German Technical Cooperation
nsport and Climate Change

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Why Transport Policies Need Reliable “Data”

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Germany

Regional Scoping Workshop on Sustainable Transport Indicators

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A Definition of an indicator

- An indicator is a **variable**, which is selected for its ability to **represent** a wider **phenomenon of interest**; which is measurable in corresponding **value units**, and which supports **interpretation, evaluation** or **action** with regard to the phenomenon of interest

- Based on the Latin verb ***indicare***:, meaning to point out, to announce, to give notice of, to determine, to estimate, to **betray**….

Source: Hendrik Gudmundson DTU Transport, Technical University of Denmark

Good data are weapons in the hands of the ones which wants to change for a more sustainable future

For what we need data? (1)

We need data to describe to status of the environment impact caused by the traffic.
This means e.g. the total amount of carbon dioxide per country or the concentration of NO2 in the urban air.
Or the information how many people live on streets with a noise level of more than 65 db(A) day time average

For what we need data? (2)

We need data to forecast the development of the environment impact caused by the traffic.
For this we need e.g. reliable emission factors for all relevant pollutants and greenhouse gases. But in addition we need also information on the transport development, e.g. a forecast how much kilometer are driven by different vehicle categories on all road categories.

For what we need data? (3)

We need data to evaluate the impact of the implementation of decisions in the past in order to see the level of enforcement.
Very often legislation is adopted but the lack of enforcement water down the effect of the measure.

For what we need data? (4)

We need data to estimate the gap between the status quo and the status required.

This means e.g. the number of people effected by annual ambient air concentrations of pm10 higher than 20 micrometer/m3.
Or the information how many people live in a distance of more than 300m form a public transport stop.

For what we need data? (5)

We need data to describe to status of the environment impact caused by the traffic.
This means e.g. the total amount of carbon dioxide per country or the concentration of NO2 in the urban air.
Or the information how many people live on streets with a noise level of more than 65 db(A) day time average

For what we need data? (6)

We need data to estimate who is responsible for the damage caused by e.g different transport modes. Without this information it is impossible to take the most cost effective measure for a country or a city.

E.g. does a fly over improve the traffic situation and reduce the pollution? Without a transport model and detailed emission factors it is impossible to find out.

Data Collection Cost

In nearly all Asean Countries the data are either not available or the quality is so low it shouldn't be used for modeling and decision making..
The argument is the data collection is to expensive for developing countries. But one wrong decision cost a country or a city much more than to create a sound and comprehensive data set.
E.g. a city build a fly over but the modeling shows the impact to the traffic situation and the pollution level is zero the construction cost is wasted and the city skyline deteriorated. The noise of the traffic will impact due to the higher emission point negative for more people.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

OECD.Stat

Factbook Country Statistical Profiles - 2015/2016 edition

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Country				Germany				
Year				2010	2011	2012	2013	2014
Subject			Unit					
Transport	Goods transport	Inland goods transport	Tonnes-kilometres, Billions	498.951	507.815	491.866	496.644	..
	Passenger transport	Inland passenger transport	Passenger-kilometres, Billions	1 046.778	1 057.771	1 061.115	1 066.058	..
	Road fatalities	Road fatalities	Per 1 000 000 inhabitants	44.60915811	49.01117419	44.76174276	41.4033722	41.74830839
CO? emissions from fuel combustion			Tonnes, Millions	759.04	731.41	744.88	759.6	..
Sulphur Oxides Emmissions			Tonnes, Thousands	430.354	423.824	427.072	..	..
Nitrogene Oxides Emmissions			Tonnes, Thousands	1 324.934	1 289.059	1 269.256	..	..
Greenhouse gas emissions			Tonnes, Thousands	946 388.274	928 694.563	939 083.309	..	..

Country		Brazil			
Year		2010	2011	2012	2013
Subject	Unit				
CO? emissions from fuel combustion	Tonnes, Millions	370.46	389.53	422.17	452.39
Greenhouse gas emissions	Tonnes, Thousands	954 324.65	991 691	1 027 739	..

Country		Indonesia			
Year		2010	2011	2012	2013
Subject	Unit				
CO? emissions from fuel combustion	Tonnes, Millions	383.2	390.46	416.27	424.61

Emissions Inventory

Why produce an Emissions Inventory?

