Evaluation Methodology

Methodology for Safety Impact Assessment

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Safety impact assessment in euroFOT

- A **safety impact assessment** estimates how many accidents/injuries a function potentially could prevent if it was widely deployed
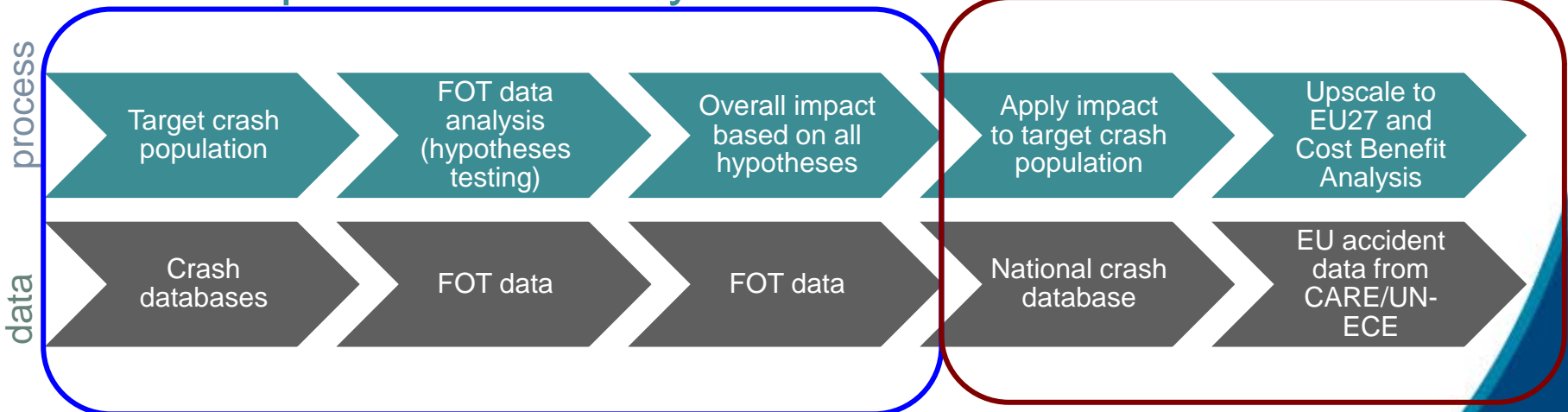
- The assessment should be:
  - ▷ Scientifically sound
  - ▷ Quantitative
  - ▷ Harmonized between VMC's
  - ▷ Suitable for CBA

Safety impact assessment in euroFOT

Two parts in analysing the impact of studied functions on safety

Empirical data analysis

Prediction of future

process

| Target crash population | FOT data analysis (hypotheses testing) | Overall impact based on all hypotheses | Apply impact to target crash population | Upscale to EU27 and Cost Benefit Analysis |

data

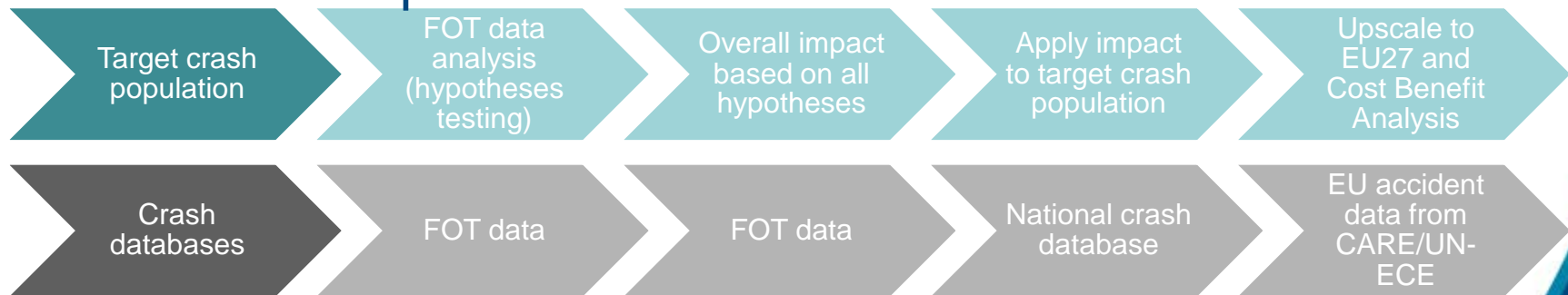| Crash databases | FOT data | FOT data | National crash database | EU accident data from CARE/UN-ECE |

