Transforming airport hubs into future-proof Multimodal Transport Hubs

TU Delft & Royal Schiphol Group

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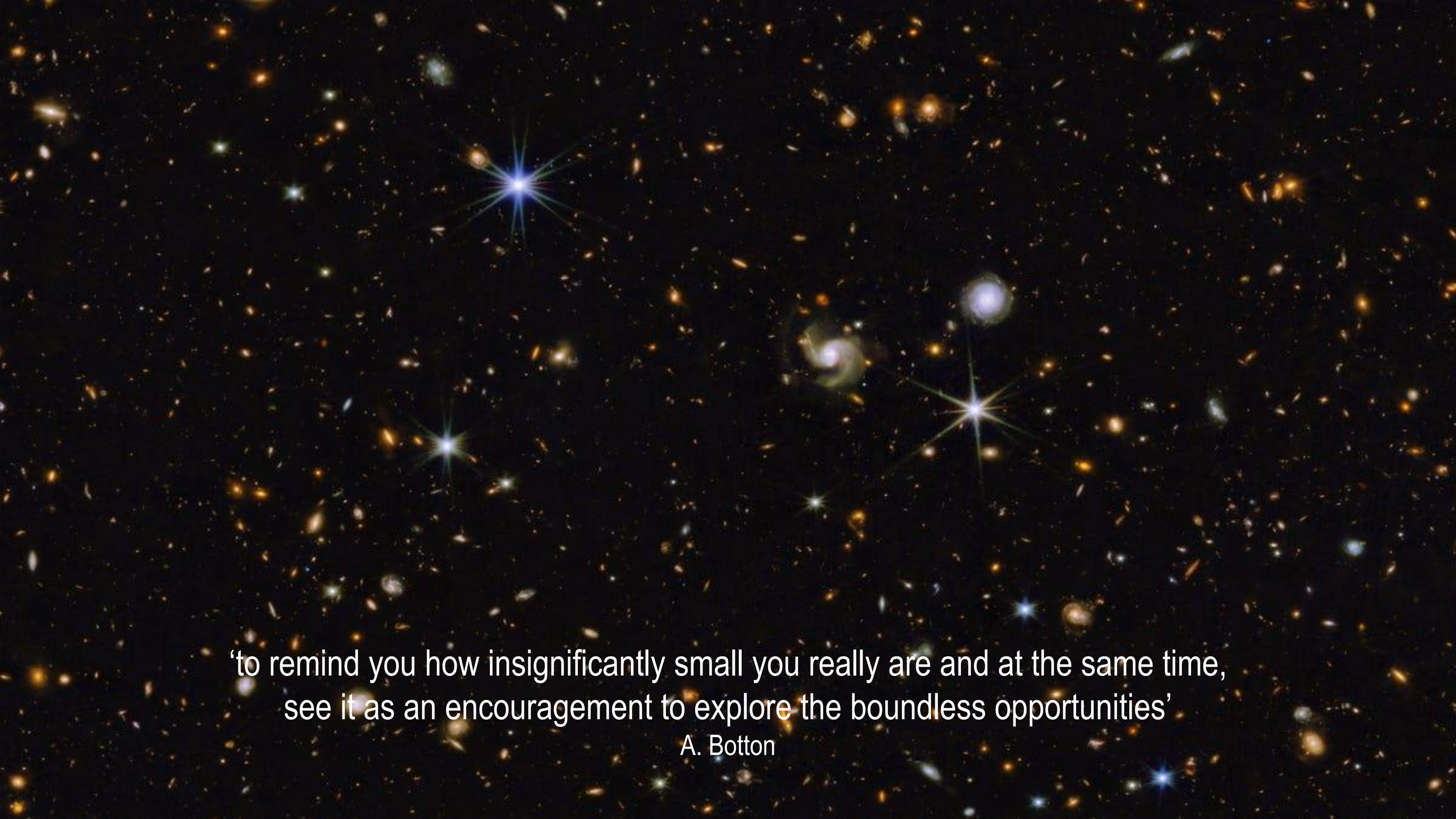


