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Travel Information Management for Seamless Intermodal Transport

INTRODUCTION

TRANSIT aims to develop a set of multimodal KPIs, mobility data analysis methods and transport simulation tools allowing the evaluation of the impact of innovative intermodal transport solutions on the quality, efficiency and resilience of the door-to-door passenger journey.

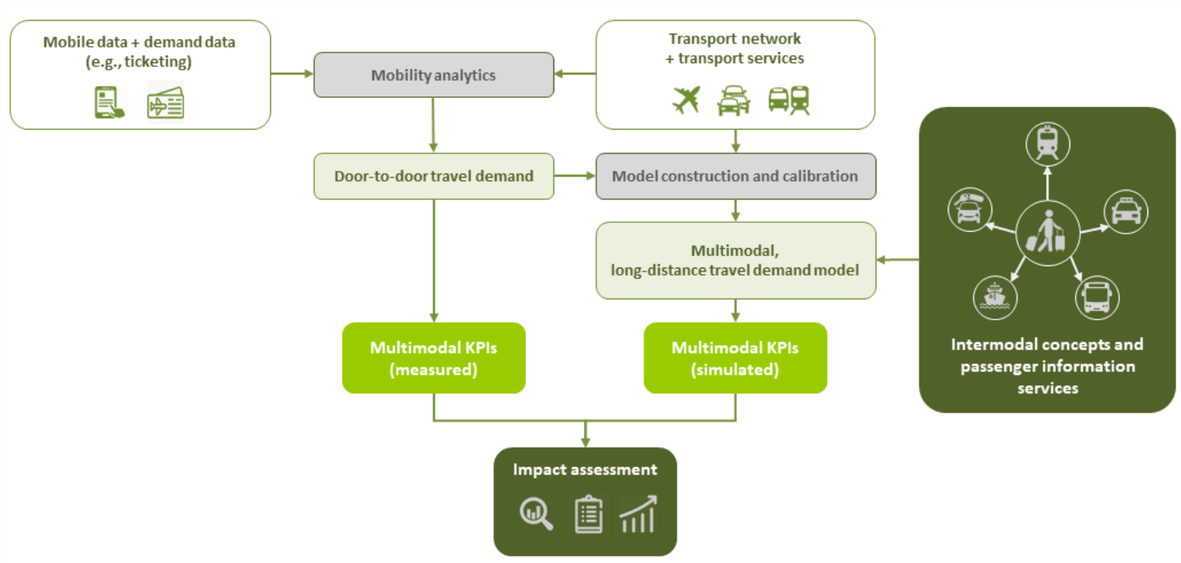

Figure 1: Diagram of the Concept behind TRANSIT

OBJECTIVES

1. **Propose innovative intermodal transport solutions** based on **information sharing** and coordinated decision making between air transport and other transport modes.
2. **Develop multimodal KPIs** to evaluate the quality and efficiency of the door to door passenger journey.
3. To develop **new methods and algorithms** to reconstruct different stages of long-distance multimodal trips and better understand its features, such as **passenger characterisation**.
4. Develop a **modelling and simulation framework** for the analysis of long-distance travel behaviour that allows a comprehensive assessment of intermodal solutions in terms of the proposed multimodal KPIs.
5. Through a series of **case studies assess the expected impact of the proposed intermodal concepts** and derive guidelines and recommendations for their practical development and implementation

CASE STUDIES

Integrated ticketing & Schedule coordination

Motivation:

An **intergrated ticket** allows a person to make a journey that involves transfers within or between different transport modes with a single ticket that is valid for the complete journey. **Sharing timetable information** can allow better coordination between transport modes, e.g. making the flights dependent on the trains arriving on time and vice-versa.

Scenarios:

- A. Baseline
- B. Integrated ticketing (soft measures)
- C. Integrated ticketing + hard measures (infrastructure enhancement)

Intermodal Solucions:

- Ticket integration
- Identification of origin-destination demand
- Resilient regional transport network
- Timetable synchronisation

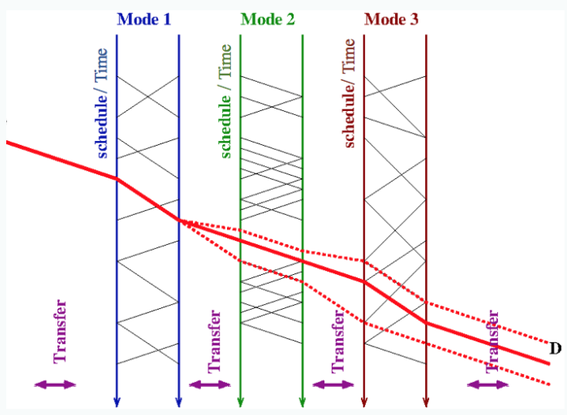

Figure 2: Timetable synchronisation

Disruption

Motivation:

A disruption is a sudden problem which interrupts a process. Having real-time information on this disruption can allow the passengers to rethink their decisions and transport operators to provide better service under these circumstances.