- provide input data for modeling the movement, deposition and effects of air pollutants
- help inform the policy makers and the public
- help define priorities and set objectives for reducing emissions
- assess the potential impacts of different reduction strategies
- evaluate the success of emission reduction programs
- forecast future emission levels to determine which emission sources might require further controls

Uses of Emission Inventories

- Preparation of strategies and regulations
- Evaluating emission trends
- Assuring compliance with regulatory/legal decisions and actions
- Use in air quality models
- Revising current air quality regulations and strategies
- Review of impact of new sources of pollution (permitting, different vehicles, etc.)
- Setting of emission fees for sources
- Establishing emission trading programs
- International reporting requirements

Area (Non-point) sources

An area or non-point source refers to any source of air pollution emitted over a relatively small area but which cannot be classified as a point source. These terms are used interchangeably. These might include household activities such as cooking and heating, small business activities, forest fires, and biogenic (natural) sources that release hydrocarbons. Biogenic sources are frequently enumerated in a separate category. Area sources can be much more difficult and time-intensive to inventory and various screening techniques are often used to estimate their emissions.

Evaporative losses/gasoline distribution, solvents

Gasoline distribution losses

- **Determine gasoline sales**
- **Estimating gasoline distribution emissions**
- **Aircraft refueling**
- **Petroleum vessel loading/unloading losses**

Stationary source solvent evaporation

- **Dry cleaning operations**
- **Surface cleaning operations (de-greasing)**
- **Surface coating**
- **Graphic arts**
- **Asphalt paving**
- **Pesticide application**
- **Commercial/consumer solvent use**
- **Synthetic organic chemical storage tanks**
- **Barge, tank truck, rail car, and drum cleaning**

Mobile sources

The following input data are required for an emission modelling:

1. **number of vehicles**
2. **vehicle fleet composition (share of light duty vehicles, separated gasoline, natural gas (CNG), liquefied petroleum gas (LPG) and Diesel, trucks differentiated between medium and heavy duty, buses differentiated between urban buses and coaches, other heavy vehicles)**
3. **vehicle age distribution**
4. **number of vehicles meeting different emission standards**
5. **information on the inspection and maintenance level**