‘to remind you how insignificantly small you really are and at the same time,
see it as an encouragement to explore the boundless opportunities’

A. Botton


SAMSUNG
Schiphol
vrachtstation 3
export

What is a hub really?

hub

/hʌb/

noun

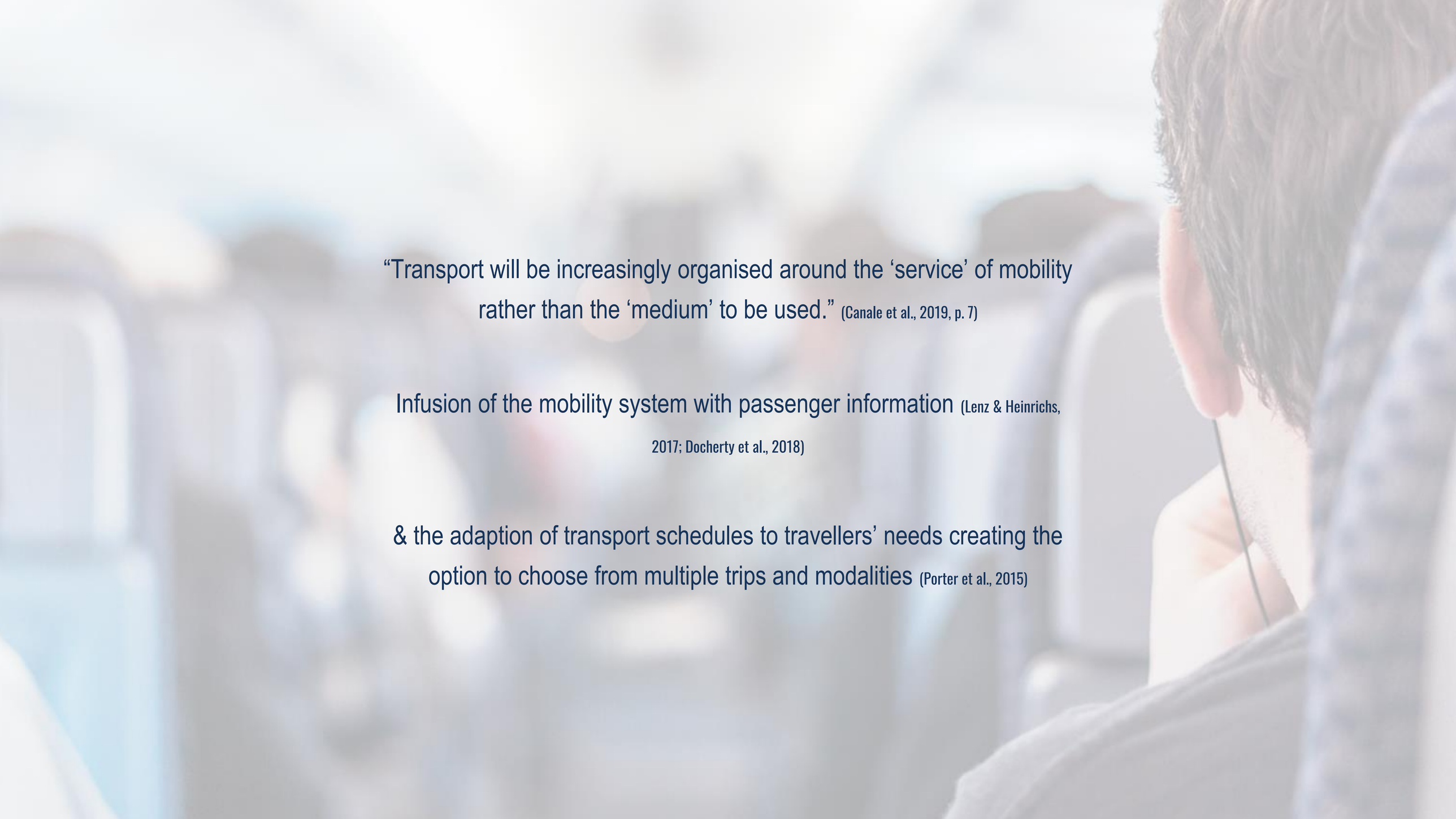
noun: **hub**; plural noun: **hubs**

1. the central part of a wheel, rotating on or with the axle, and from which the spokes radiate.

