8th International Conference on BIG DATA & Data Science for Official Statistics
BILBAO 2024

Informing Climate Change and Sustainable Development Policies with Integrated Data

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MPD for Transport & Mobility Statistics

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Nommon Solutions and Technologies

The need for transport and mobility statistics

Urban mobility plans

Regional/national transport plans

Transport concessions

New mobility services

Traffic management

Competition studies

Catchment areas of transport hubs

Continuous monitoring

Limitations of traditional travel surveys

- They depend on users' availability and willingness to answer.
- People tend to simplify their answers, which may lead to incorrect or imprecise information.
- They are expensive and require months to complete, which limits the size of the sample and the frequency with which information is updated.
- Due to their high cost, they do not usually provide information about special periods and events that have a significant influence on mobility (holidays, special events, etc.).

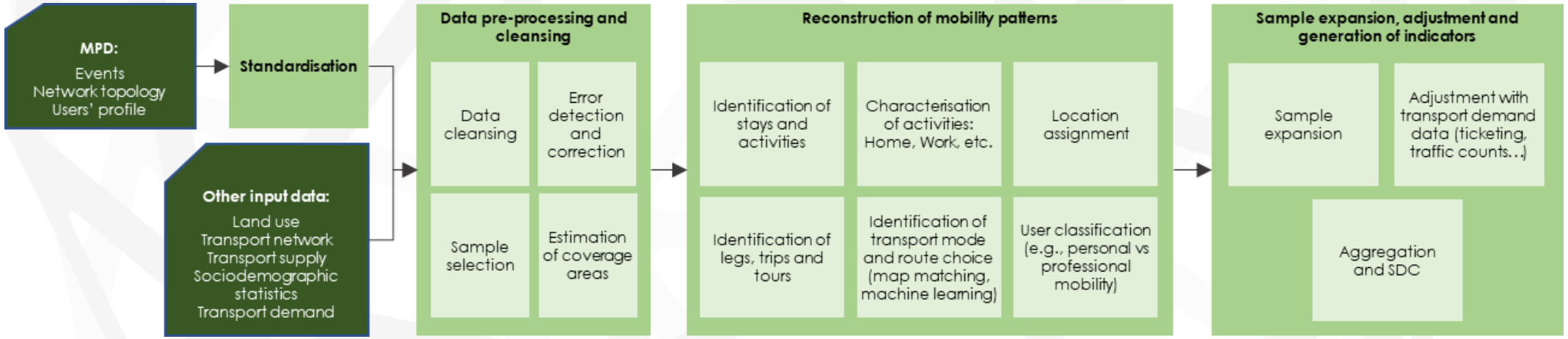
MPD can help overcome these limitations.

The COVID-19 crisis made the value of this technology even more apparent, due to both the difficulties to perform traditional field work and the need to monitor mobility patterns on a more frequent basis than that enabled by traditional methods.

Methodological aspects: the importance of validation

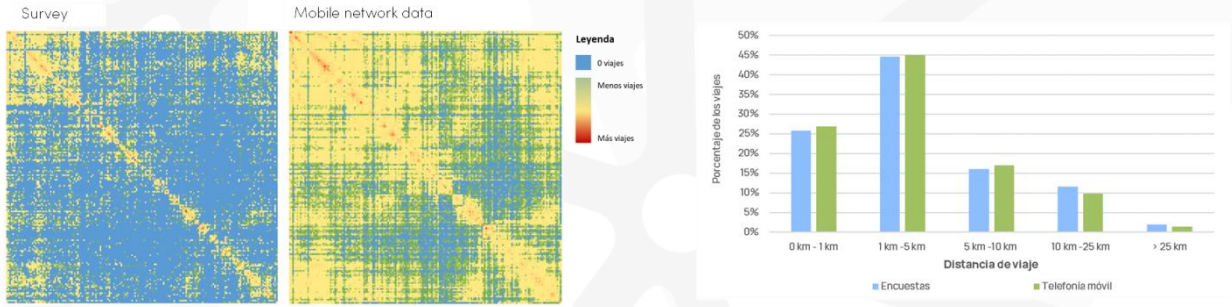
Numerous validation experiments performed over the past ten years show that, if appropriately processed, MPD can provide high-quality mobility information

- No standard methodology: the basic principles are well-known, but the devil is in the details
- Different methodologies → different results: importance of validation in a real environment

