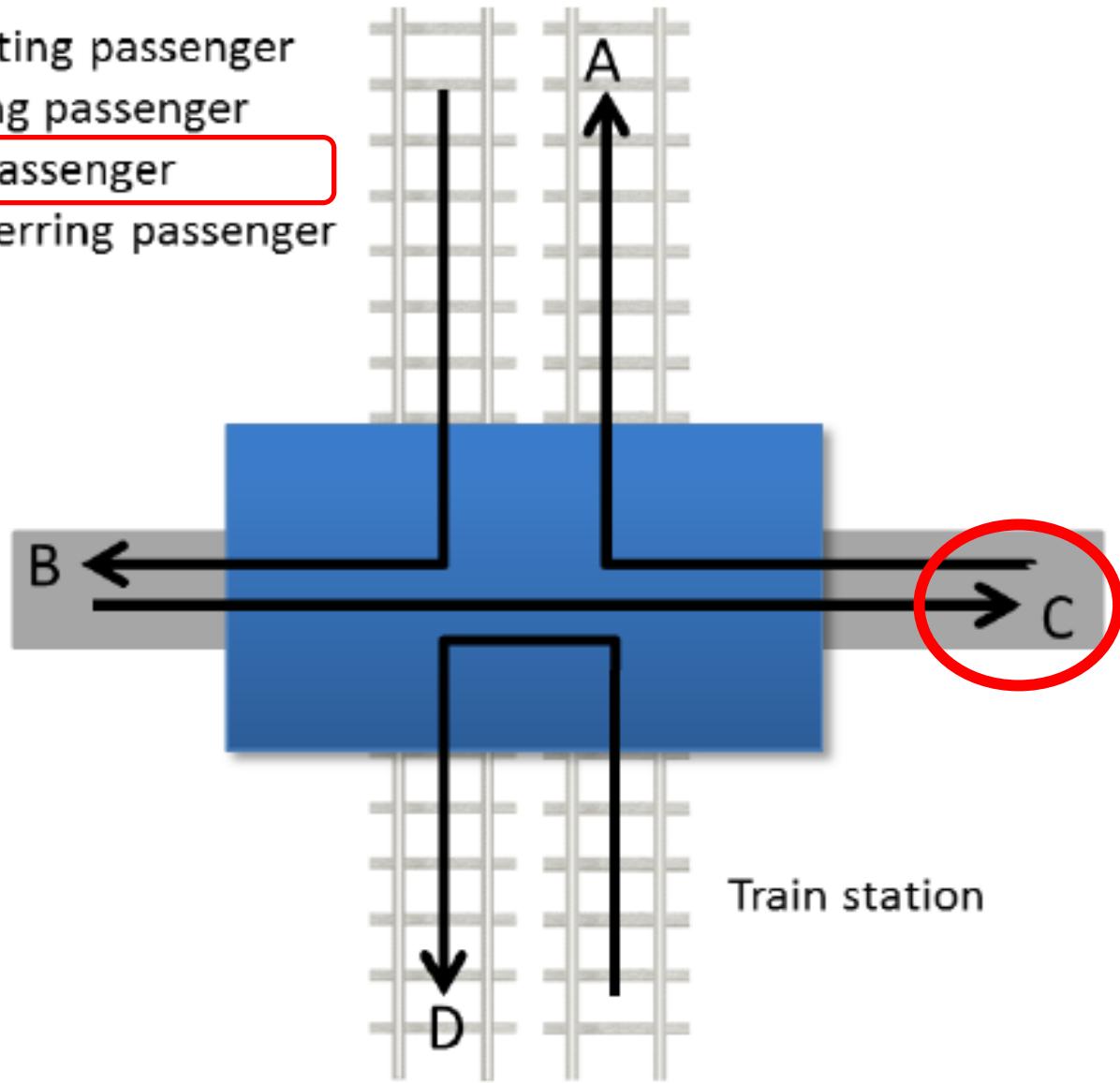
34





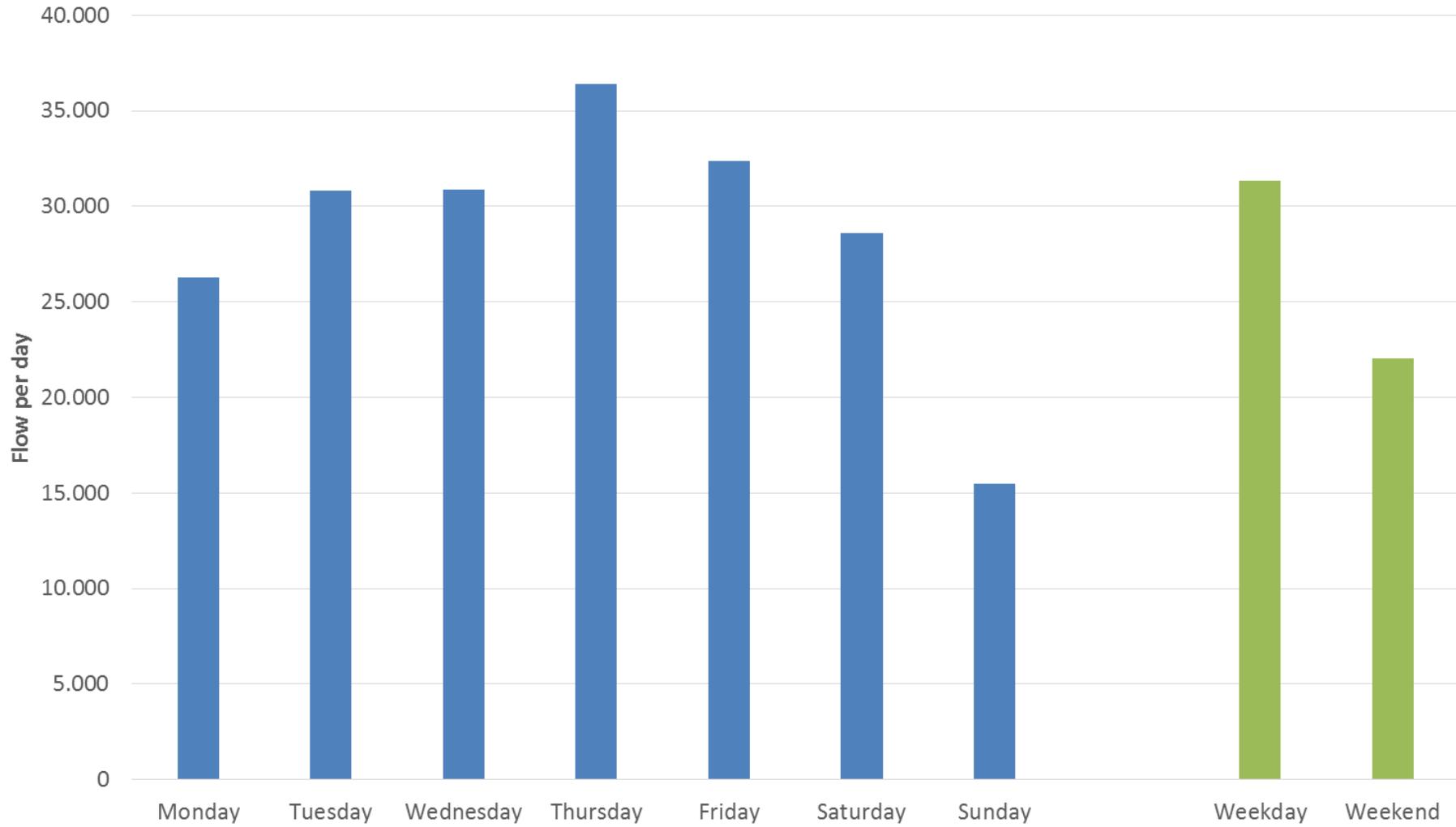


- A: Departing passenger
- B: Arriving passenger
- C: Non-passenger
- D: Transferring passenger