Continue

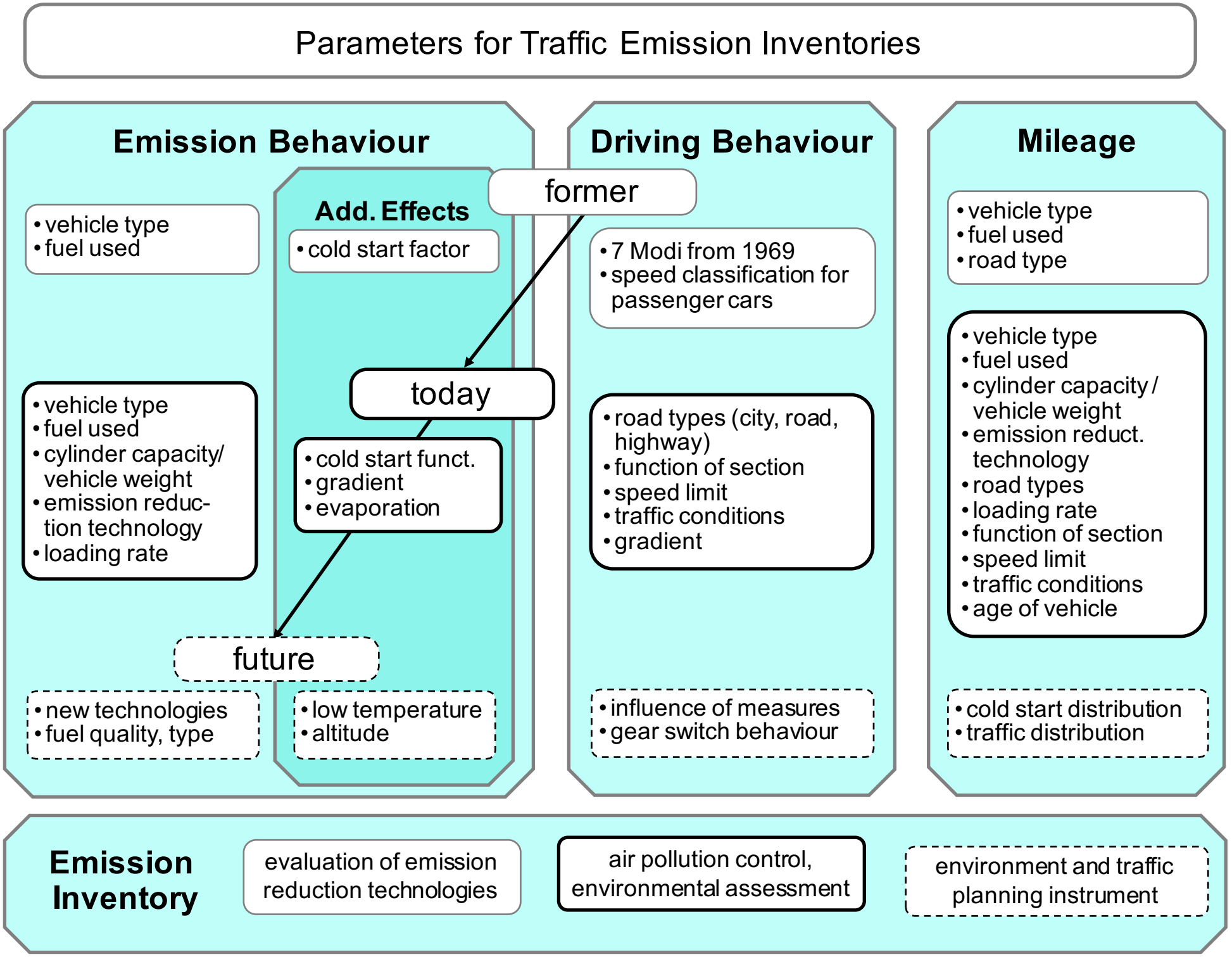
6. annual mileage for the different vehicle categories
7. vehicle speed information depending on the road category, urban, rural and highway
8. meteorological condition, day/night fluctuations, seasonal changes
9. fuel characterisation, e.g. sulphur level, vapour pressure, aromatic and alcohol content
10. total fuel consumption

These input parameters are the minimum to start an emission inventory for the mobile sector. For other parameters, default values can be used. To further improvements measured emission factors, information on driving behaviour and length of the trip should be developed. For heavy duty trucks information on the load and of the slope of the road should be evaluated. The altitude of the roads should be made available