Safety impact assessment in euroFOT

The term "safety impact" can be interpreted in several ways:

- Changes in crash involvement
  - (Not available in euroFOT)

- Changes in near crash (incident) involvement

- Changes in other measures with more or less clear connection to safety:
  - changes in (mean) speed
  - changes in (mean) headway
  - frequency of lane changes
  - …..

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Step 1: identify the target crash population

- Of all crashes that occur, which can the function prevent?
  - Example for LDW: crashes that start with inadvertent lane departure & vehicle speed above 60 kph & lane markers present
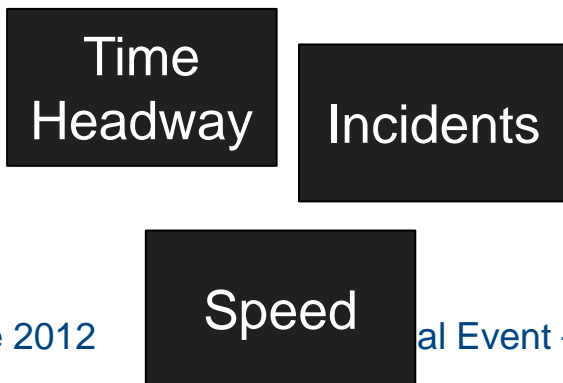
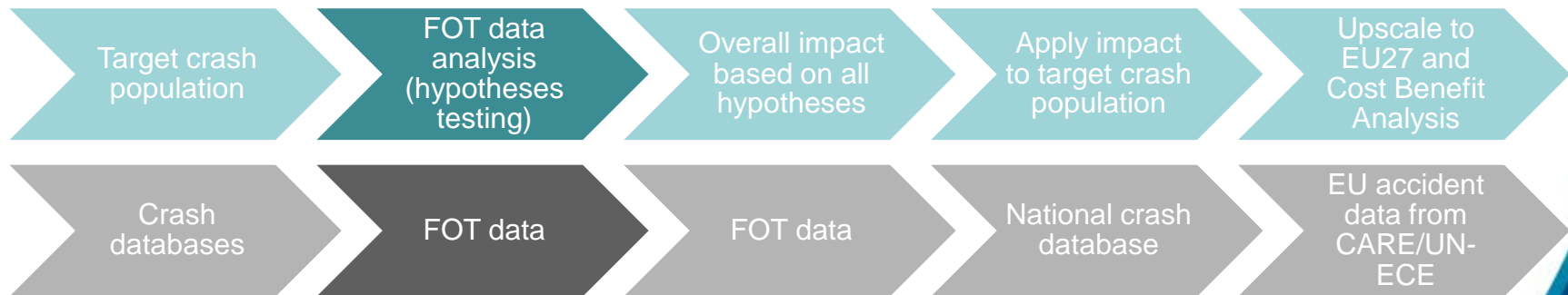| Target crash population	FOT data analysis (hypotheses testing)	Overall impact based on all hypotheses	Apply impact to target crash population	Upscale to EU27 and Cost Benefit Analysis
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STRADA **TC**

STATS19 **TC**

GIDAS **TC**

Step 2: test if function effects driver behaviour

In the collected data, can safety relevant changes between baseline (no function) and treatment (function available) be identified?