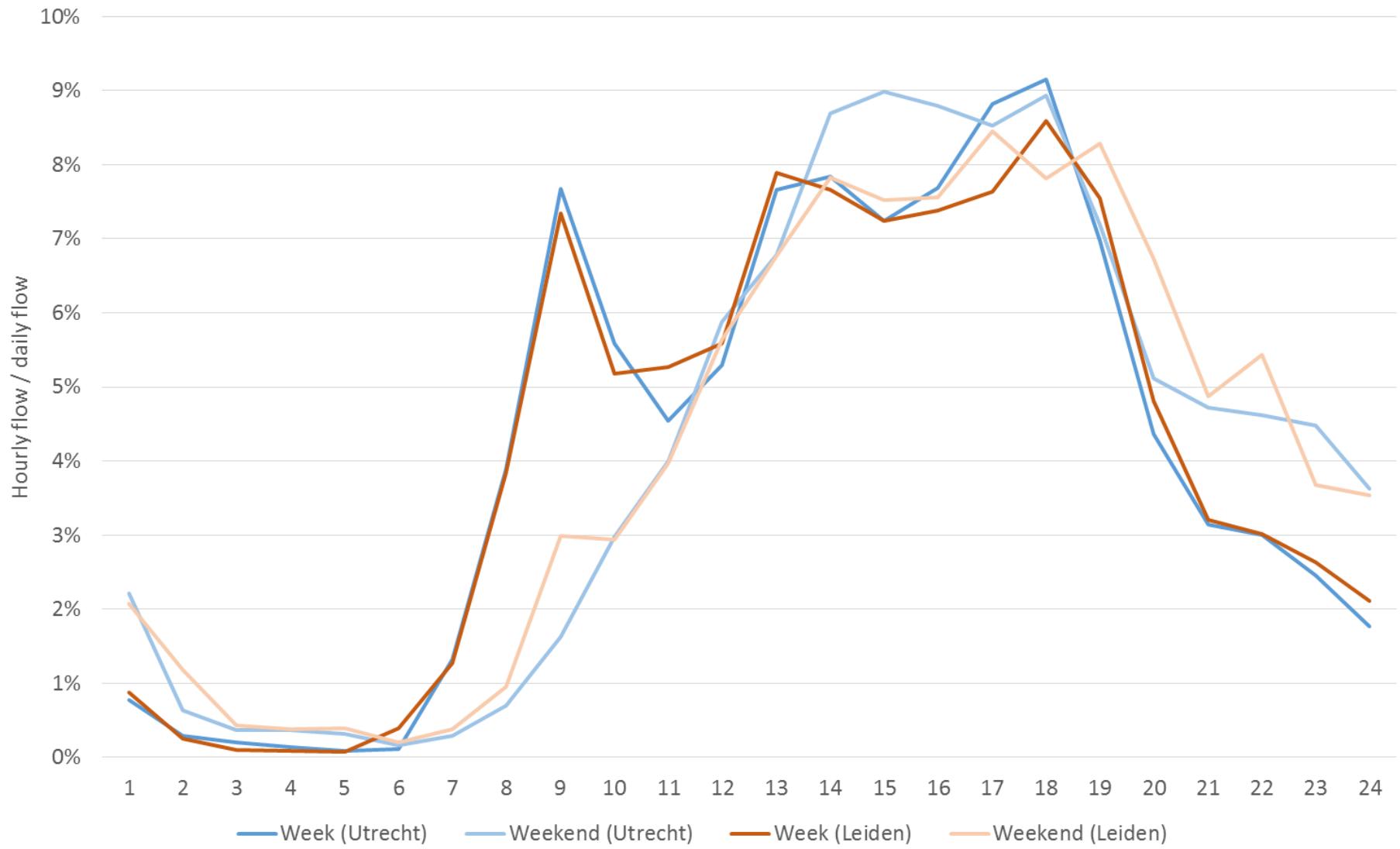




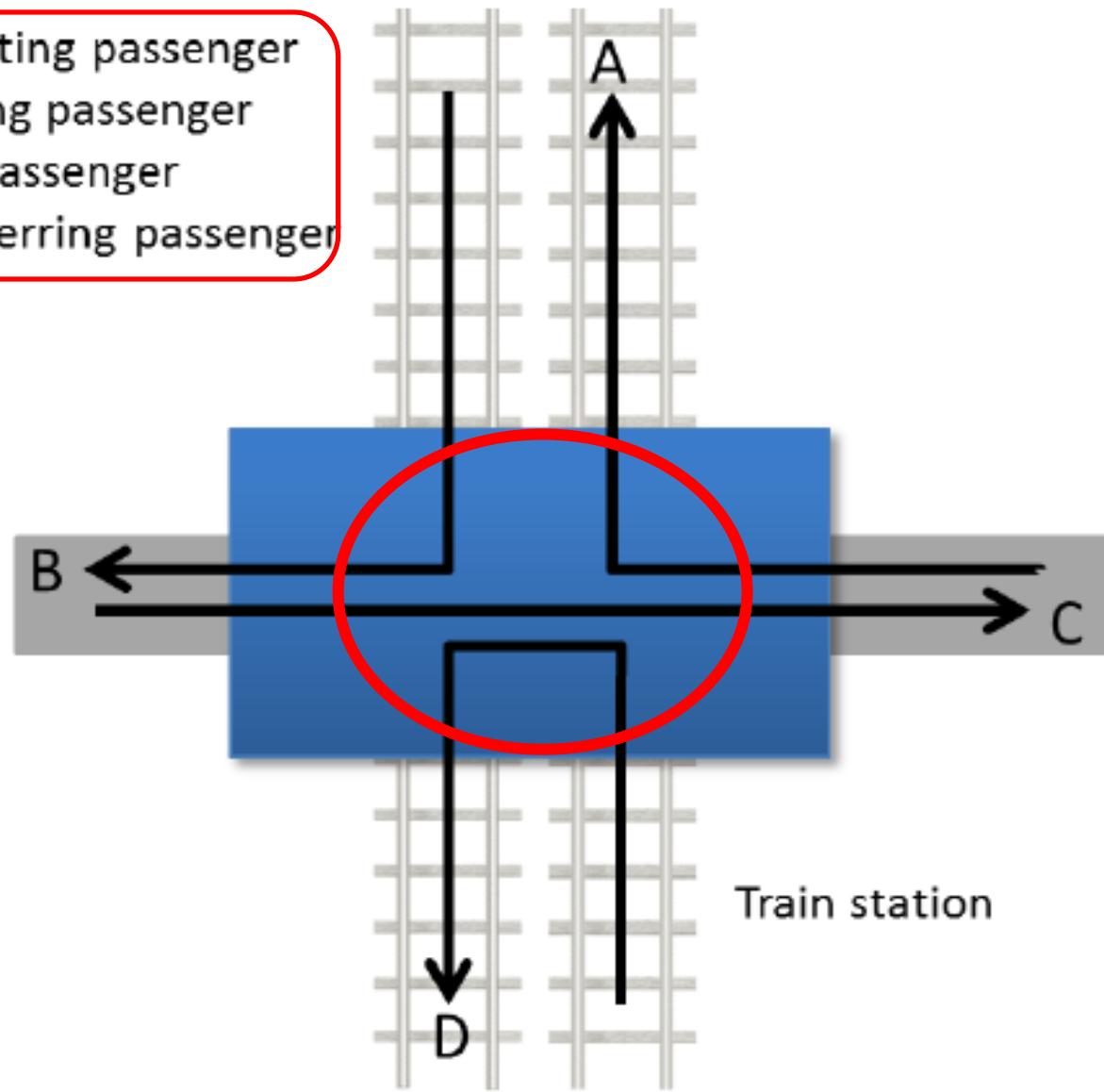
Intra-city flow (non passengers) via Utrecht Central station