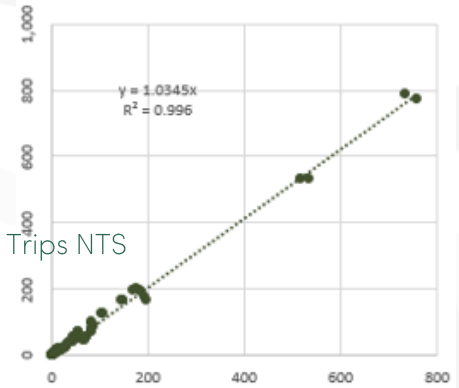


Validation experiments

Comparison with HTS in Valencia, Spain



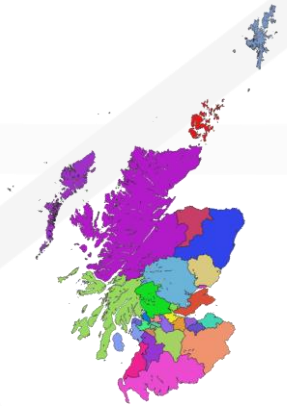
Comparison with UK National Travel Survey



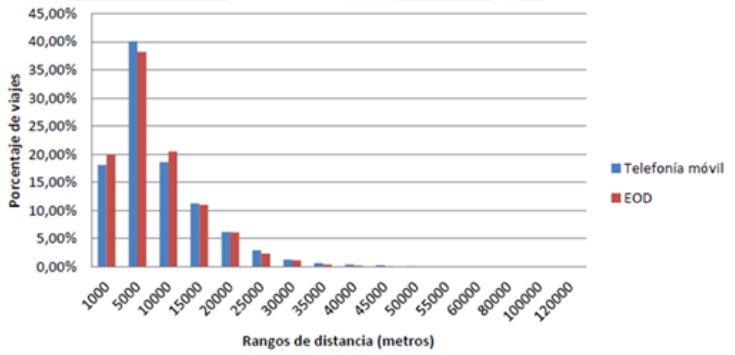
Comparison with Scotland's Transport and Travel Survey

Nommon data	Highlands/Islands	Grampian	Tayside	Central	Fife	Edinburgh	Lothians	Glasgow	Dunbartonshire / Argyle and Bute	Renfrewshire / Inverclyde	North Lanarkshire	South Lanarkshire	Ayrshire	Borders / Dumfries & Galloway
Journey Origin (Council Grouping)														
Highlands/Islands	95,4	1,8	0,4	0,2	0,1	0,2	0,1	0,4	0,7	0,1	0,4	0,1	0,1	0,1
Grampian	1,0	96,8	1,6	0,1	0,1	0,1	0,0	0,1	0,0	0,0	0,1	0,0	0,0	0,0
Tayside	0,2	2,1	87,8	1,3	6,0	0,8	0,3	0,4	0,2	0,2	0,3	0,4	0,1	0,1
Central	0,1	0,1	1,7	80,6	4,1	2,4	3,1	1,7	2,0	0,5	2,4	0,9	0,3	0,1
Fife	0,1	0,1	7,2	3,7	79,3	5,1	2,8	0,6	0,2	0,1	0,3	0,2	0,1	0,1
Edinburgh	0,1	0,1	0,5	1,4	3,0	81,9	10,5	0,8	0,2	0,1	0,4	0,3	0,1	0,7
Lothians	0,1	0,1	0,5	2,7	2,8	15,8	72,6	0,7	0,3	0,3	1,5	0,9	0,1	1,7
Glasgow	0,1	0,2	0,2	0,9	0,4	0,5	0,5	70,6	6,2	8,1	4,2	6,6	1,5	0,1
Dunbartonshire / Argyle and Bute	0,7	0,1	0,3	2,6	0,1	0,4	0,2	15,5	59,0	13,5	4,6	1,0	2,0	0,1
Renfrewshire / Inverclyde	0,1	0,0	0,2	0,6	0,1	0,3	0,3	17,7	11,3	60,8	1,2	3,7	3,3	0,4
North Lanarkshire	0,0	0,1	0,2	2,6	0,3	0,8	1,6	7,9	3,6	1,0	70,7	10,5	0,5	0,1
South Lanarkshire	0,1	0,1	0,2	1,1	0,2	0,7	1,2	14,4	0,7	3,7	11,5	64,1	1,3	0,8
Ayrshire	0,0	0,3	0,1	0,3	0,1	0,2	0,2	3,3	1,8	3,2	0,8	1,6	87,3	0,8
Borders / Dumfries & Galloway	0,1	0,3	0,2	0,2	0,2	2,2	2,7	0,4	0,2	0,7	0,6	1,8	1,2	89,4

