

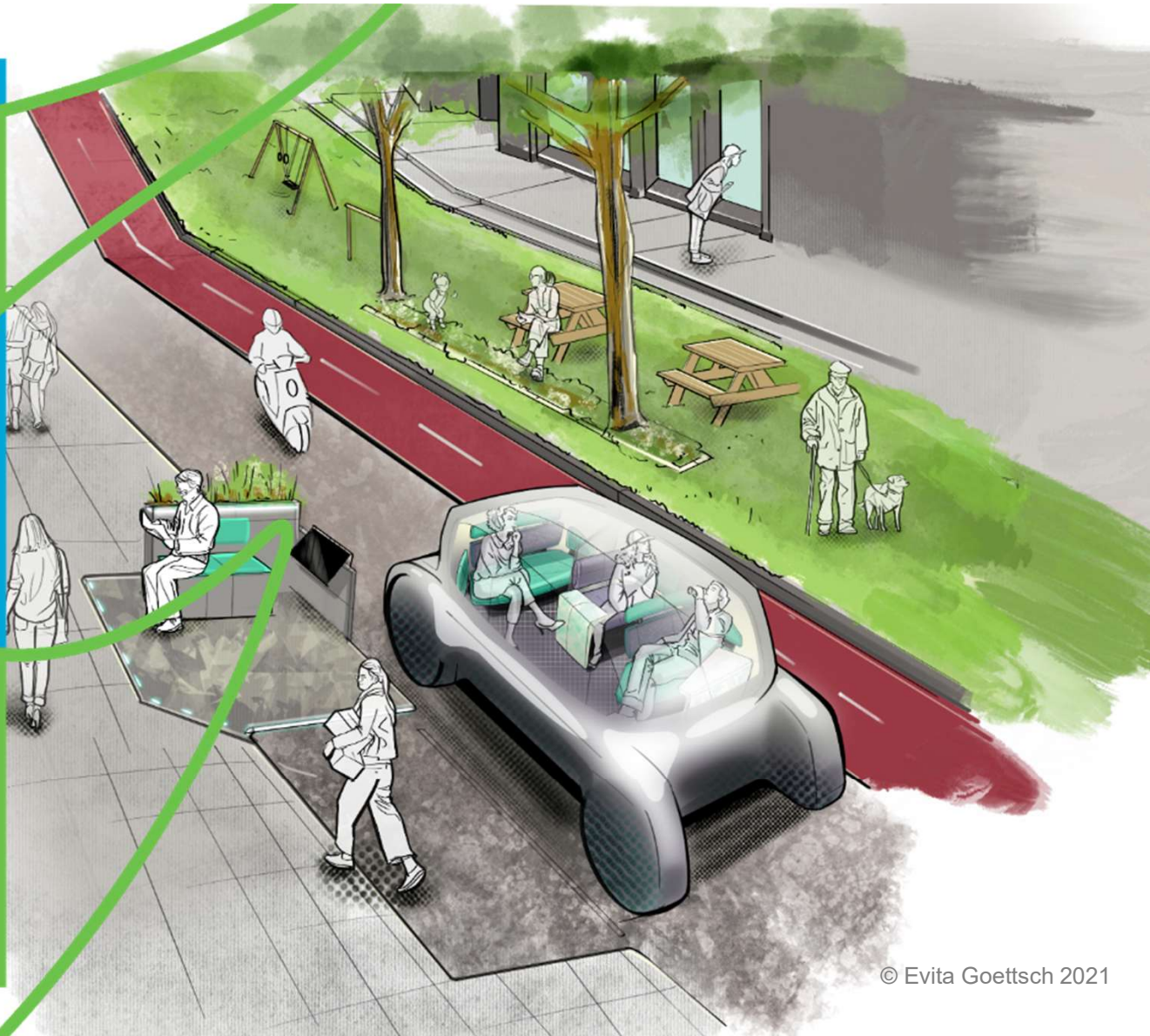
Seamless Multi-modal Travel

*Dr.ir. Suzanne Hiemstra-
van Mastrigt*

KERC Korea-EU Horizon Europe
Researchers Networking Forum
on Energy & Advanced Mobility
October 14-16, 2025