Comparing intra-city flows at Utrecht Central en Leiden Central

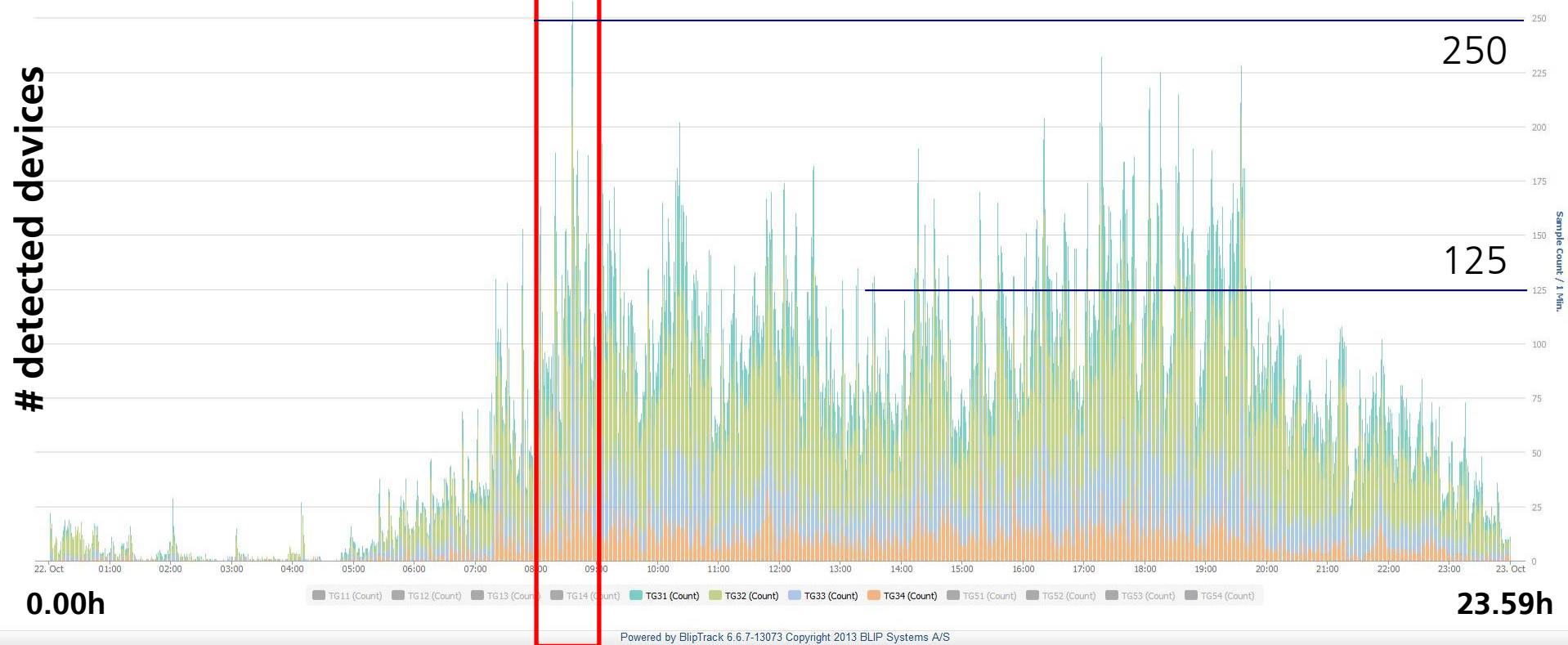


