Abstract
Transportation system for IAM: application of a demand model to study areas

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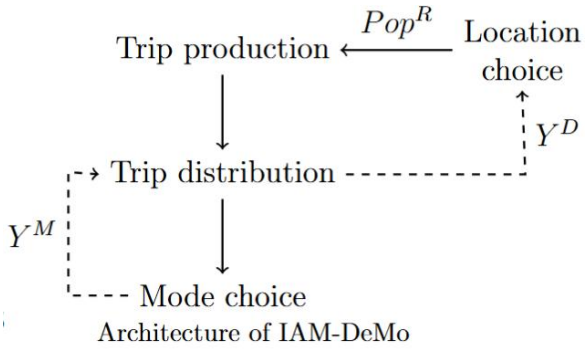
This work focuses on modelling a transportation system for Innovative Air Mobility (IAM). It builds upon the specification, still carried out and yet published, of a demand model for IAM named "IAM-DeMo" (Innovative Air Mobility DEmand MOdel). The IAM-DeMo was based on discrete choice theory and comprises four sub-models interconnected by satisfaction variables. It includes the mode choice model (the core), as well as those modelling levels needed to study the impacts of IAM on the population: location choice, trip production, and trip distribution. It is developed at both national and regional scales, which makes it possible to assess accessibility effects on remote areas. The use cases considered are tourism-related and commuting mobility. As a further step on top of the specification, in this study, we: a) define spatial dimensions (study areas, zoning, and transport network); b) project required input data to future scenarios; and c) identify demand model parameters.



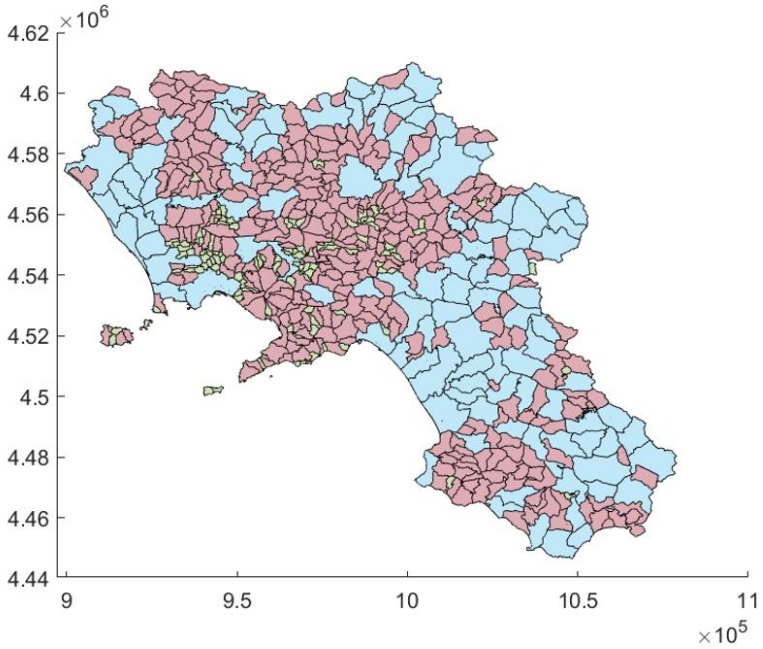
Architecture of IAM-DeMo

Spatial dimensions include the study areas, their zoning, and the transport network. Trips may start and end at many different points thus the study areas are divided into zones (zoning) and analyse only the trips between the centroids of each zone [1]. We have applied IAM-DeMo to Italy at the national level and the Campania region at the regional level. We have built thematic maps and indicators to carry out zoning. The result was a coarser level of zoning based on areas and land uses. At the regional scale, zones approximately correspond to municipalities: large municipalities are subdivided by land use; small ones are aggregated; medium-sized are standalone zones. At national scale, metropolitan areas are used.

Regarding the **projection of input data into future scenarios**, the target years are selected as 2035 and 2050, aligned with European Commission sustainability objectives

[2]. Projection was based on statistical studies and academic literature. The studies provide:

- Sociodemographic data from ISTAT (Italian National Institute of Statistics) to estimate decision-makers, utility function attributes, and weights for satisfaction variables.
- Transport and territorial data (ISTAT) to describe modal attributes (costs, time intervals) and future infrastructures.
- Planning documents to identify future transport networks and infrastructures, and new attraction areas.



Regional study area “Campania Region”. Large municipalities in blue, medium ones in red, small ones in green

The transport network comprises the primary links (ground transport infrastructures, air routes…) and a detailed access/egress network. The IAM-DeMo considers 15 transport modes, including IAM. In this study, construction of new vertiports has not been considered but only existing airfields and heliports have been included.

The IAM-DeMo features a highly articulated architecture, capable of accounting for multiple use cases, decision-makers, trip purposes, and time slots, to capture the diverse transport phenomena stemming from the introduction of IAM. Our primary objective is to establish a methodological framework that enables the interrelations between IAM and travellers’ behaviour. For this reason, we **define all parameters for IAM-DeMo** combining academic literature and expert judgment, rather than calibrating the model with a disaggregate likelihood approach, which would have required the creation and administration of a survey, and subsequent analysis of the data. We adapt parameters (e.g., partitioning coefficients and trip rates) from calibrated models found in the literature. When we are unable to find suitable literature sources, we rely on expert judgment (we rely on the Delphi method, along with other techniques, to minimize bias and perform reasonableness checks).

Conclusions. This study provides a comprehensive methodological framework for assessing the potential impacts of IAM on future mobility, especially in remote and underserved areas. The IAM-DeMo model demonstrates the feasibility of integrating IAM into multi-modal transport systems at different spatial scales. Initial application to Italian

national and regional case studies highlights how IAM could complement existing transport infrastructure, particularly by improving accessibility in low-density zones. The projected scenarios for 2035 and 2050 show that IAM has the potential to influence mode choices, particularly for specific trip purposes such as tourism and resident mobility. While quantitative outputs remain indicative, this work contributes a structured basis for future scenario analysis, policy support, and investment planning in IAM. The framework and assumptions presented here can be used to guide subsequent model calibration and data collection efforts.

[1] Cascetta, E., 2009. Transportation systems analysis: models and applications. volume 29. Springer Science & Business Media.
[2] Erbach, G., 2021. European climate law. Regulation (EU) 1119.

Biography
Valeria Cosenza

Brief professional biography

2021 Master's degree in Building Engineering-Architecture.
Thesis in Urban Planning [a]

2022 – 2023 Scholarship for research purposes
“Definition and evaluation of parameters for the assessment of the resilience of transport networks” [a]

2023 - *ongoing* PhD
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