International Transport Forum

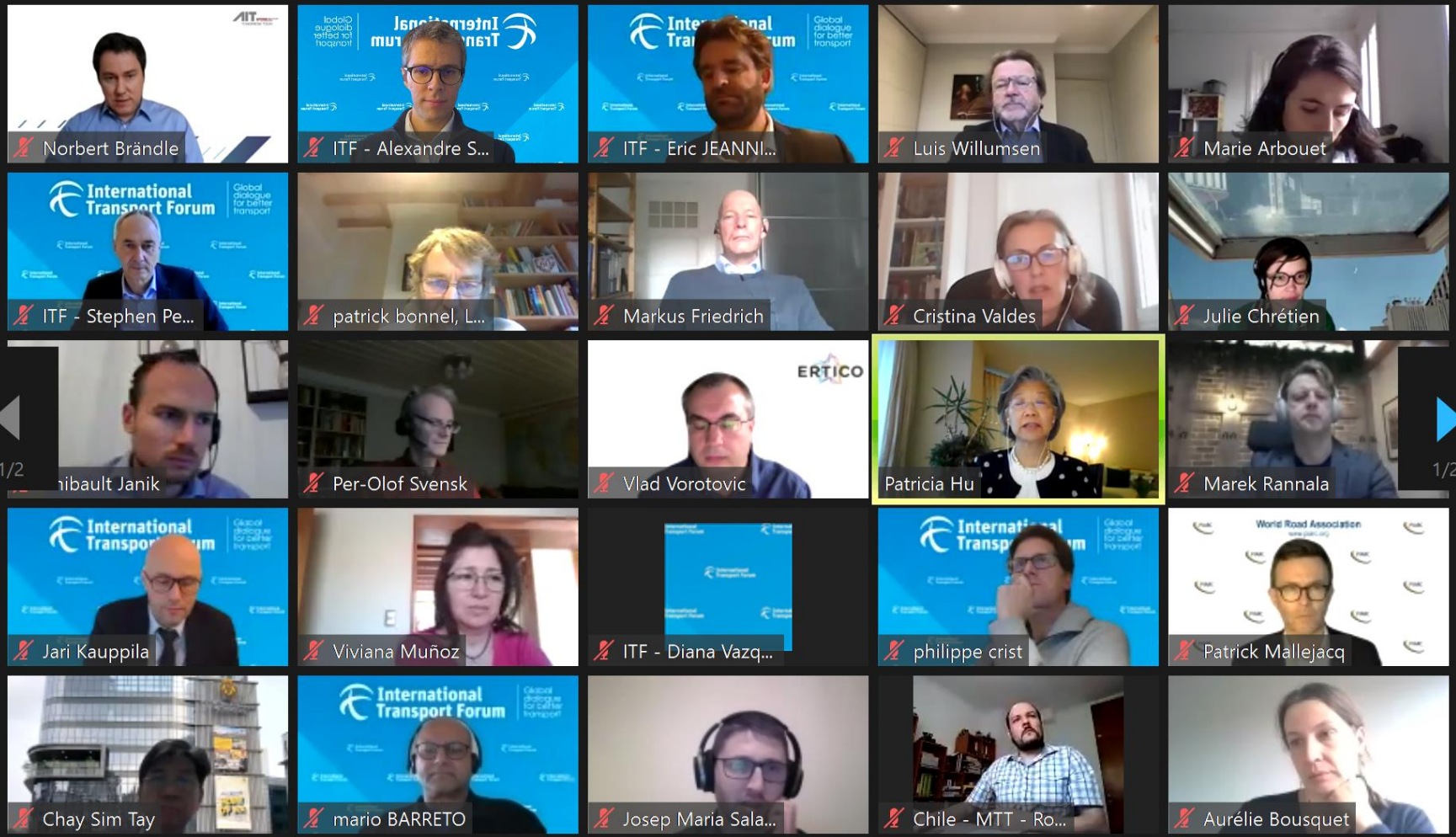
Big Data for Travel Demand Modelling

ITF Roundtable

Alexandre Santacreu, Policy Analyst

ITF Transport Statistics Meeting, 21 October 2021, Paris

OECD


Norbert Brändle
ITF - Alexandre S...
ITF - Eric JEANNI...
Luis Willumsen
Marie Arbouet
ITF - Stephen Pe...
patrick bonnel, L...
Markus Friedrich
Cristina Valdes
Julie Chrétien
ibault Janik
Per-Olof Svensk
Vlad Vorotovic
Patricia Hu
Marek Rannala
1/2
1/2
Jari Kauppila
Viviana Muñoz
ITF - Diana Vazq...
philippe crist
Patrick Mallejacq
Chay Sim Tay
mario BARRETO