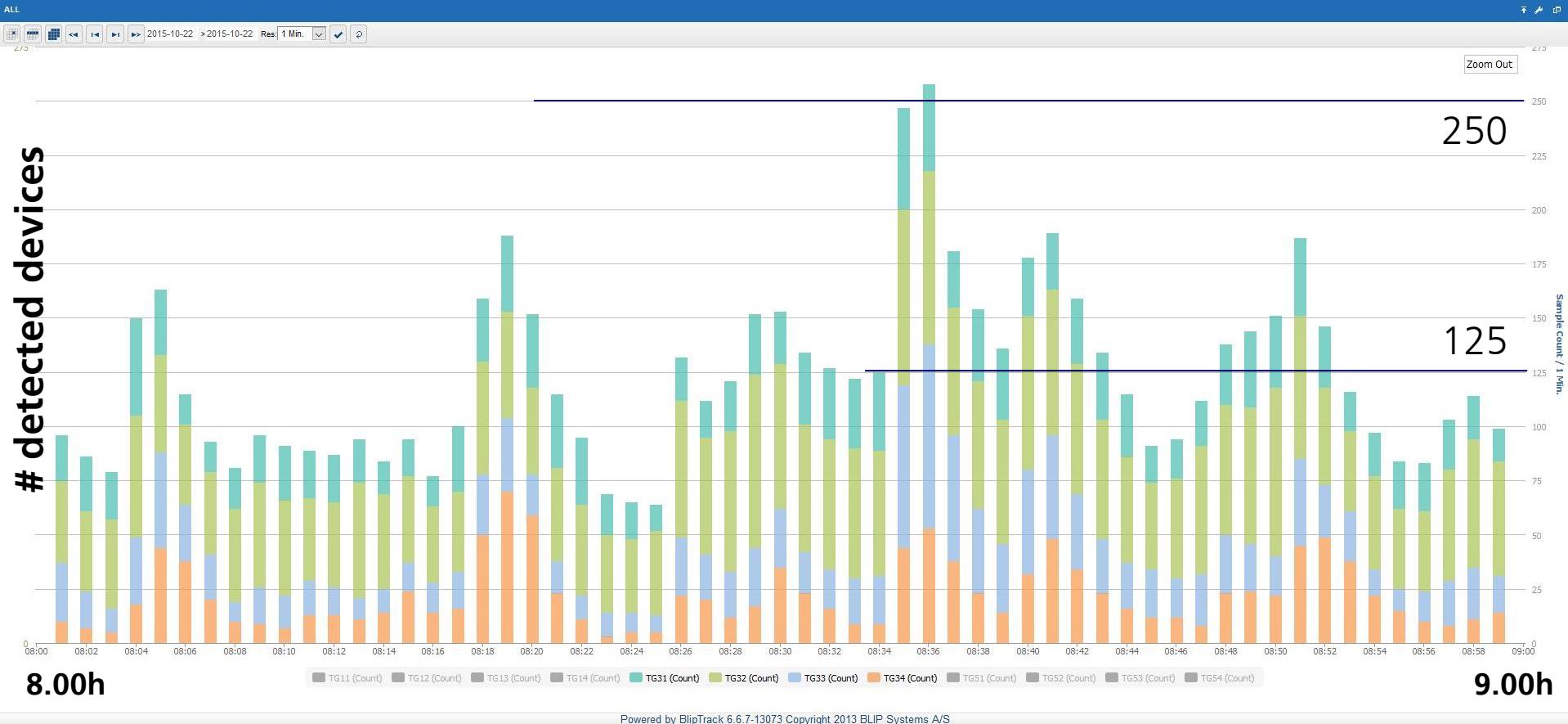
- A: Departing passenger
- B: Arriving passenger
- C: Non-passenger
- D: Transferring passenger