   Similar: pivot | axis | fulcrum | centre | centre point

2. the effective centre of an activity, region, or network.
   "the city has always been the financial hub of the country"

   Similar: centre | centre of activity | core | heart | focus | focal point | middle



"Transport will be increasingly organised around the 'service' of mobility rather than the 'medium' to be used." (Canale et al., 2019, p. 7)

Infusion of the mobility system with passenger information (Lenz & Heinrichs, 2017; Docherty et al., 2018)

& the adaption of transport schedules to travellers' needs creating the option to choose from multiple trips and modalities (Porter et al., 2015)

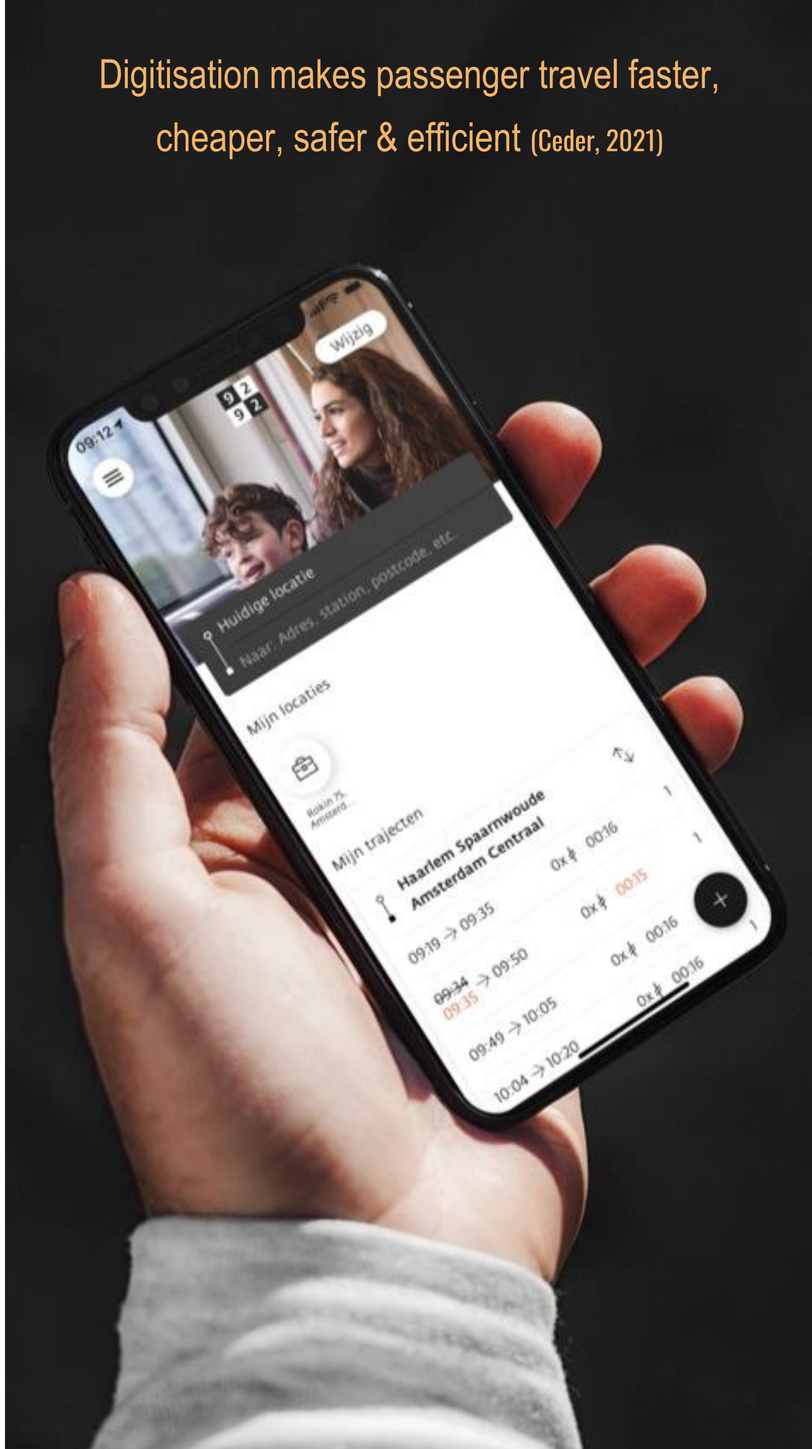
society's growing demand for sustainability