Josep Maria Sala...
Chile - MTT - Ro...
Aurélie Bousquet

Roundtable discussion

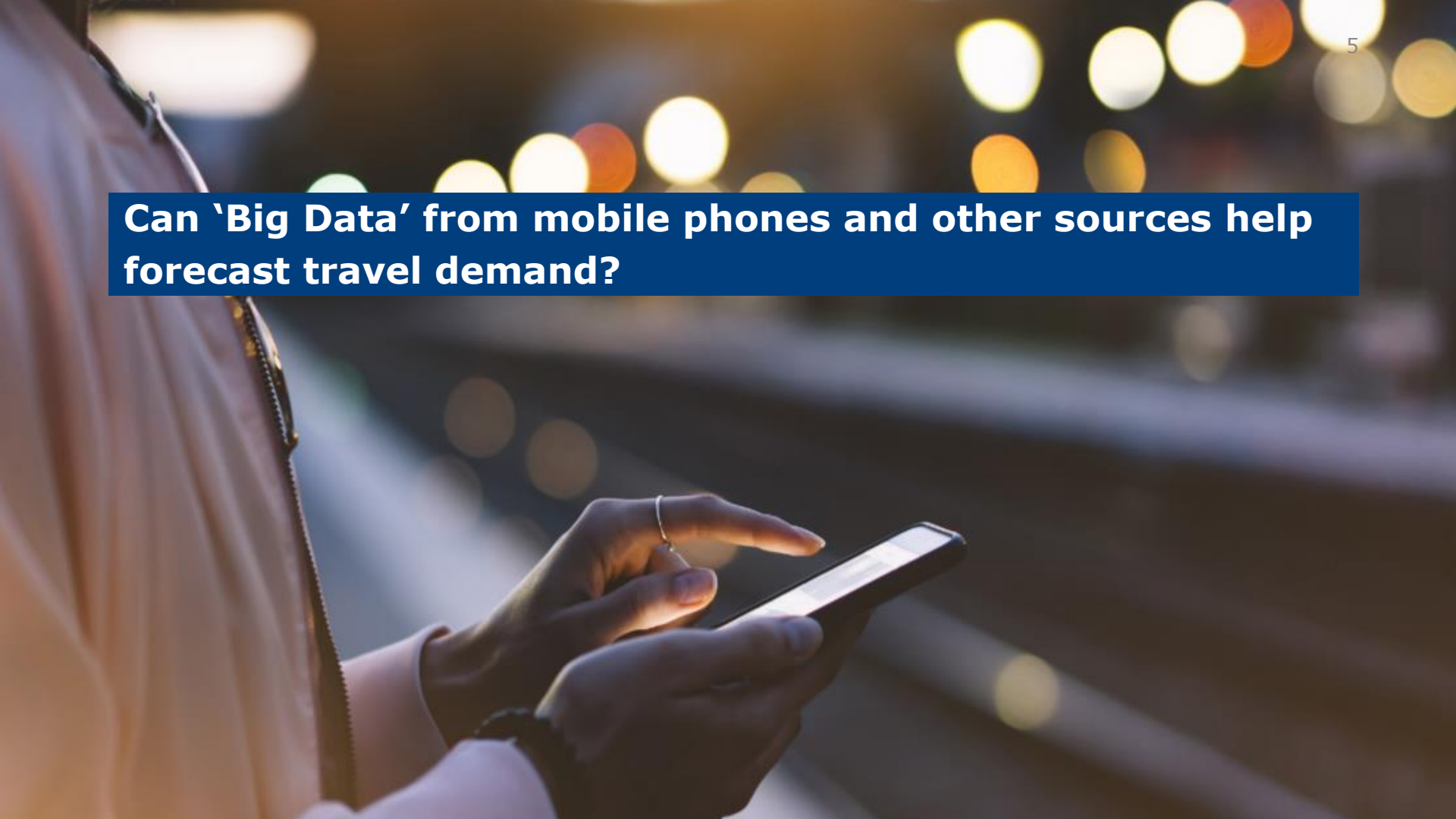
- Roundtable meeting on **14-16 December 2020**, with participants from **28 organisations (14 countries)**
- Authors of **4 discussion papers** presented their findings, based on using mobile signal, smartphones apps and smart cards in transportation planning
  - Patrick Bonnel (University of Lyon),
  - Norbert Brändle (Austrian Institute of Technology),
  - Imane Essadeq and Thibault Janik (Systra), and
  - Luis Willumsen (Nommon Solutions and Technologies).