Industrial Design
Engineering

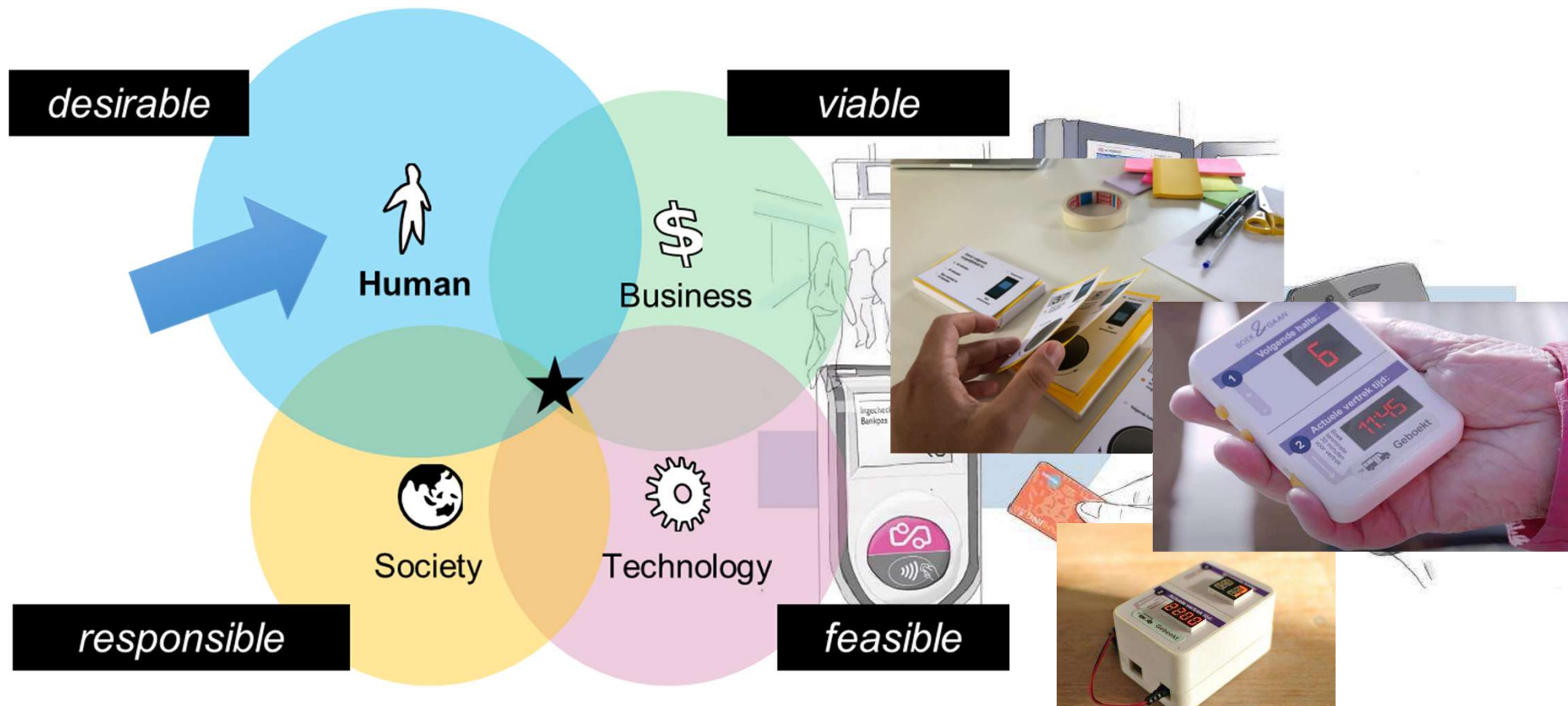


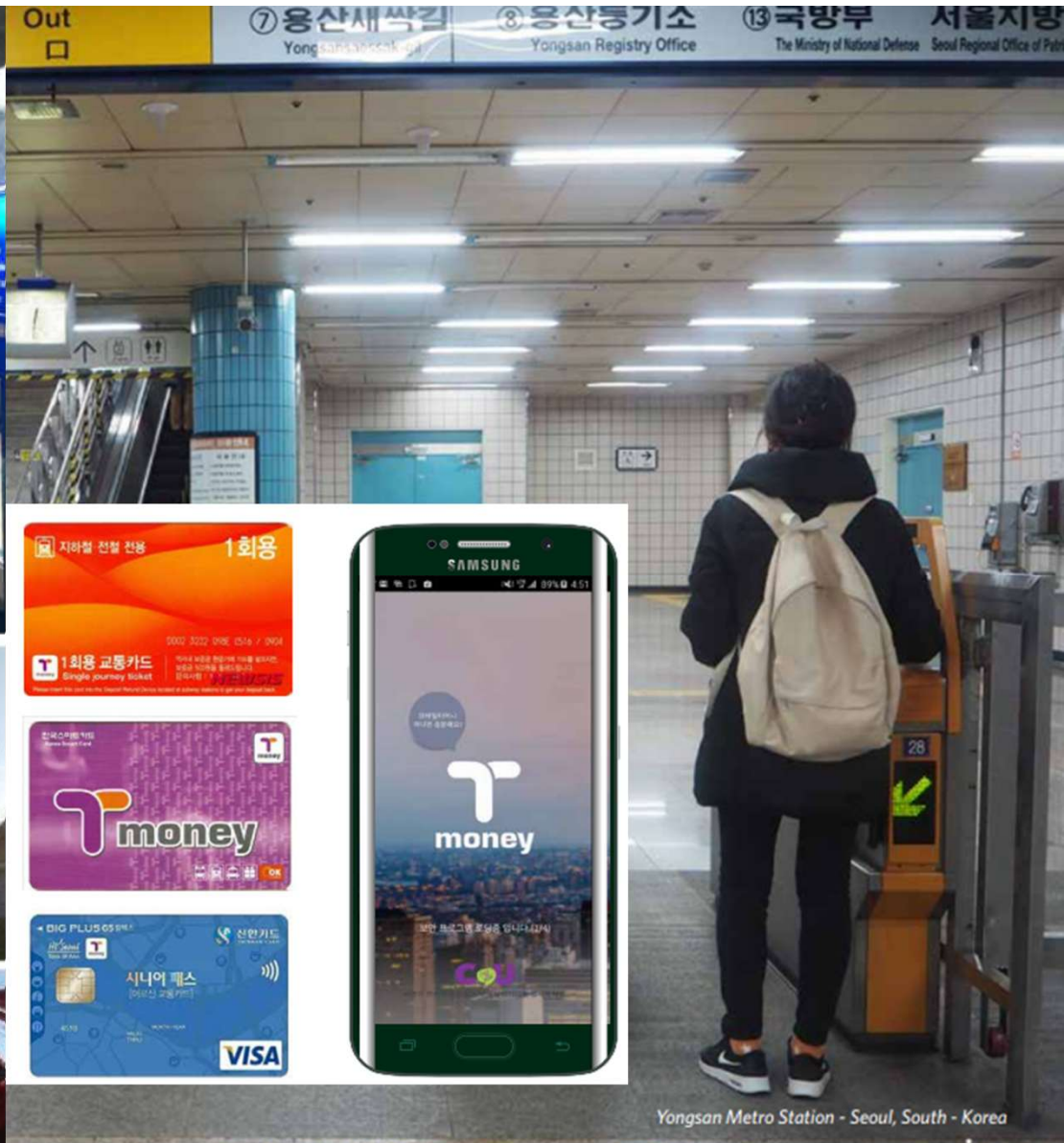
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About me