The complex systems of transport and mobility are developing fast

New modalities are often characterised by CO2 neutrality, autonomy, sharing and connected

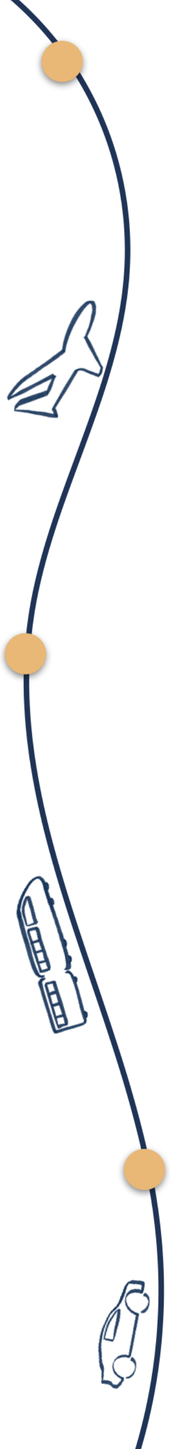
(Nikitas et al., 2020; Docherty et al., 2018; Sprei, 2018; Kane & Whitehead, 2017)

Digitisation makes passenger travel faster, cheaper, safer & efficient (Ceder, 2021)



With about 200 companies involved in the development of electric vertical-takeoff-and-landing vehicles (eVOTL) (7 Urban Air Mobility Companies to Watch | Greenbiz, 2021)

The two critical trends of sustainability and digitisation reinforce the importance of multimodal journeys emphasising greater passenger convenience and comprehensiveness (Docherty et al., 2018)



Travellers change modality at the intersection of these transport systems in currently so-called transit hubs, defined as the gathering point of various travel modalities (Li & Xu, 2019)

The rise of multimodal travel highlights the importance of paying attention to the passenger service quality at transport systems' intersections, as those are the critical links that make or break a seamless multimodal passenger journey (Monzón et al., 2016) and, accordingly, designing passenger-oriented Multimodal Transport Hubs (MTHs) (Rongen, 2020)

For airports to maintain, and perhaps strengthen, their position in the passenger mobility industry, their current function as a transit hub should be reshaped into a passenger-oriented MTH.

Prior research states that successful MTHs integrate both infrastructure and service elements of modalities (Bell, 2018; Monzón et al., 2016; Chauhan et al., 2021)

Infrastructure elements are the facilities required to operate the transport modalities (such as railways, highways, runways, and buildings) (Li & Loo, 2016; Canale et al., 2019)

Service elements are the services that facilitate a seamless interchange between multiple modes of transport (such as transaction, reservation, information & planning services) (Chauhan et al., 2021; Veeneman et al., 2020)