Working group on Big Data

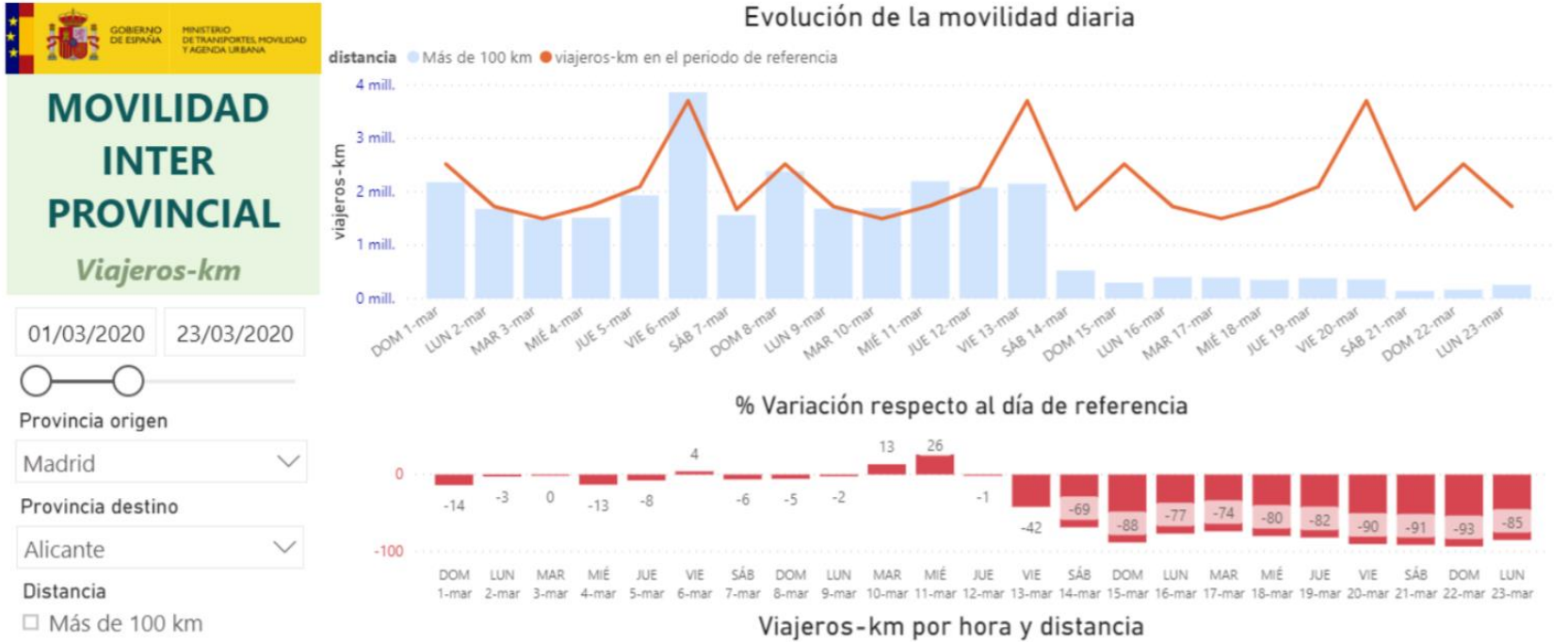
- Took on board the conclusions of the **ITF "Big Data" working group** (Austria, Canada, Finland, France, Greece, Italy, Netherlands, Norway, Serbia, United Kingdom, United States and UNECE).