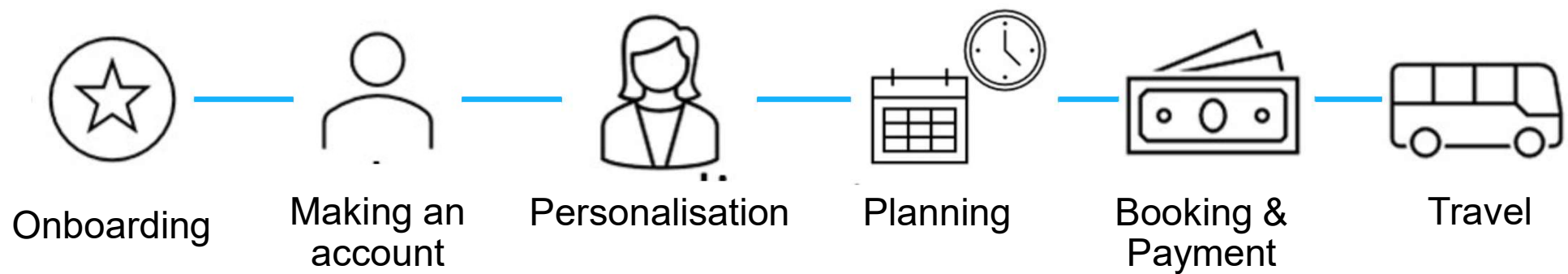


User-centered and integral approach





Mobility Services | User evaluation of MaaS apps in the Netherlands



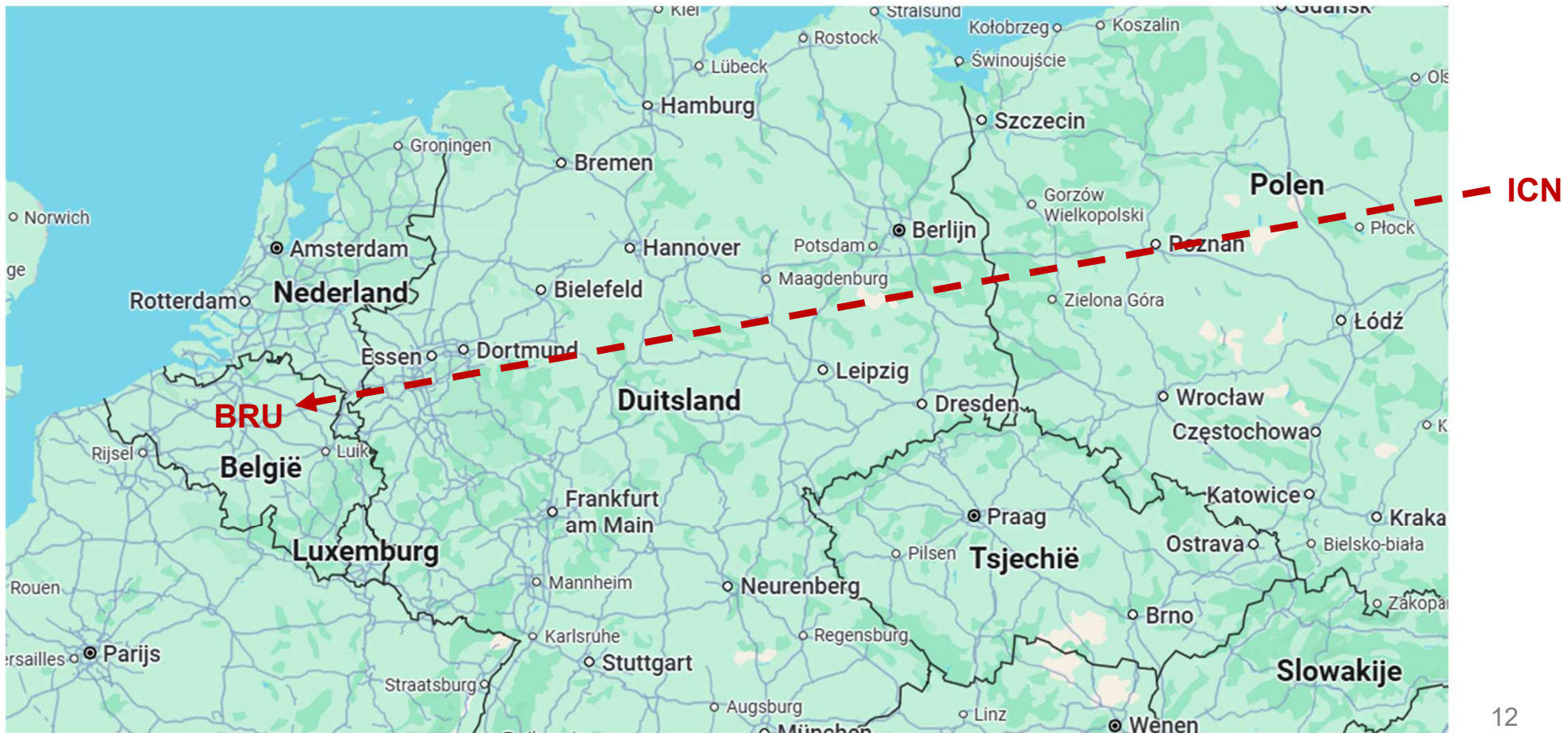
TU Delft B737 Aircraft Lab



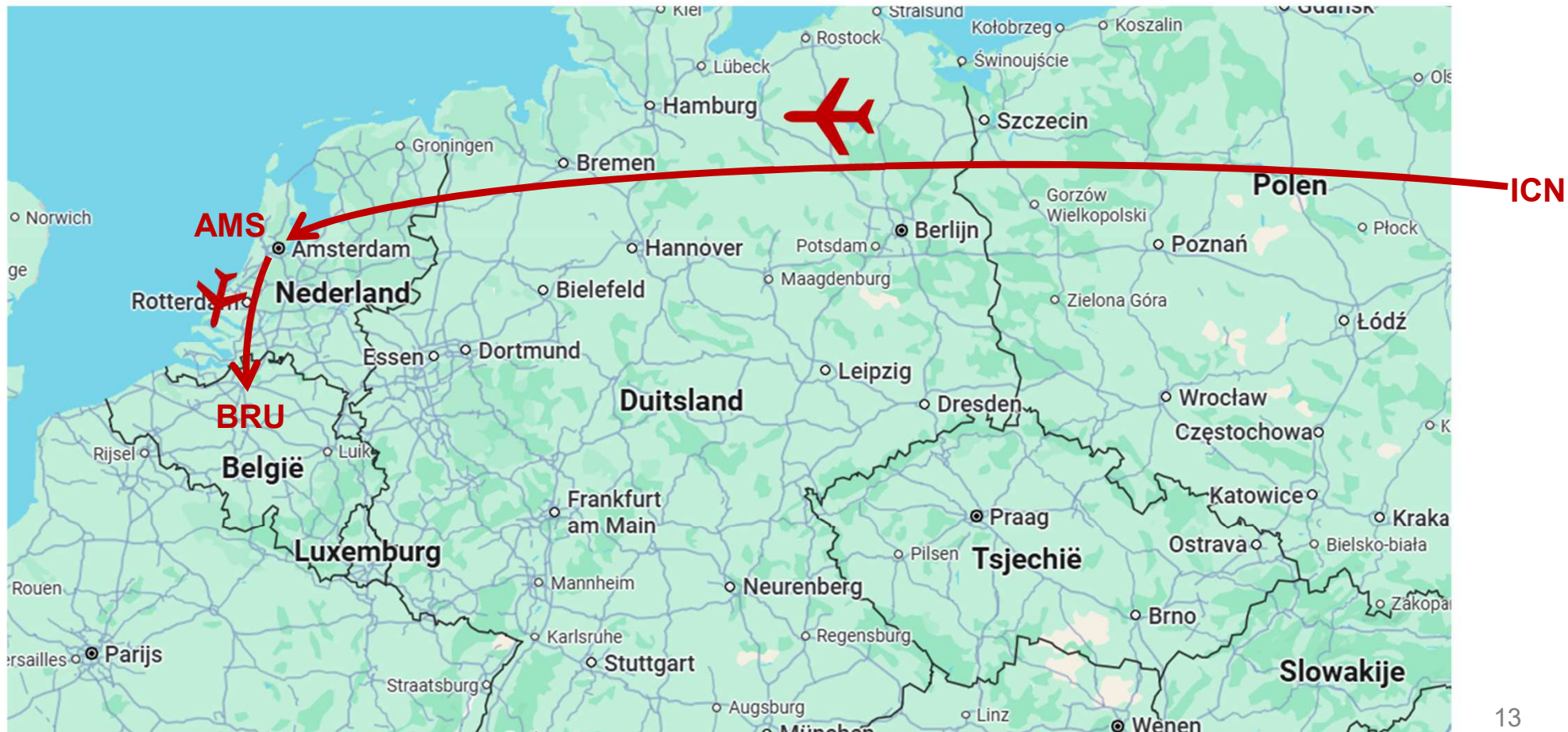
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 636308.

PASSME Fast airports.
Stress-free journeys.