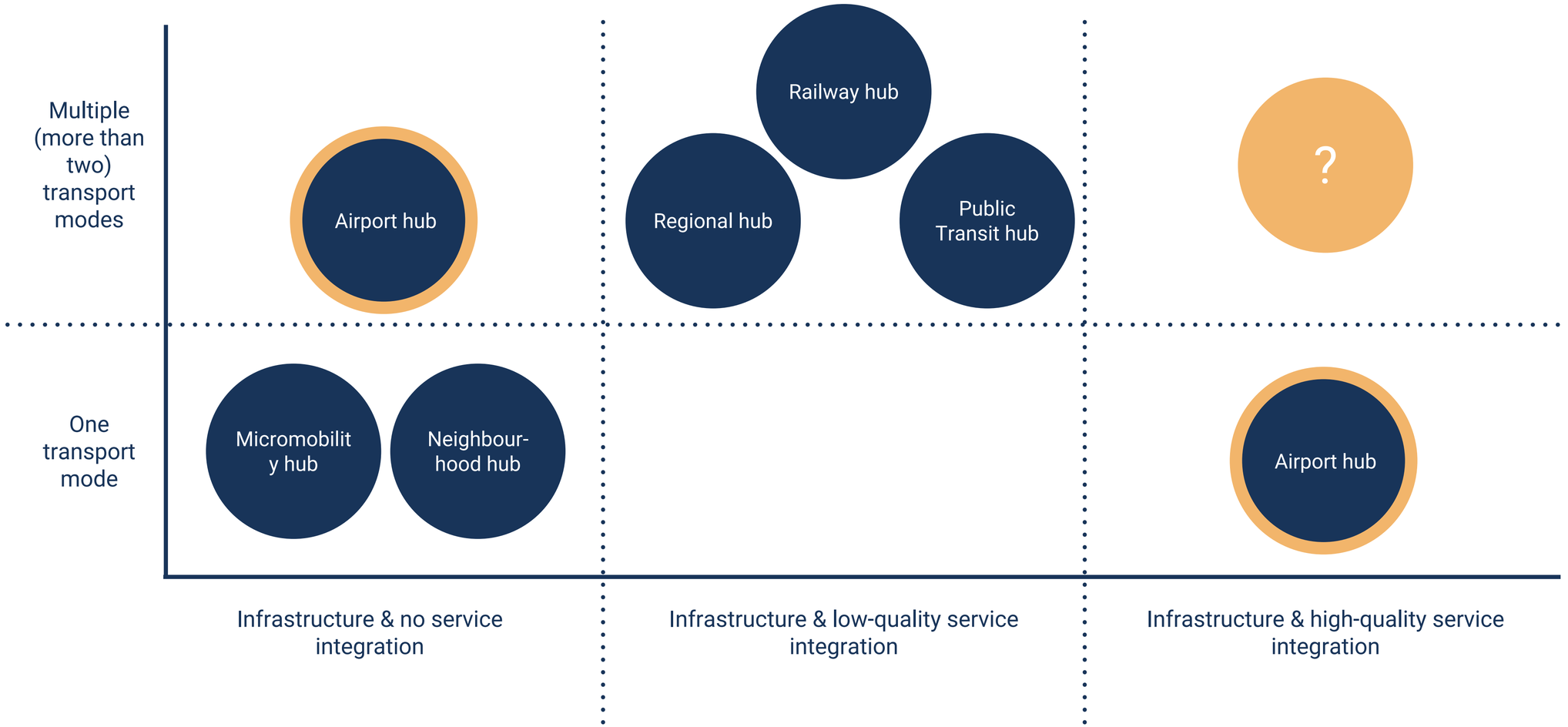
High-speed rail requires passport controls