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Time Headway

Incidents

Speed

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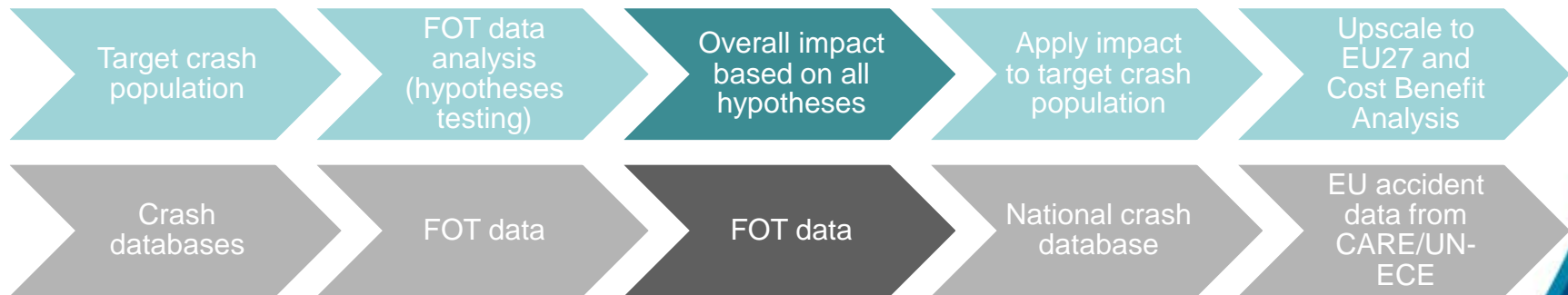# Two approaches to data

- **Event based analysis**
  - ▷ For time discrete events (incidents, hard brakings, etc)
    - ▷ Identify time segments which contain types of events that is thought to predict crashes
    - ▷ Compare frequencies in baseline and treatment
    - ▷ Can also be applied in simulation

- **Aggregation based analysis**
  - ▷ Function influence on continuous variables (speed, etc)
    - ▷ Take longer recorded time segments for interesting variables
    - ▷ Compute average value over time segments
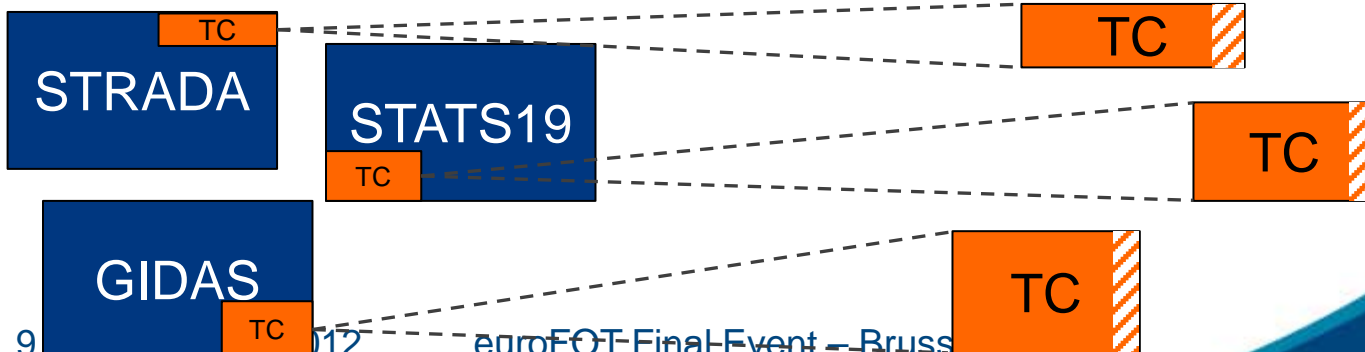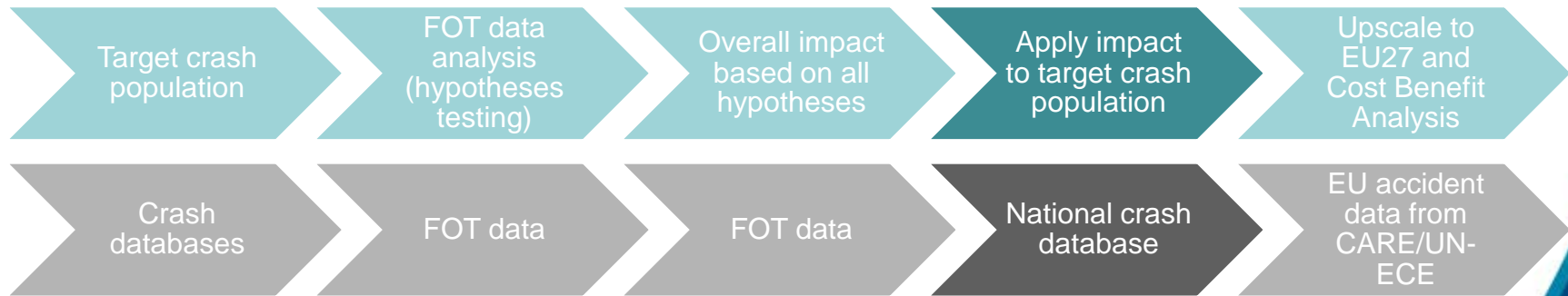   - ▷ Compare overall averages in baseline and treatment