Transport survey data	Highland / Islands	Grampian	Tayside	Central	Fife	Edinburgh	Lothians	Glasgow	Dunbartonshire / Argyll & Bute	Renfrewshire / Inverclyde	North Lanarkshire	South Lanarkshire	Ayrshire	Borders / Dumfries & Galloway
Journey Origin (Council Grouping)														
Highland / Islands	96,8	1,6	0,2	0,1	0,2	0,2	0,1	0,2	0,1	0,2	0,1	0,0	0,0	0,0
Grampian	0,9	97,2	1,1	0,0	0,1	0,2	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0
Tayside	0,1	1,2	93,1	0,7	2,9	0,7	0,3	0,3	0,1	0,2	0,0	0,1	0,0	0,1
Central	0,1	0,0	1,2	85,5	1,5	1,9	2,6	2,8	1,0	0,4	1,9	0,5	0,2	0,2
Fife	0,1	0,1	4,1	1,5	88,3	3,3	1,1	0,4	0,1	0,3	0,1	0,1	0,1	0,0
Edinburgh	0,1	0,2	0,6	1,1	2,1	82,6	9,6	1,0	0,1	0,2	0,4	0,6	0,1	0,8
Lothians	0,0	0,1	0,5	2,6	1,0	15,8	75,5	0,7	0,3	0,2	1,1	0,6	0,1	0,9
Glasgow	0,1	0,0	0,2	1,3	0,3	0,9	0,3	72,1	5,9	7,7	4,0	4,6	2,1	0,1
Dunbartonshire / Argyll & Bute	0,0	0,1	0,2	1,2	0,1	0,4	0,5	15,7	75,3	2,9	2,3	0,7	0,4	0,0
Renfrewshire / Inverclyde	0,1	0,0	0,3	0,4	0,2	0,3	0,3	16,0	2,4	72,7	0,9	2,5	3,4	0,1
North Lanarkshire	0,1	0,0	0,1	2,2	0,2	1,1	1,5	10,0	2,1	1,0	73,0	8,0	0,4	0,2
South Lanarkshire	0,0	0,1	0,2	0,6	0,1	1,1	0,9	11,7	0,7	3,0	8,4	71,0	1,3	0,8
Ayrshire	0,0	0,0	0,1	0,2	0,1	0,2	0,1	4,4	0,4	3,3	0,4	1,3	88,9	0,6
Borders / Dumfries & Galloway	0,0	0,1	0,1	0,3	0,1	1,9	1,4	0,4	0,1	0,1	0,1	0,8	0,8	91,0

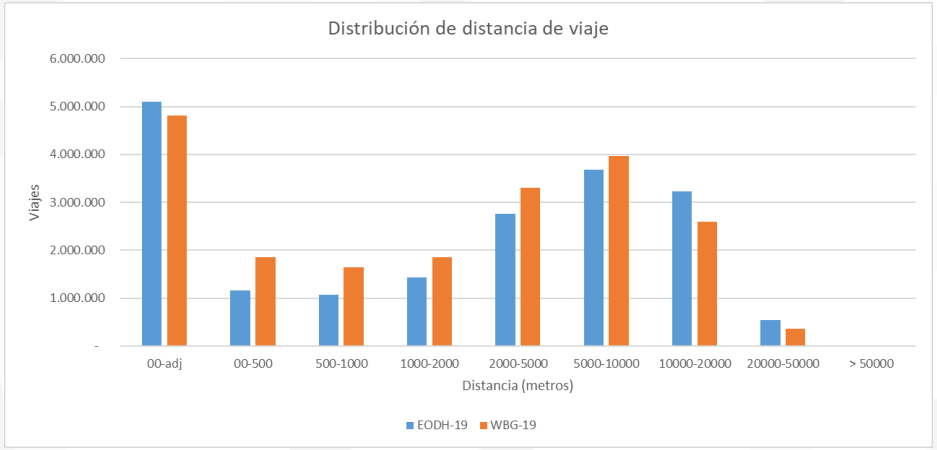


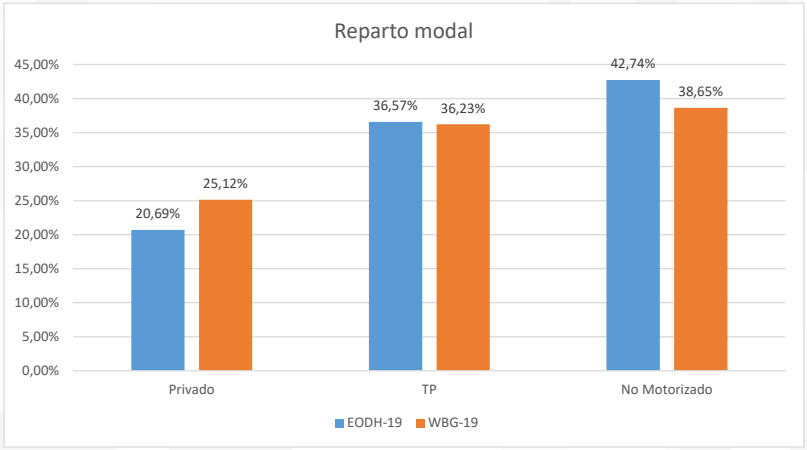
Comparison with HTS in Santiago de Chile