- Chair: Patricia Hu,
  Director of the Bureau of Transportation Statistics, US Department of Transportation

Can ‘Big Data’ from mobile phones and other sources help forecast travel demand?



Planners already use big data to complement traditional sources



Planners already use big data to complement traditional sources

- **Mobile network data** best captures long-distance trips
- **Smartphone app data** offer higher spatial accuracy and are more likely to infer transport mode, capture short-distance trips and detect short activities.
- **Vehicle telematics** and **smart-card data** are very precious data sources but fail to capture door-to-door journeys.

Continuous sampling, large samples, immediate availability

Strengths and weaknesses of big data:

(+) Low latency

(+) Large sample

(-) Data is rarely shared

(-) Data protection is problematic

(-) Often impossible to know if a sample is representative

International Transport Forum

How to share and access big data?

- The private sector collects much of the big data relevant to transport planners
- Need for partnerships
- Privacy is often cited as the #1 barrier

Big data can complement but cannot replace traditional travel surveys

- can respond to new transport planning questions
- misses valuable socio-demographics information collected in household travel surveys
- often lacks transparency and documentation

1. Protect private and commercial data

Collect data only for defined purposes and only the minimum required:

- **Purpose specificity** ensures that data is collected solely for a precise regulatory task.
- **Data minimisation** gives preference to the lightest possible data collection mechanism.

Deploy privacy protection techniques:

- aggregation, pseudonymisation, encryption and privacy impact assessments
- "safe answers" approach - partners exchange only query results instead of raw data

2. Develop guidelines for the use of big data in transport models

- Technical transport modelling guidelines
- Encourage use of big data and prevent misuse
- Country specific data sources and legal frameworks

3. Smartphone ecosystems should enable the collection of location data through apps

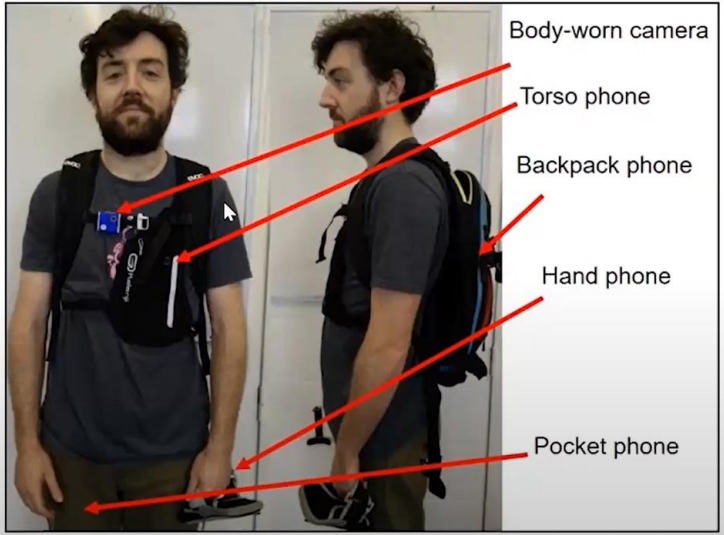
- Apps that collect **location data**: on-demand transport and ticketing apps, dedicated travel survey apps, journey planners, and apps trading location data against a free service
- A **marketing ID** helps aggregate location data coming from the same device through different apps