detected devices



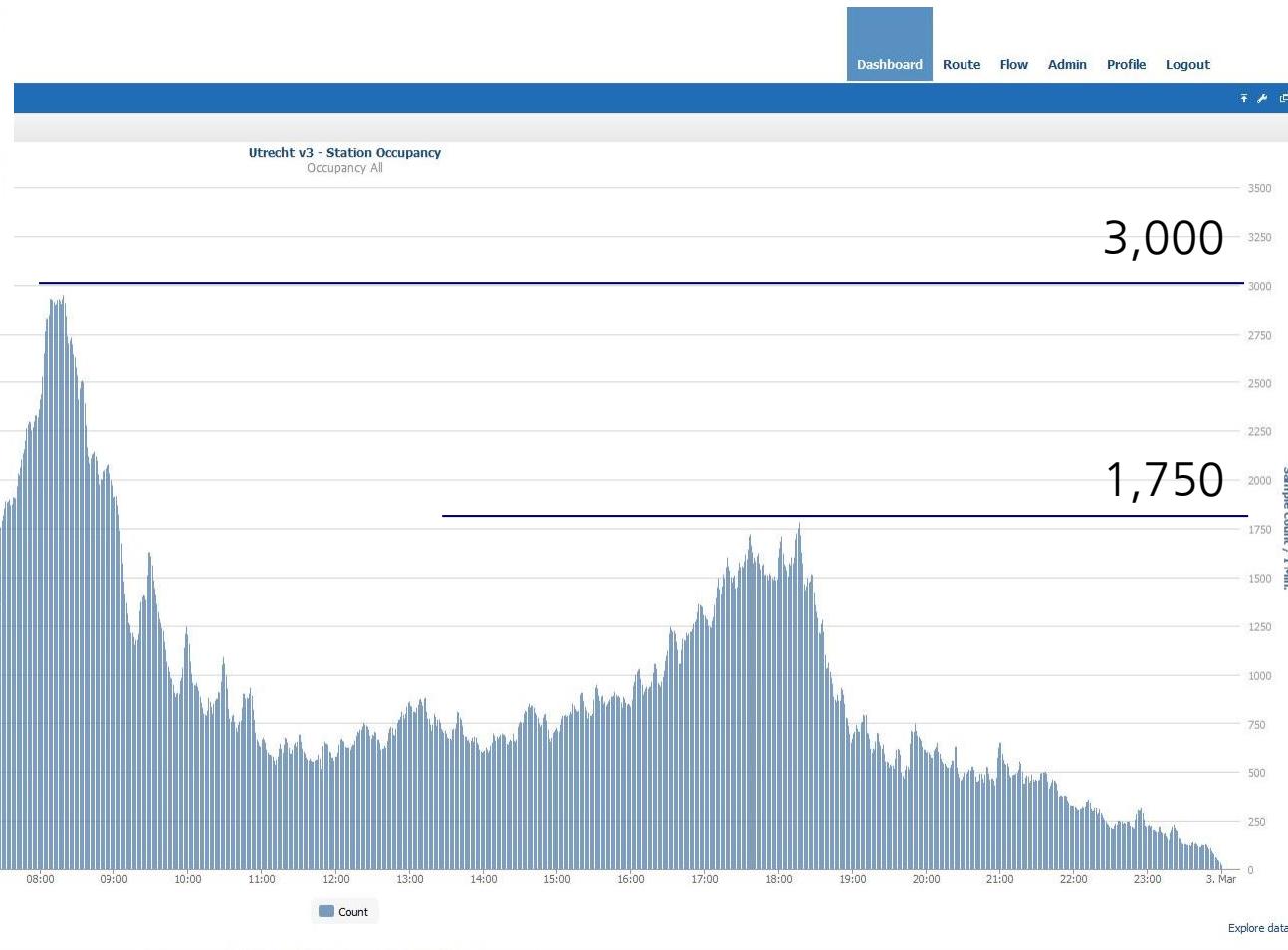


Geen treinen rond Utrecht: dit zijn de gevallen



Drukte op Utrecht Centraal (archieffoto) © ANP

Een defecte bovenleiding ontregelt een groot deel van het treinverkeer van en naar Utrecht. Bekijk hier op welke trajecten:



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