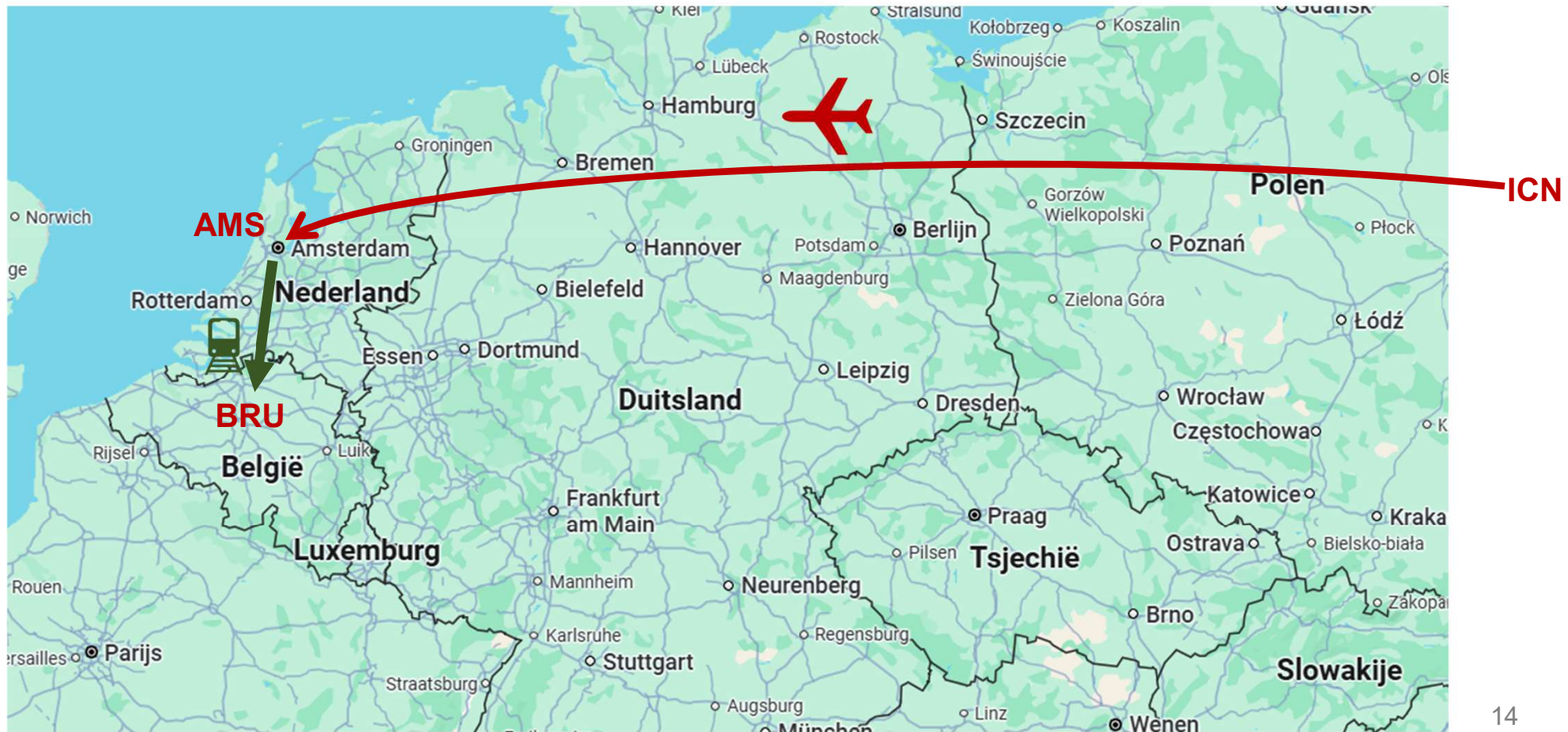
Air-rail transfers: an example ☺



Air-rail transfers: an example ☺

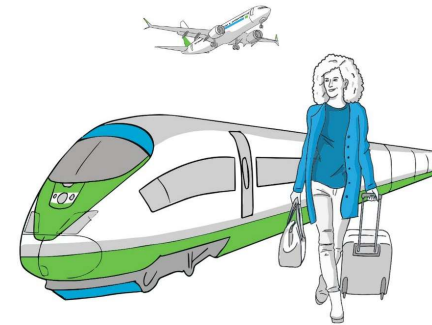


Air-rail transfers: an example ☺

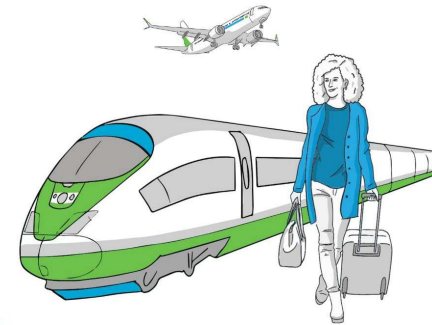
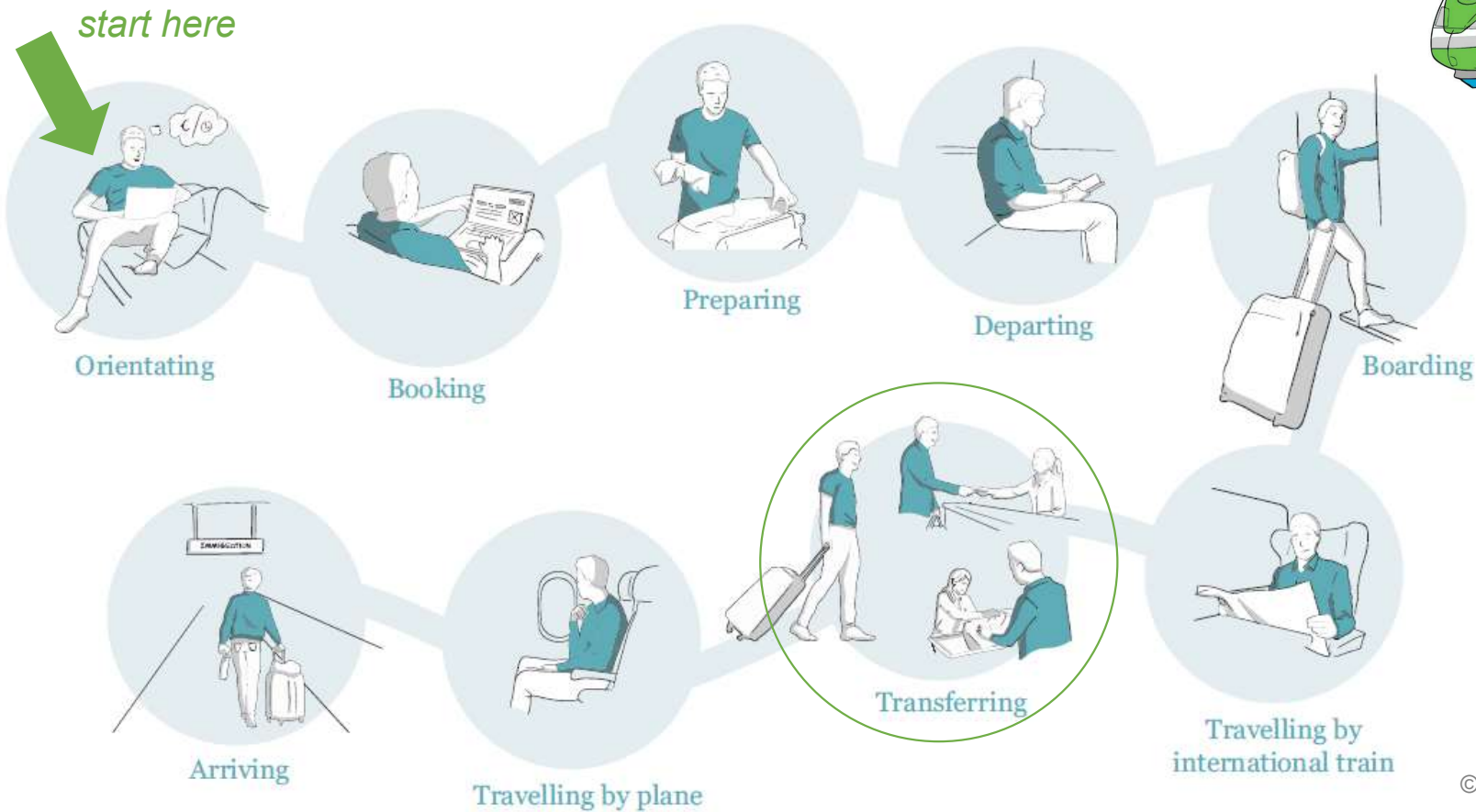


Air-rail transfers

- Reduce short haul flights in Europe
- Improve air-rail transfer at Schiphol
- Use journey perspective to reframe the problem
- Create service design vision



Air-rail transfers



Current rail-air journey



Current rail-air journey

Phase

Orientating

Booking

Preparing

Departing

Travelling by
Train

Transferring

Travelling by
plane

Arriving

Main insights

Compare options
door to door.

Indication of
greenest option.

Indication of
transfer time and
time in vehicle.

< Thu, 22 Jan >

SORT BY

Impact

Default on sort by
impact.

Indication impact
travel option.