4. Define a roadmap for household travel surveys

- Collect socio-demographic, behavioural and attitudinal information.
- Validate and re-calibrate big data analytics.
- Maintain and further improve the quality of household travel surveys.
- Declining response rates.
- Potential for **data fusion** with sources such as ticketing, mobile phone signal and smartphone app data
- Design and test **smartphone-assisted** household travel surveys

5. Leverage artificial intelligence for data mining

- Infer trip details from mobile network data and smartphone sensors
- A task that AI could perform
- Sussex-Huawei Locomotion Challenge , invites researchers to identify eight modes of transport based on smartphones' GPS, Wi-Fi and mobile network data.



(http://www.shl-dataset.org)

6. Create and promote a recognised data steward function in the public and private sectors

- Both public and private organisations should designate "data stewards"

  individuals or teams who proactively initiate, facilitate and co ordinate data-sharing partnerships.

- They will initiate pilots and scale them up, promote the exchange and reuse of data in the public interest, and protect potentially sensitive information

7. Invest in the data-related training of the public-sector workforce

Expertise is needed to protect privacy, set up the right governance frameworks and make the right technical choices.

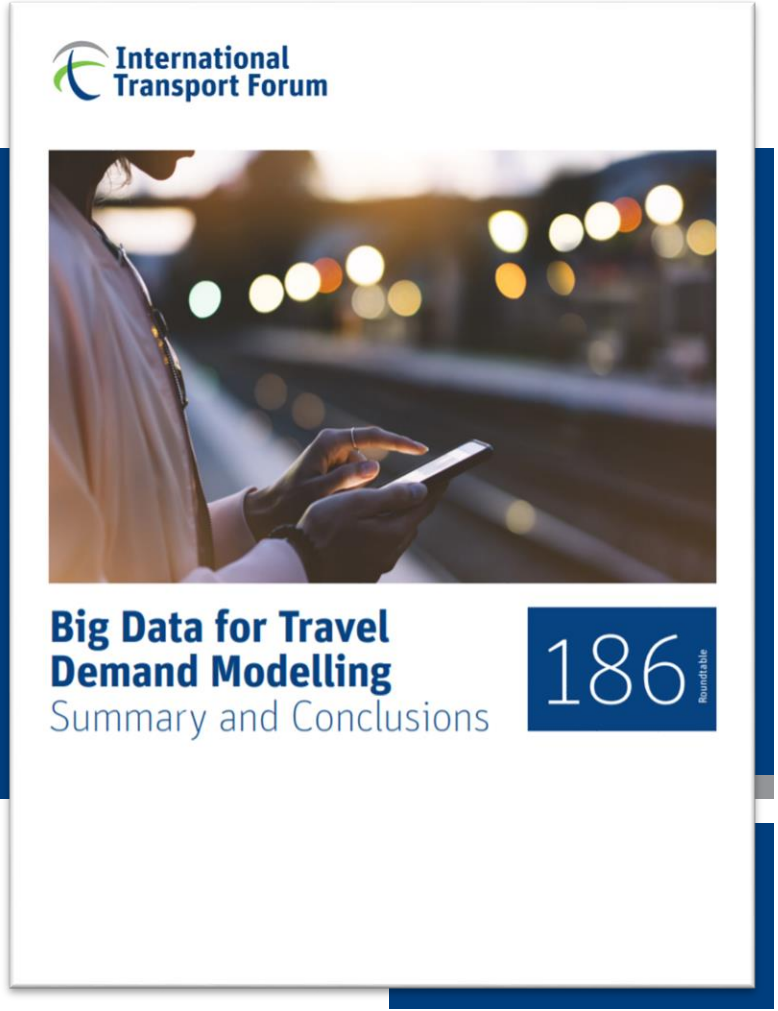
Authorities should:

- **Recruit** big data specialists for transport planning
- **Train** public-sector workers in relevant skills
- **Know** which data is adequate for which purpose

International Transport Forum

Thank you

Alexandre.Santacreu@itf-oecd.org



OECD