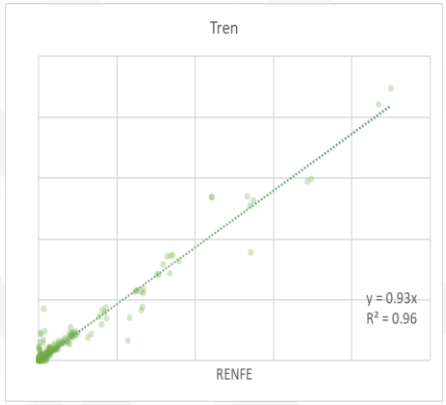
Validation experiments

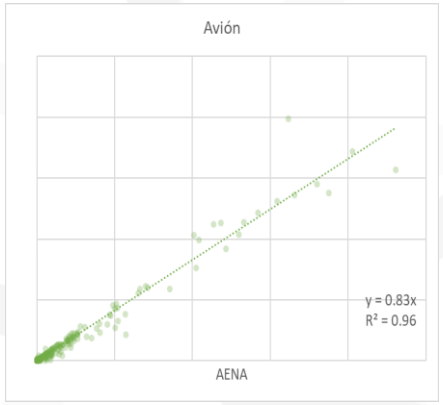
Comparison with Bogotá HTS



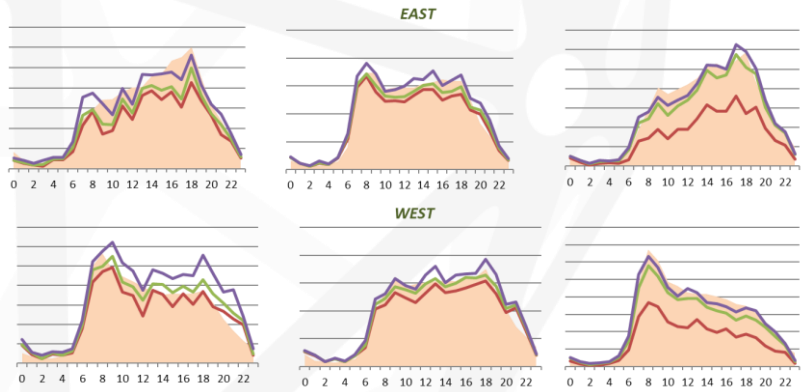


Comparison with RENFE and AENA ticketing data





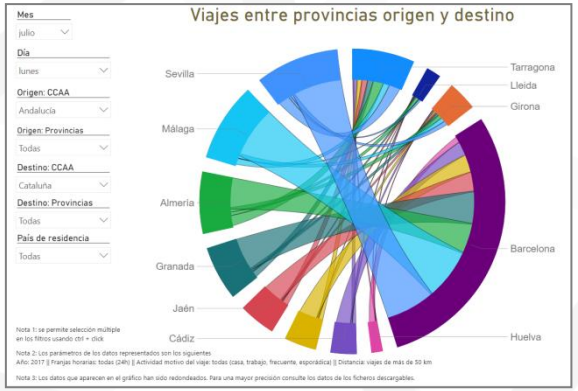
Comparison with traffic counts

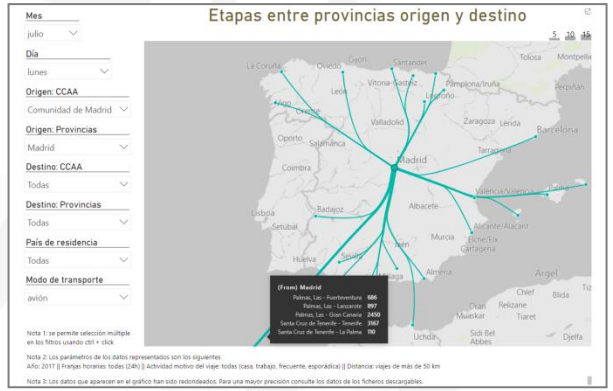


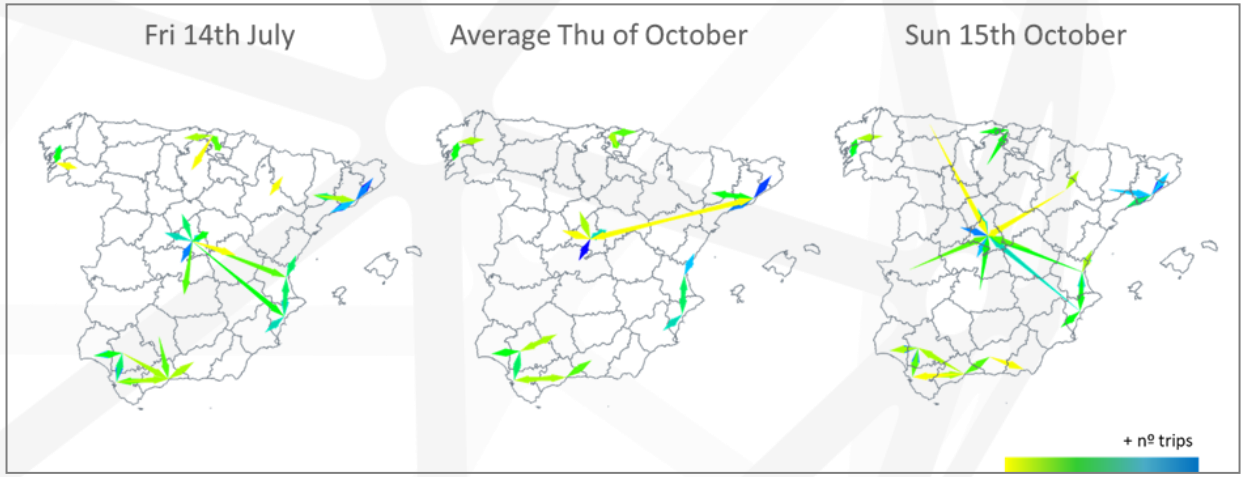
Case study 1: Analysis of passenger mobility in Spain

Phase 1 (2017-2018): pilot study, aimed at validating the idea of replacing the National Travel Survey by information obtained from MPD.

- Trips under study: interprovince trips