Indication of total
costs.

TRIPSCANNER

FROM Rue Champs 22, Paris TO Hotel Freedom, Brooklyn, New York

Greener choice

245 less CO2

8.45

2h

3h

14h 30

1h

8h

1h 30

23:15

Thalys

Transfer

KLM

Operated by:

THALYS

KLM

Impact | 1200kg CO2

Total €340

Air-Rail ticket €320 extra costs €20

Check >

IBERIA

10:30

2h 20

2h

14h 50

1h

8h

1h 30

23:30

Transfer

KLM

Impact | 1500kg CO2

Total €360

Flight ticket €350 extra costs €10

Check >

KLM

Impact | 1100kg CO2

FAIR CHOICE



TULIPS

Schiphol
Group

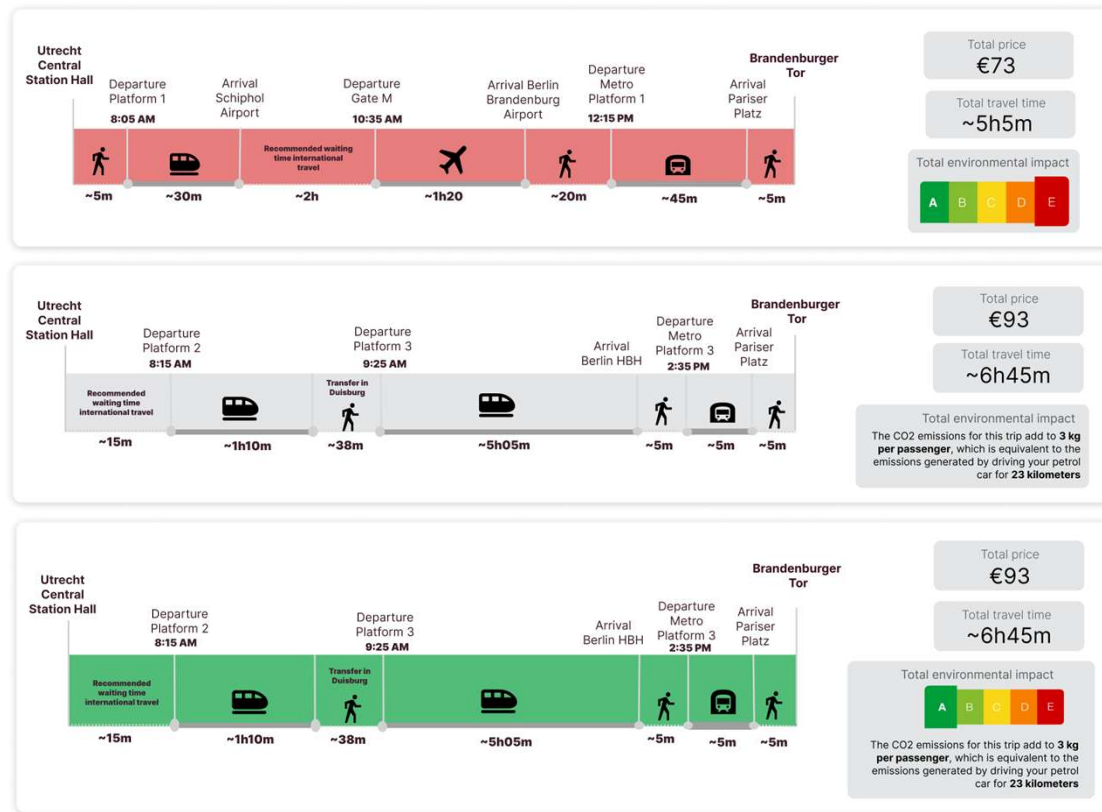
KLM

TU Delft

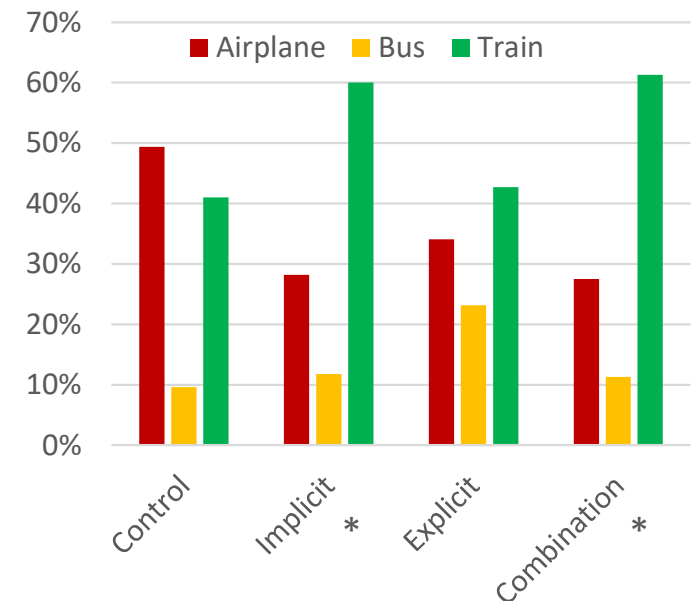


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Sustainability Labels



Modality Choices ($n=330$)



Possibly -40% CO₂ emissions when using the implicit label

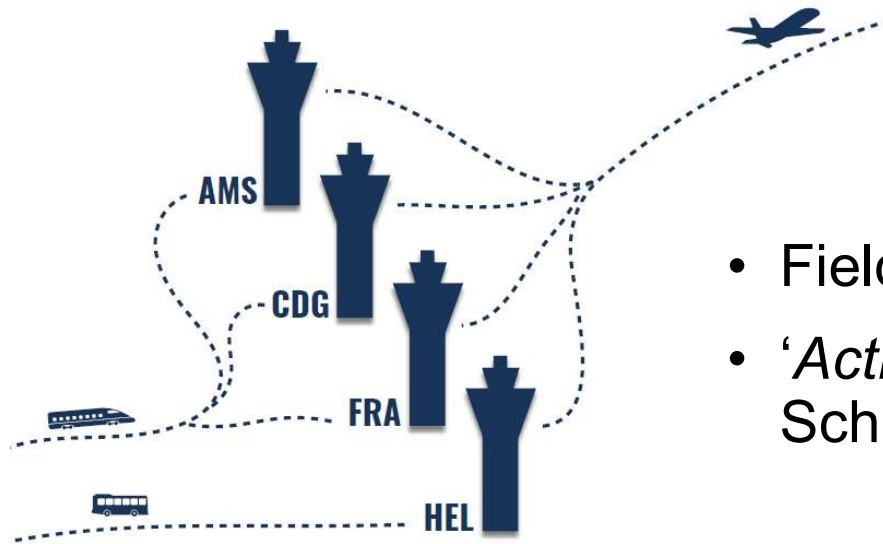


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101036996.