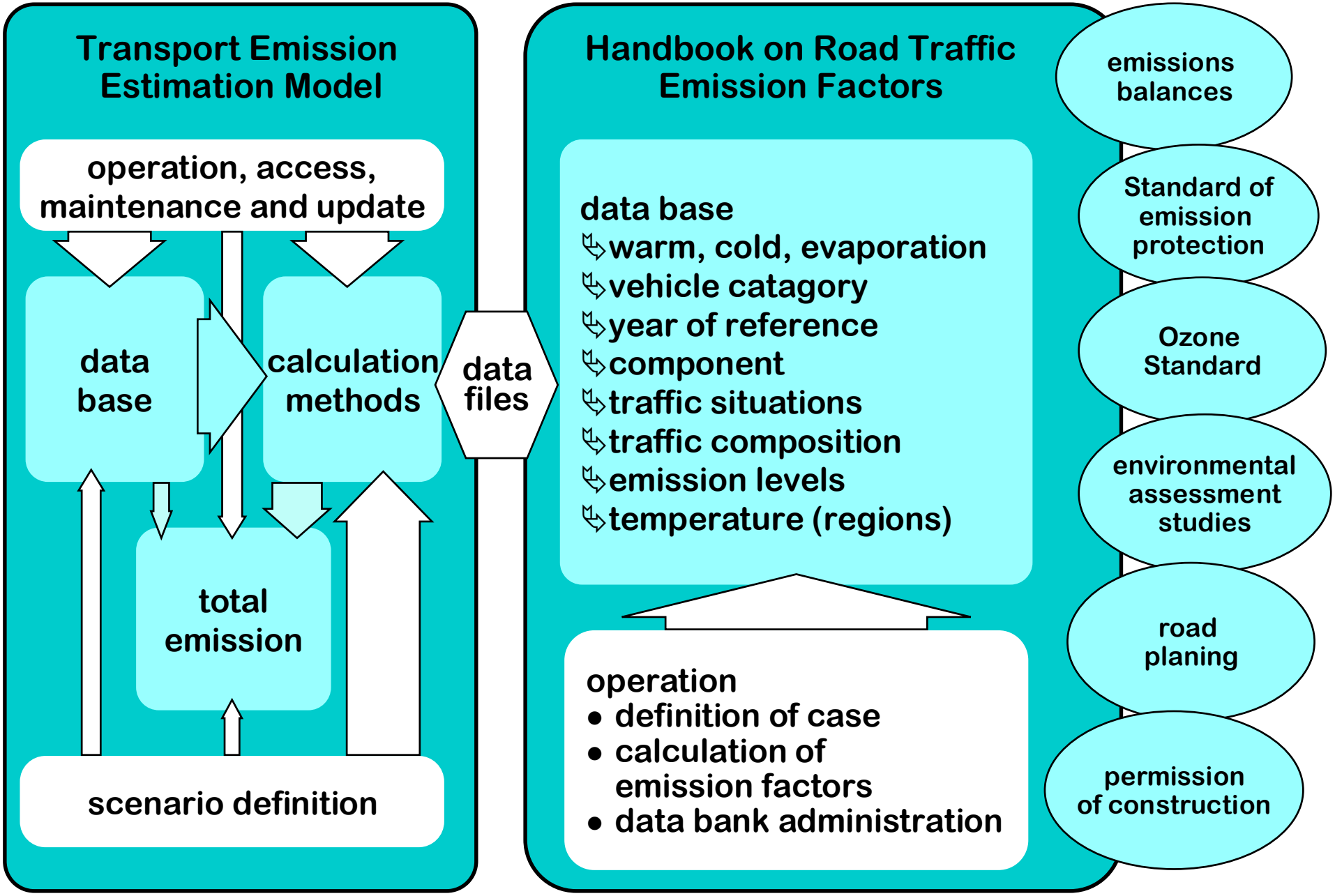
Non road sources

The non road sources include a large number of different emission sources like construction machines and equipment, tractors, locomotive, lawn mowers, boats, ships, fork lifter chainsaws, oil field equipment and many others.

It is very difficult and time consuming to establish an inventory for this sector


Parameters for Traffic Emission Inventories
Emission Behaviour
Add. Effects
Driving Behaviour
Mileage
former
today
future
• vehicle type
• fuel used
• cold start factor
• 7 Modi from 1969
• speed classification for passenger cars
• vehicle type
• fuel used
• road type
• vehicle type
• fuel used
• cylinder capacity/ vehicle weight
• emission reduc- tion technology
• loading rate
• cold start funct.
• gradient
• evaporation
• road types (city, road, highway)
• function of section
• speed limit
• traffic conditions
• gradient
• vehicle type
• fuel used
• cylinder capacity / vehicle weight
• emission reduct. technology
• road types
• loading rate
• function of section
• speed limit
• traffic conditions
• age of vehicle
• new technologies
• fuel quality, type
• low temperature
• altitude
• influence of measures
• gear switch behaviour
• cold start distribution
• traffic distribution
Emission Inventory
evaluation of emission reduction technologies
air pollution control, environmental assessment
environment and traffic planning instrument

Traffic emission inventories



Consolidation of the data base for the German Emission Inventory Methodology

Generation of Data

- Emission Factors
- Mileage
- Traffic Data
- Traffic Structure
- Auxiliary Data

Processing of the Data Base

- Parameter definition and differentiation
- Data base definition
- Developement of methodologies
  - Cold Start
  - Evaporation
  - Projection of traffic data
  - geografic / time scale resolution

Application

- National and local environmental politics
- Standard of Immission Protection
- Construction of Traffic Plants
- Environmental Assessment Studies