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Step 3: if there are empirical differences, what is the overall interpretation?

- If some indicators are positive, some neutral and some negative, how should they be combined?

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| Longer time headway | + | fewer incidents | + | higher speed | = ????? |

Step 4: if a function's overall effect is judged positive, how would the target crash population change if all vehicles in the countries where it was evaluated had it?

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TC

TC

TC

Step 5: take the average "local" impact and project on EU-27

ℰ Given the predicted crash population change in the countries where the function was evaluated, how could other countries be expected to change?

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CARE/ UN-ECE
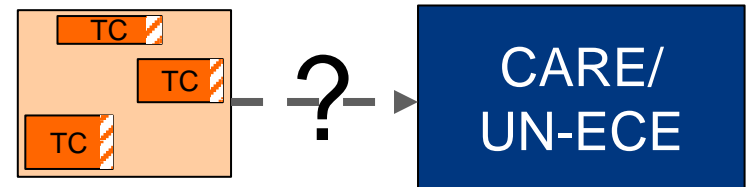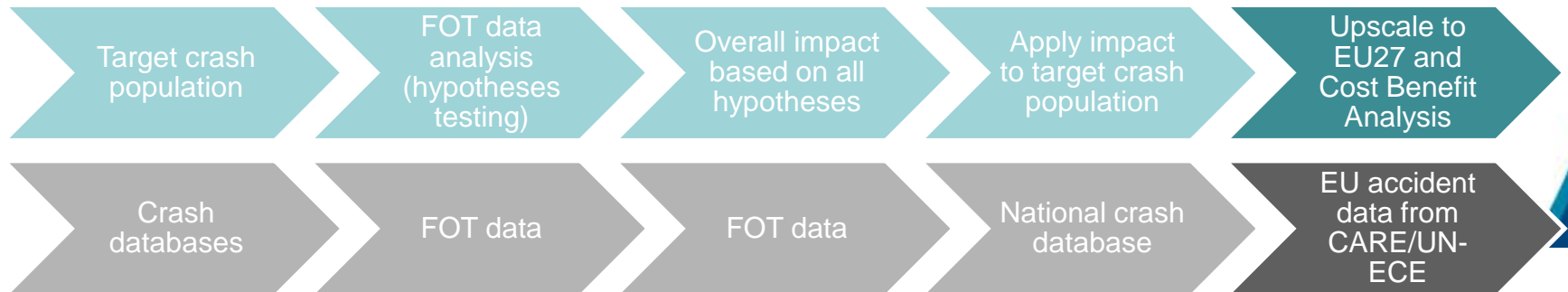
Safety Impact Assessment is a challenge and a leap of faith!

- When using non-crash data to predict future crashes, you have to assume that your indicators are causally predictive of crashes
- Today, no generally agreed indicator set exists (our knowledge on crash causation is insufficient)
  - Different studies/approaches make different assumptions
    - VTTI (100 car) - Kinematic state + gaze behaviour is predictive
    - Alcolock – Intoxication is predictive
    - Speed limiter – High speeds are predictive
    - euroFOT – Hard brakings and time headway are predictive
- Results should be used with caution!

8 Functionalities, 28 Partners, 1000 Vehicles
1 Field Operational Test, **8 Functionalities**
28 Partners, 1000 Vehicles, 1 Field Operational Test
8 Functionalities, **28 Partners**, 1000 Vehicles
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SEVENTH FRAMEWORK PROGRAMME

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