- Days of study: 60 days of 2017
- Zoning system: NUTS-3
- Products: trip matrices, leg matrices, tour matrices, route matrices
- Segmentation by transport mode: private vehicle, bus, rail, air, sea
- Other segmentations: time of the day, trip purpose, travellers' sociodemographic profile







https://www.transportes.gob.es/ministerio/proyectos-singulares/estudios-de-movilidad-con-big-data/estudios-de-movilidad-anteriores/estudio-interprovincial-2018

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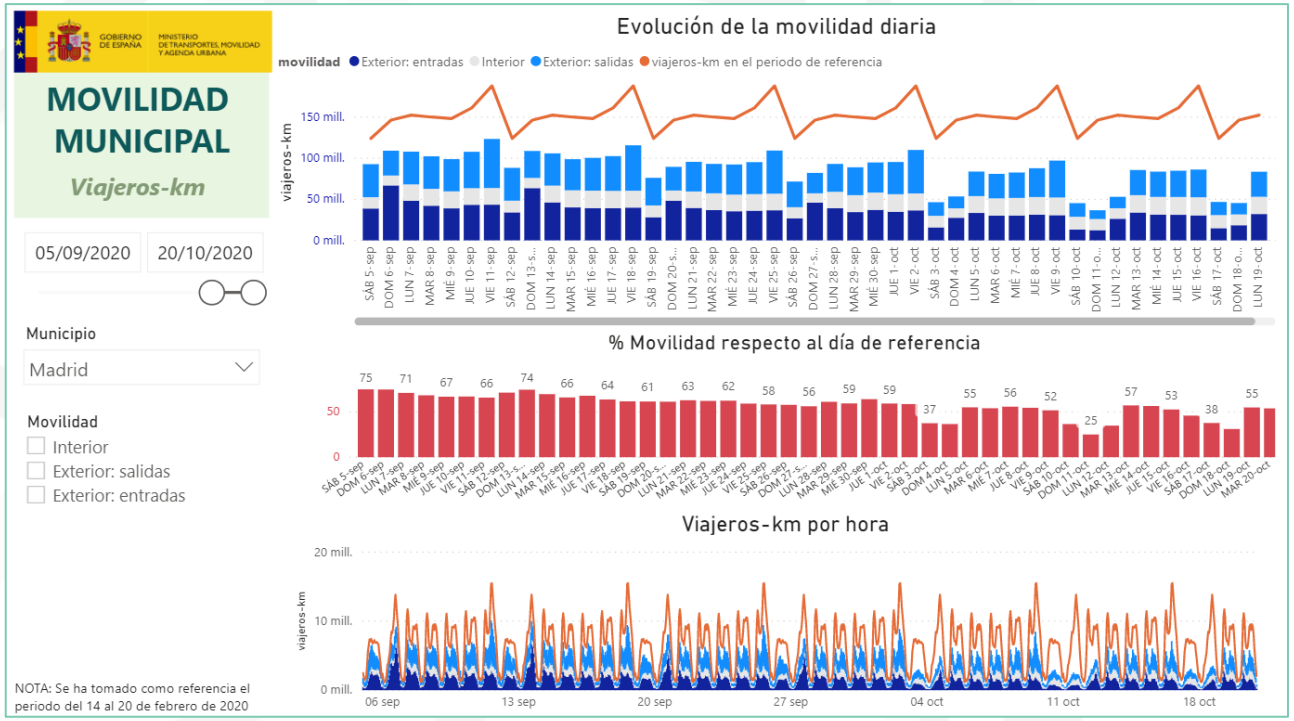
Case study 1: Analysis of passenger mobility in Spain