Multi-modal transport hubs

Transforming Airport Hubs into passenger-oriented Multimodal Transport Hubs

Which elements contribute to a better multimodal transfer?



- Field study benchmark
- ‘*Action research*’ at Schiphol Airport



Travelers change modality at the intersection of these transport systems in currently so-called **transit hubs**, defined as the gathering point of various travel modalities

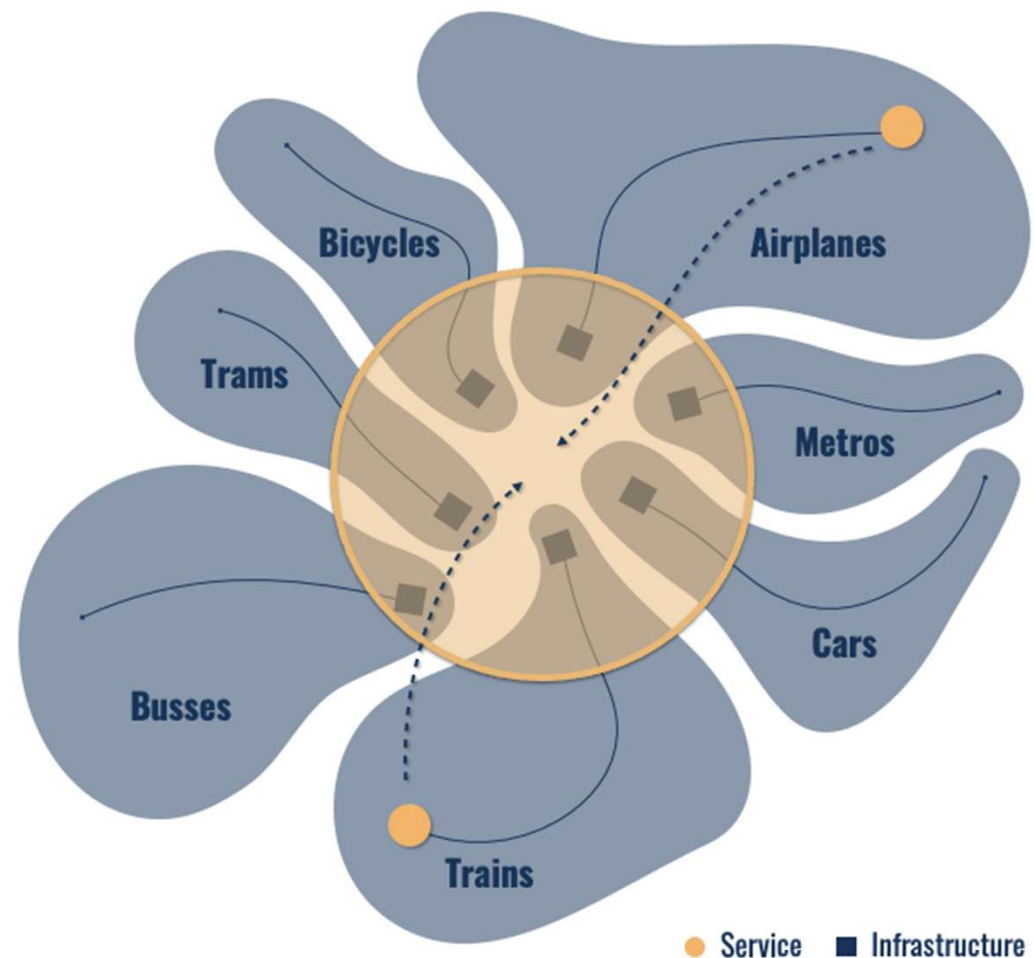
Here the **infrastructure** of transport modalities merge. These are the facilities required to operate the transport modalities (such as railways, highways, runways, and buildings)

(Li & Loo, 2016; Canale et al., 2019)

Integrate the **service elements** of the different modality networks for seamless multimodal journeys (such as one journey contract, transaction, reservation, information and planning services, and baggage handling.)

(Babić et al., 2022; Chauhan et al., 2021; Veeneman et al., 2020)