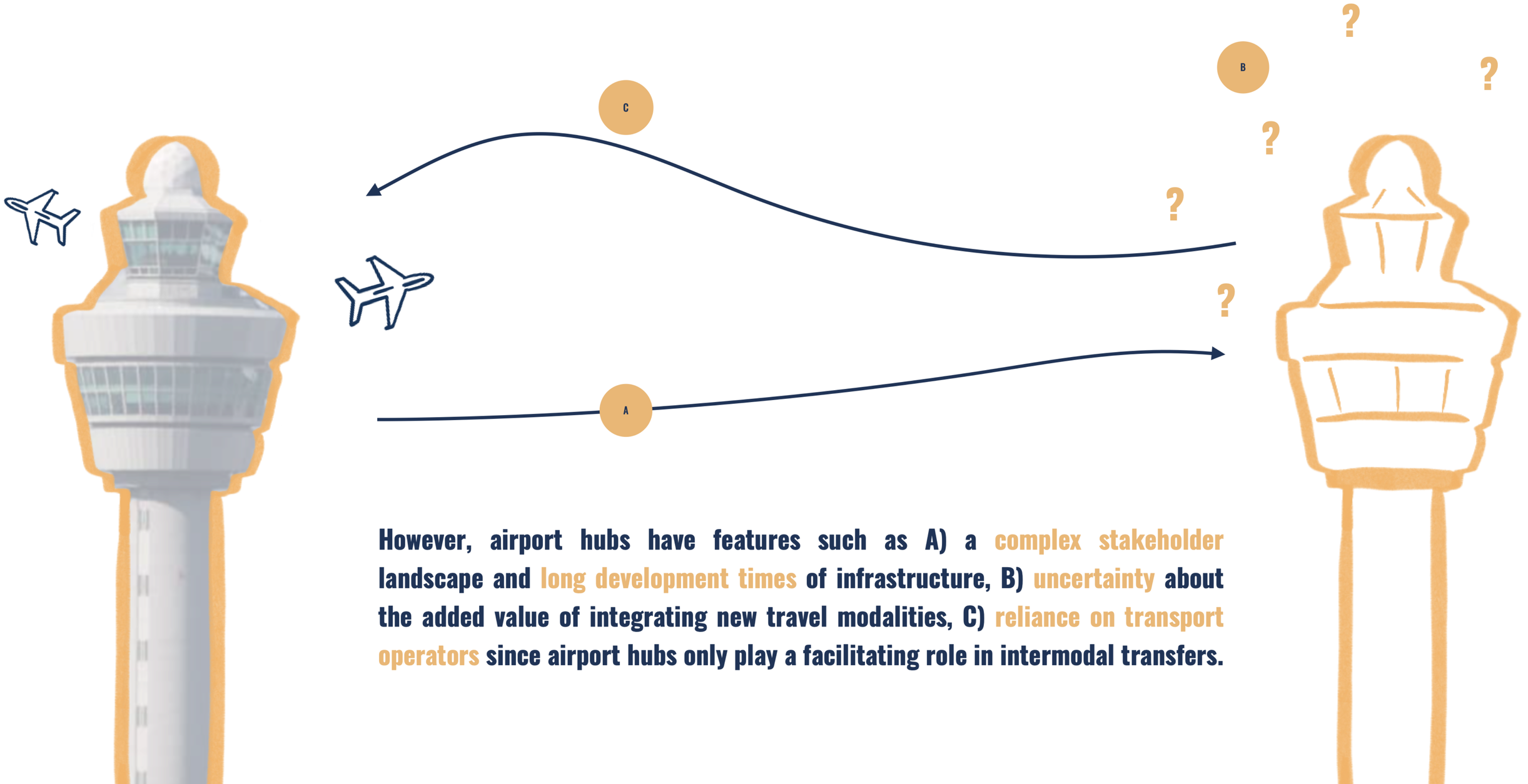
Air transport innovations are expected to be feasible at short distances in the short term

(Schäfer et al., 2019)