Phase 2 (2020-2021): mobility monitoring during the COVID-19 crisis

- Trips under study: trips longer than 500 m
- Days of study: 60 days of 2017
- Zoning system: municipality/district level
- Products: trip matrices
- No segmentation by transport mode
- Other segmentations: time of the day, trip purpose, travellers' sociodemographic profile
- Delivery term: 2-3 days within the day under study



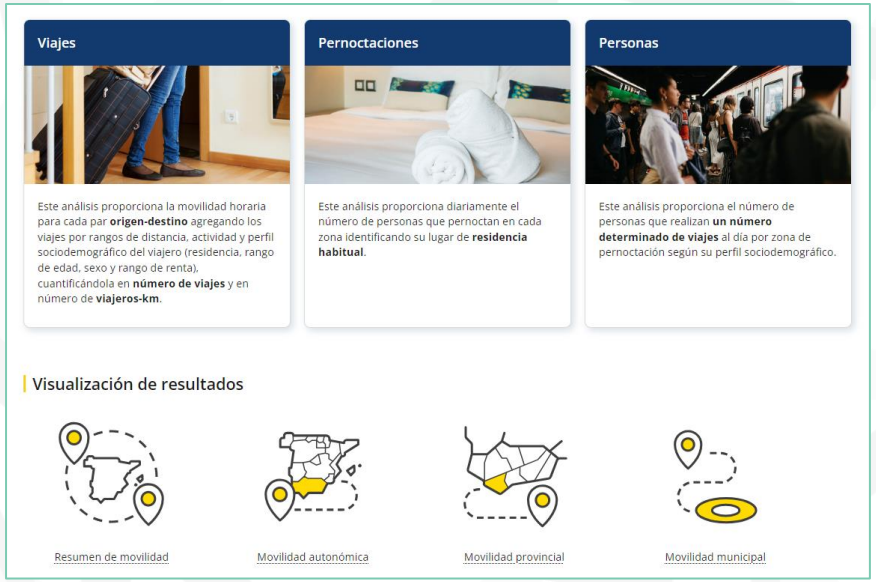
https://www.mitma.gob.es/ministerio/covid-19/evolucion-movilidad-big-data

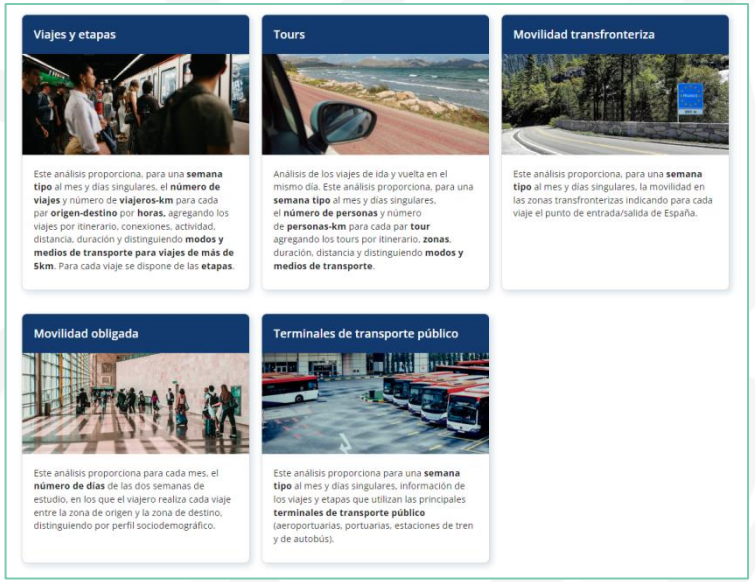
GOBIERNO DE ESPAÑA
MINISTERIO DE TRANSPORTES Y MOVILIDAD SOSTENIBLE

Case study 1: Analysis of passenger mobility in Spain

Phase 3 (2022-2025):

- Trips under study: trips longer than 500 m
- Basic studies: daily monitoring of mobility
- Advanced studies: detailed mobility studies (OD matrices segmented by mode, studies of transport hubs…)
- Route matrices





https://www.transportes.gob.es/ministerio/proyectos-singulares/estudio-de-movilidad-con-big-data

Case study 1: Analysis of passenger mobility in Spain

Case study 2: Analysis of travel demand in Bogotá, Buenos Aires, Medellín and Asunción

Phase 1: analyse the evolution of mobility patterns from 2019 through 2021 in Bogotá and Buenos Aires to identify the changes caused by the COVID-19 pandemic

- Development of a methodology for the estimation of OD matrices segmented by transport mode (private, public, non-motorised) from the fusion of MPD, travel surveys and public transport smart card data.
- Methodology later on applied to other Latin American cities, such as Medellín and Asunción.