Scenarios:

- A: Baseline
- A.1: Disruption in the ground side
- A.2: Disruption in the air side
- B.1: A.1 + mitigation
- B.2: A.2 + mitigation

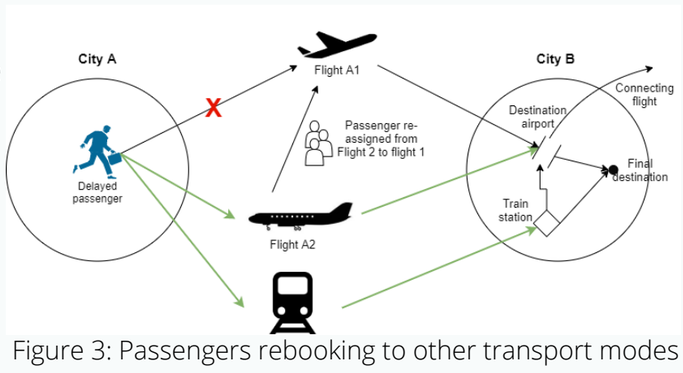

Figure 3: Passengers rebooking to other transport modes

Intermodal Solucions:

- Airport reassignment
- Passenger rebooking to other transport modes
- Estimation of the travel time from door to airport
- Frequencies and schedules updating
- DMAN/AMAN optimisation

PASSENGER CHARACTERISATION

New **sources of geolocated data** have allowed the development of a methodology to extract a series of passenger indicators. The methodology was validated against the information provided by passenger surveys at the Madrid Barajas Airport.

The COVID-19 crisis and the substantial shift resulting from the pandemic brings back interest to **passengers' characterisation**. The application of the methodology to July 2020 mobile phone data provides insights about how passenger-profile has changed during the COVID-19 crisis at the Madrid-Barajas airport. The following trends are observed:

Catchment area

- **Domestic flights:** there is a bigger catchment area for domestic flights.
- **International flights**: there is a smaller catchment area for international flights.

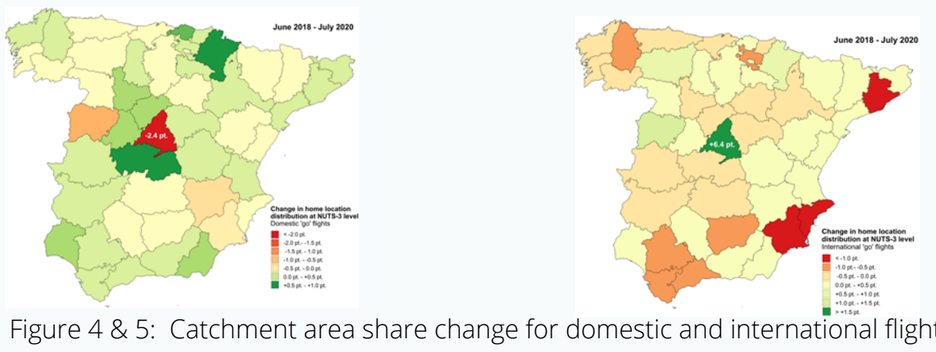

Figure 4 & 5: Catchment area share change for domestic and international flights

Access mode

- **Accessibility:** there is a sharp decrease in the **rail mode share from 16% to 2%**. This decrease can be partly associated with the health risk perception of public transport modes, but also a train frequency reduction, which has a strong impact on the door-to-door travel time.

NUTS-3 unit	Modal share June 2018	Modal share July 2020	Change in train access legs
Toledo	16.3%	0.1%	-99.4%
Valladolid	21.9%	3.3%	-96.9%
Cádiz	35.8%	12.3%	-99.4%
Sevilla	42.2%	11.5%	-98.3%
Zaragoza	16.9%	5.7%	-89.9%
Salamanca	14.0%	3.2%	-96.3%
Cuenca	36.6%	0.0%	-100.0%
Barcelona	27.5%	4.5%	-98.5%
Ciudad Real	19.3%	13.1%	-87.9%
Guadalajara	10.3%	0.0%	-100.0%
Total	**16.0%**	**2.0%**	**-96.2%**

Table 1: Rail share to access Barajas (Madrid Airport)