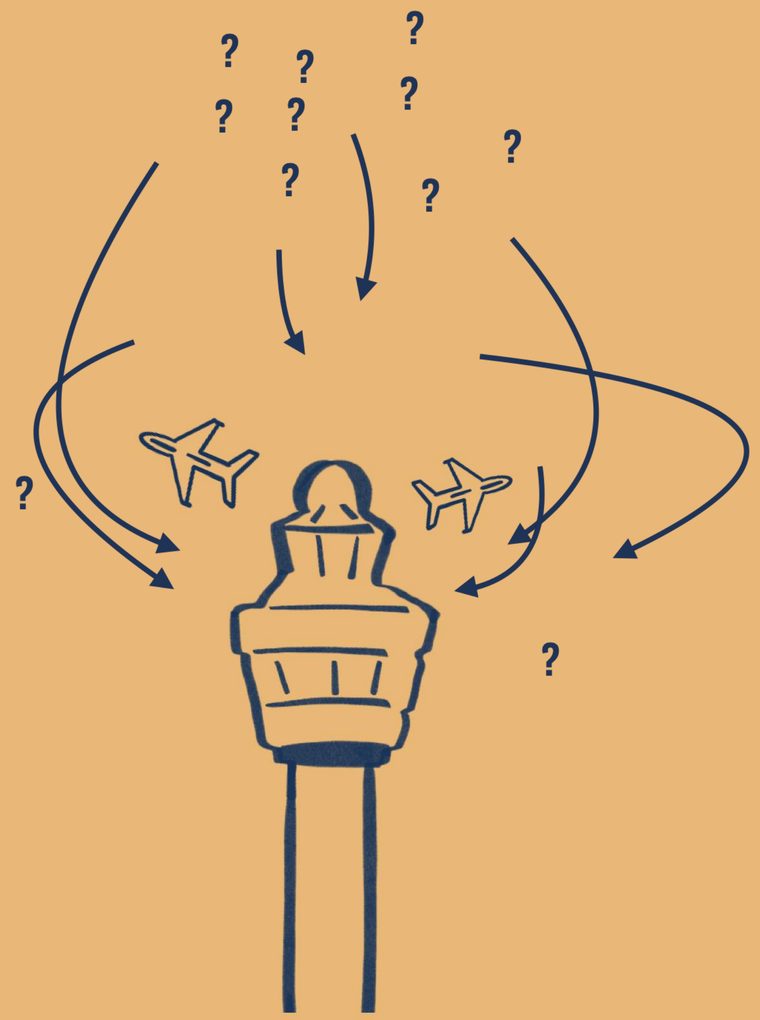
So the properties of MTHs are highly dependent on the type of modalities they integrate, and therefore I created a classification of transport modalities for MTHs

	Ultra-long-haul (Airplanes, boats)	Long-haul (Airplanes, boats, high-speed rail, trains)	Medium-haul (High-speed rail, train, ferry, bus, car)	Short-haul (Car, bus, metro, motorbike, bike, ferry, scooter)
	5.000 - 10.000 km	200 - 5.000 km	50 - 200 km	< 50 km
Sea port	X	X	X	X
Airport hub	X	X	X	X
Regional airport		X	X	X
Railway hub		X	X	X
Public transit hub			X	X
Neighbourhood hub			X	X
Micromobility hub				X


Multiple (more than two) transport modes
One transport mode
Airport hub
Railway hub
Regional hub
Public Transit hub
?
Micromobilit y hub
Neighbour-hood hub
Airport hub
Infrastructure & no service integration
Infrastructure & low-quality service integration
Infrastructure & high-quality service integration



However, airport hubs have features such as A) a complex stakeholder landscape and long development times of infrastructure, B) uncertainty about the added value of integrating new travel modalities, C) reliance on transport operators since airport hubs only play a facilitating role in intermodal transfers.



Research Question 1.

How should airport hubs harness alternative travel modalities with attention to when and to what degree?

Research Question 2.

How should airport hubs absorb the infrastructure and service of alternative travel modalities to facilitate high-quality passenger transfers?

Research Question 3.

What interventions supports airport hubs in transforming into Multimodal Transport Hubs?

“No action without research; no research without action”

THANK YOU

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