https://www.nommon.es/case-studies/monitoring-travel-demand-bogota-buenos-aires-world-bank-transit-insights/

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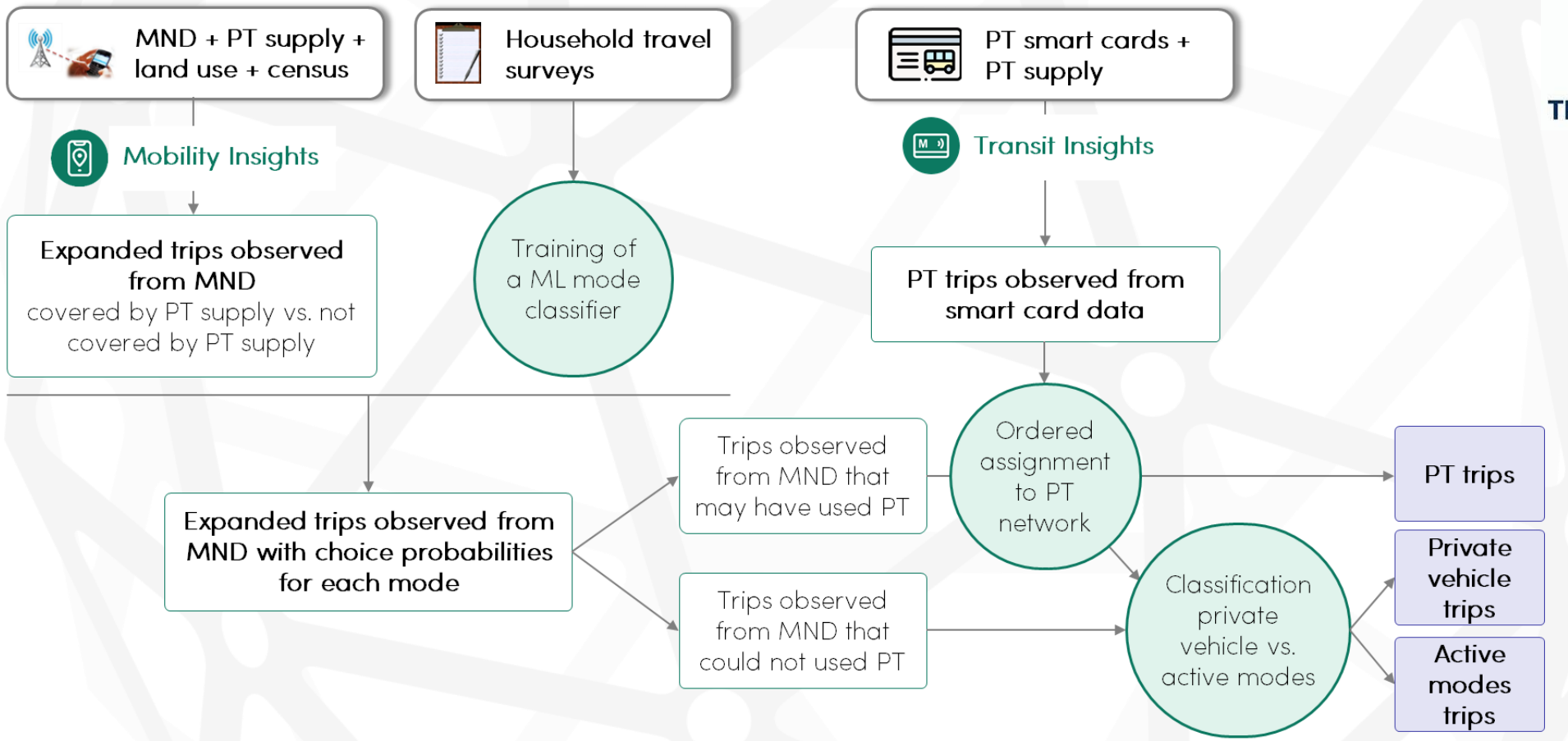
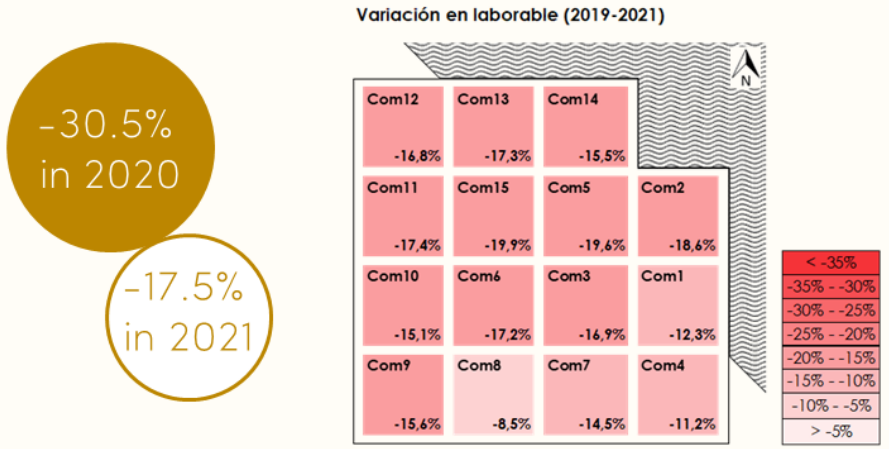
Case study 2: Analysis of travel demand in Bogotá, Buenos Aires, Medellín and Asunción