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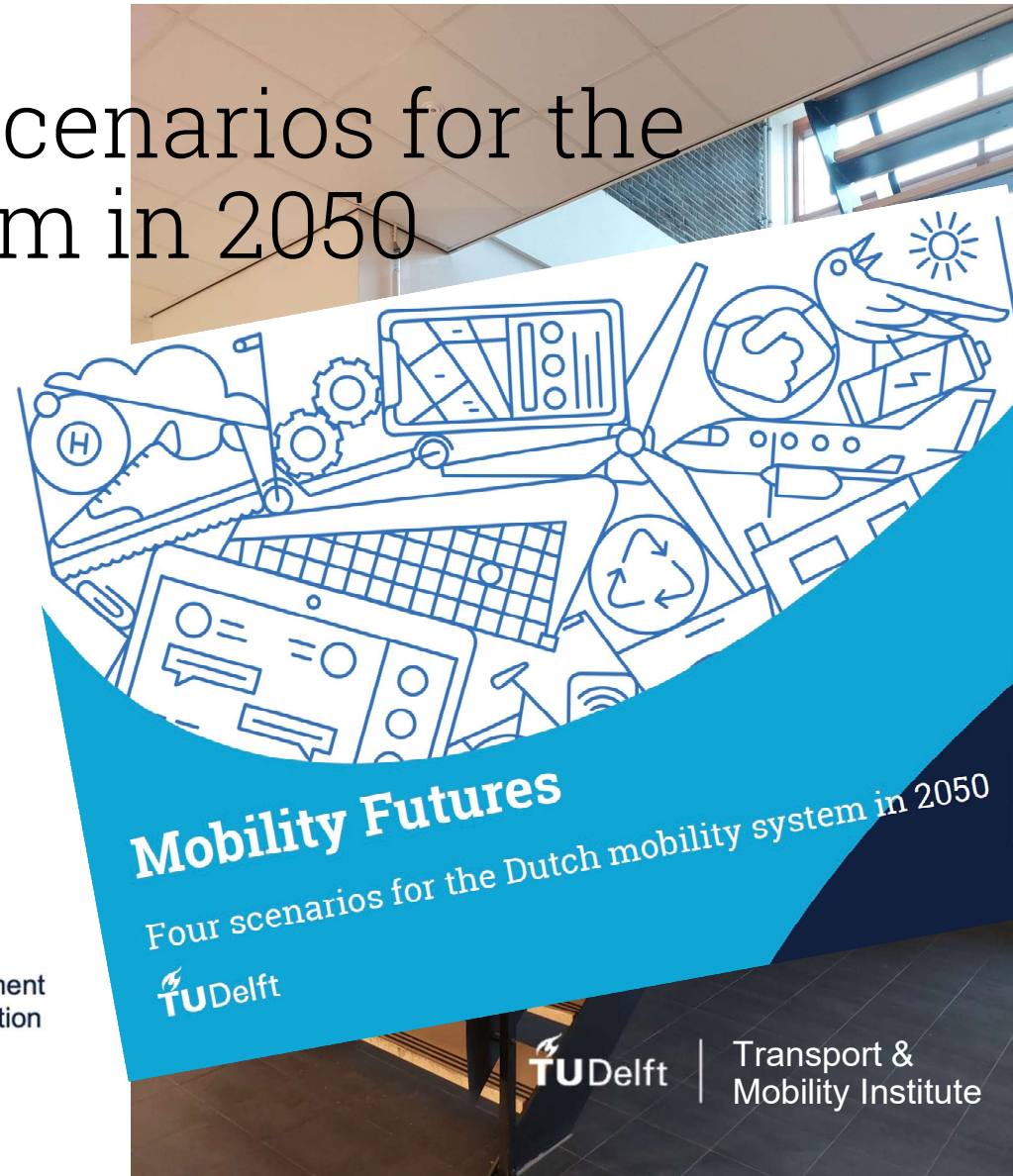
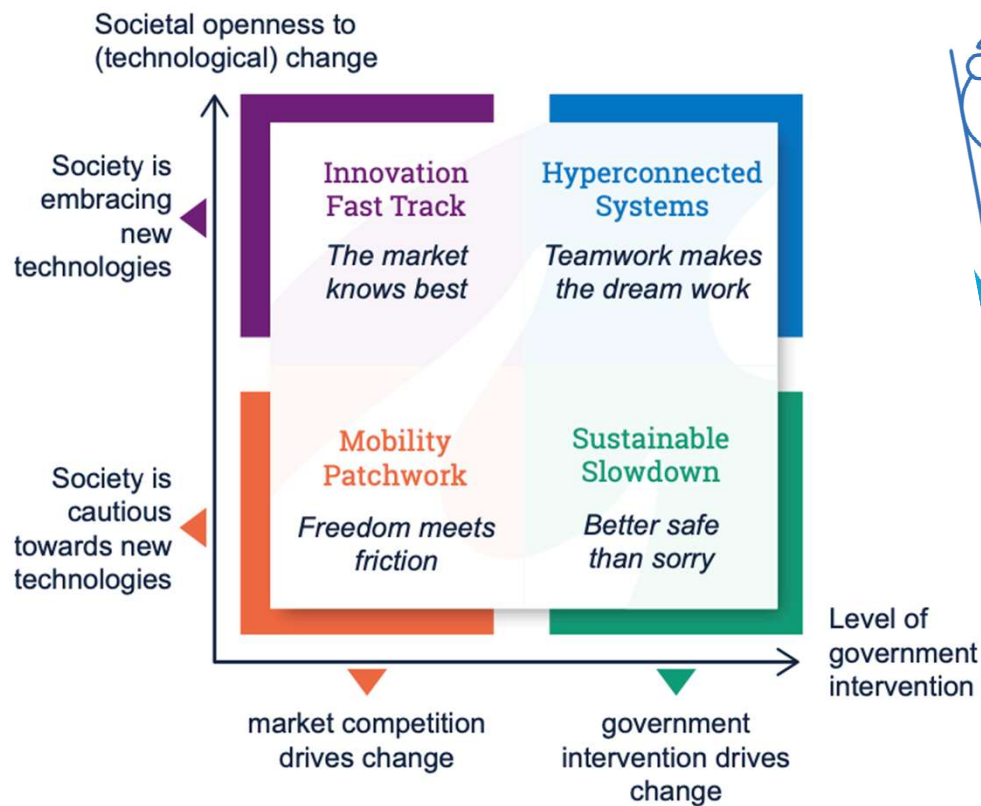




Other projects include:

- Crossing behaviour and needs of wheelchair pedestrians in an urban area in the Netherlands (go-along interviews)
- Bus Rapid Transit (BRT) configurations and their impact on ridership
- Increasing adoption of shared mobility in small municipalities (FusiMob)
- A passenger vision for the future of the electric aviation 9-seater services: a case study on the Førde - Bergen route in Norway
- Demand Responsive Transport (DRT) services for non-digital travellers
- Improving organisational resilience in airports

TU Mobilisers: Four scenarios for the Dutch Mobility System in 2050



Thank you!



More information & Contact

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Industrial Design
Engineering





Seamless Personal Mobility Lab | TU Delft

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In this Delft Design Lab, we explore the ideal user experience for future mobility services, in... >

delftdesignlabs.org/seamless-personal-mobility

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