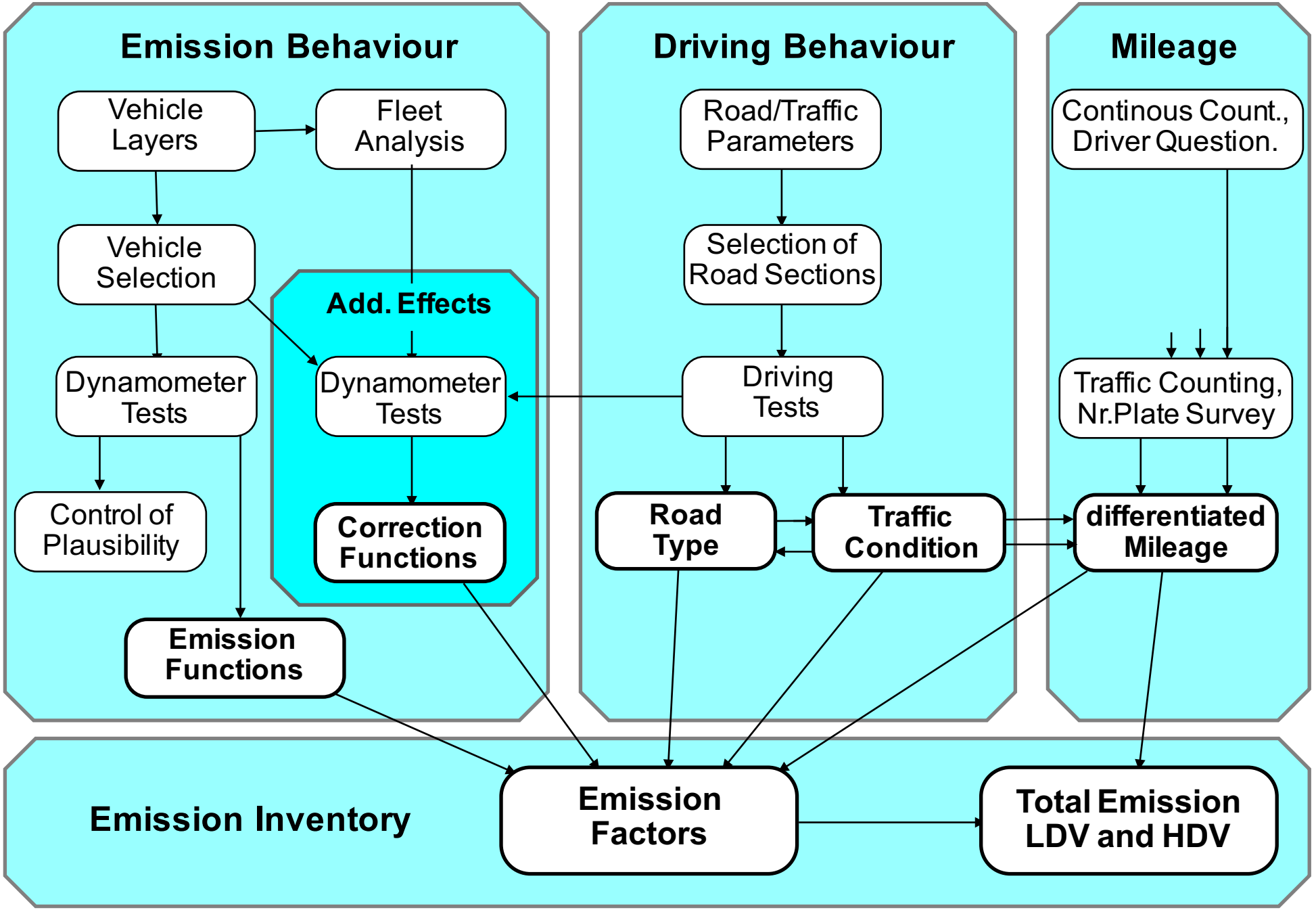
Maintainance and Update

differentiate
data according to necessities

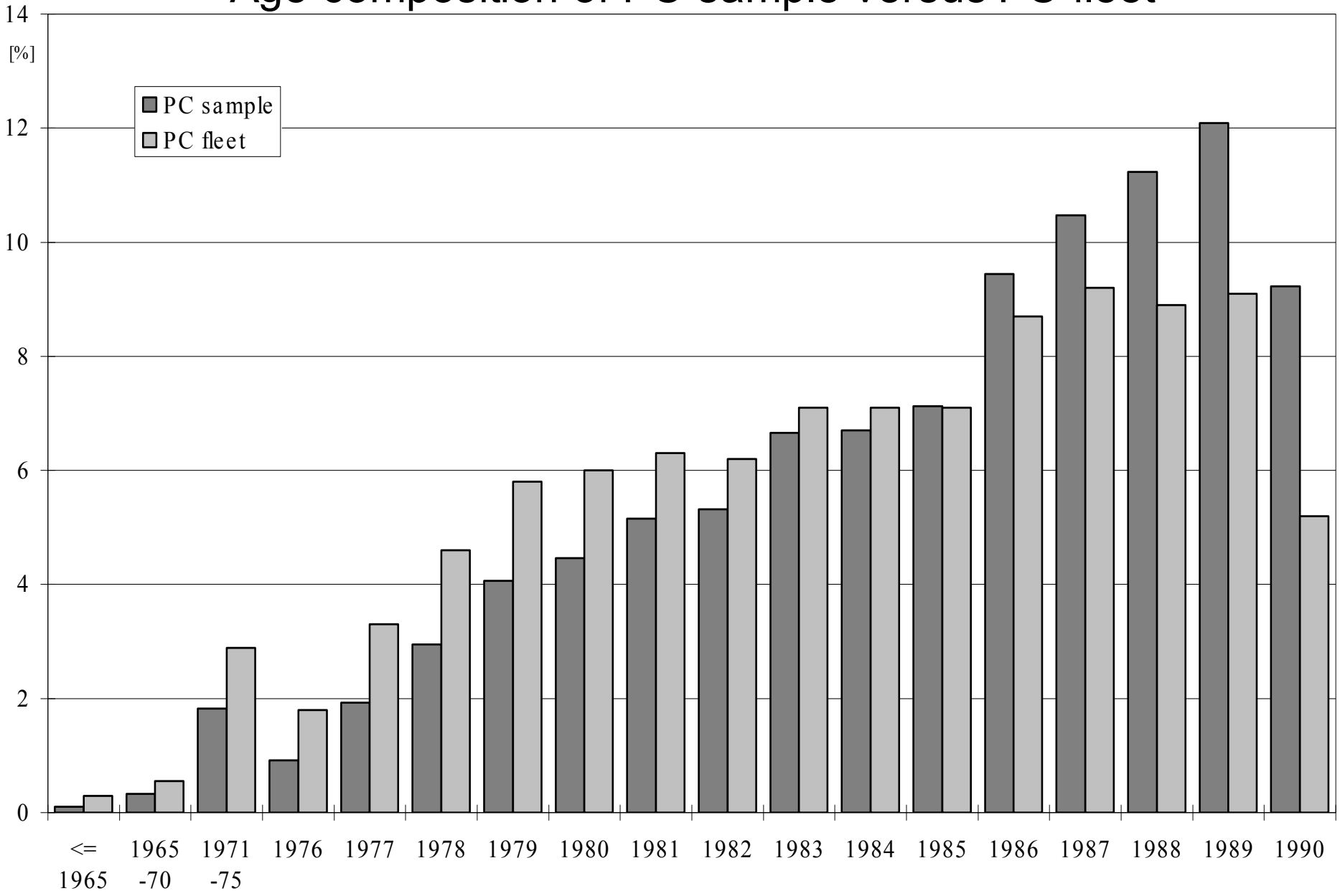
integrate
data bases and methodologies

harmonize
further fields of application

Procedure for Calculating Emission Factors



Age composition of PC sample versus PC fleet



Example of a good Data Reporting

Transport and Environment Reporting Mechanism (TERM)

The Transport and Environment Reporting Mechanism (TERM) report has been monitoring progress in integrating environmental objectives into transport since 2000. TERM 2015 is launched at the end of the year in which the European Environment Agency (EEA) launched its report *European environment: State and outlook 2015* (SOER 2015) (EEA, 2015a).

EEA Report | No 7/2015

Evaluating 15 years of transport and environmental policy integration

TERM 2015: Transport indicators tracking progress towards environmental targets in Europe

ISSN 1977-8449

European Environment Agency

Contents of the TERM Report

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