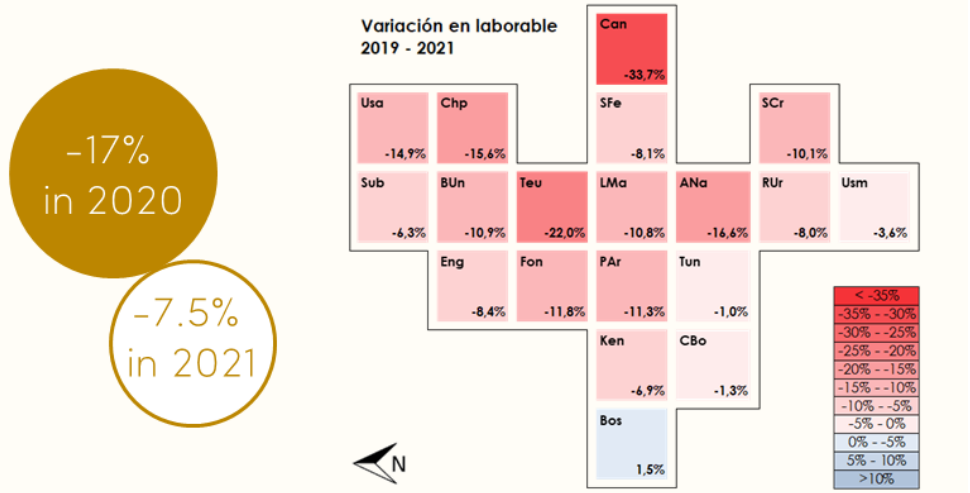


Case study 2: Analysis of travel demand in Bogotá, Buenos Aires, Medellín and Asunción

Trip generation in Buenos Aires



Trip generation in Bogotá



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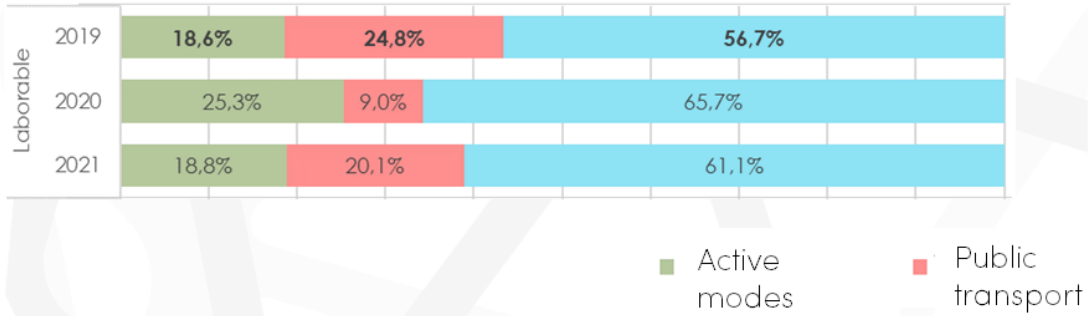
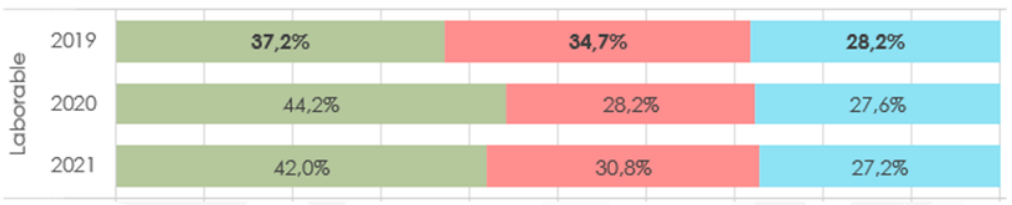
Case study 2: Analysis of travel demand in Bogotá, Buenos Aires, Medellín and Asunción

Modal split in Buenos Aires



Modal split in Bogotá



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MPD and travel behaviour analysis: conclusions

Complementary data source	→	Main data source
Cross-sectional studies	→	Continuous monitoring
Independent analysis of different sources	→	Data fusion
Input for traditional models	→	New travel demand models

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