euroFOT - European Large-Scale Field Operational Test on In-Vehicle Systems

4. Tagung Sicherheit durch Fahrerassistenz
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Aria Etemad, Christoph Kessler
Ford Research & Advanced Engineering Europe

SEVENTH FRAMEWORK PROGRAMME

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Bringing intelligent vehicles to the road

Contents

- The euroFOT project
  - Objectives, functions, expected results
- Highlights for on-going activities
- Lessons learned and conclusions

History

- EU Initiative (2001): Halving fatalities by 2010
  - White paper – 'European transport policy for 2010: time to decide'
  - Road safety: Road Safety Action Programme (2003-2010)

- **F**ield op**E**rational te**S**t suppor**T** **A**ction FESTA 2008
  - Collect and publish how to do a FOT
- Field Operational Tests in FP7 research program
  - Advanced Driver Assistance Systems (euroFOT)
  - Mobile Devices (TeleFOT)
  - FOT-Net

- euroFOT
  - Proposal in Oct 2007, launched by Ford Research Aachen
  - Start in May 2008
  - 40 month duration till August 2011
  - 28 partners, 22 m € budget, 14 m € funding from EC

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Why field tests (euroFOT)?

- Intelligent Vehicles have a large potential for safer, cleaner and more efficient transport solutions
- Technologies are mature (several systems in series production)
- Limited data on real-life operation and how drivers use the systems in ordinary traffic
- This restricts our capabilities to improve the systems, understand their impacts and make the right decisions for deployment

euroFOT Objectives

- Perform multiple coordinated tests of Intelligent Vehicle Systems with **ordinary drivers in real traffic**
- Investigate performance, driver behaviour and user acceptance
- Assess the impacts on safety, efficiency and the environment, based on road data

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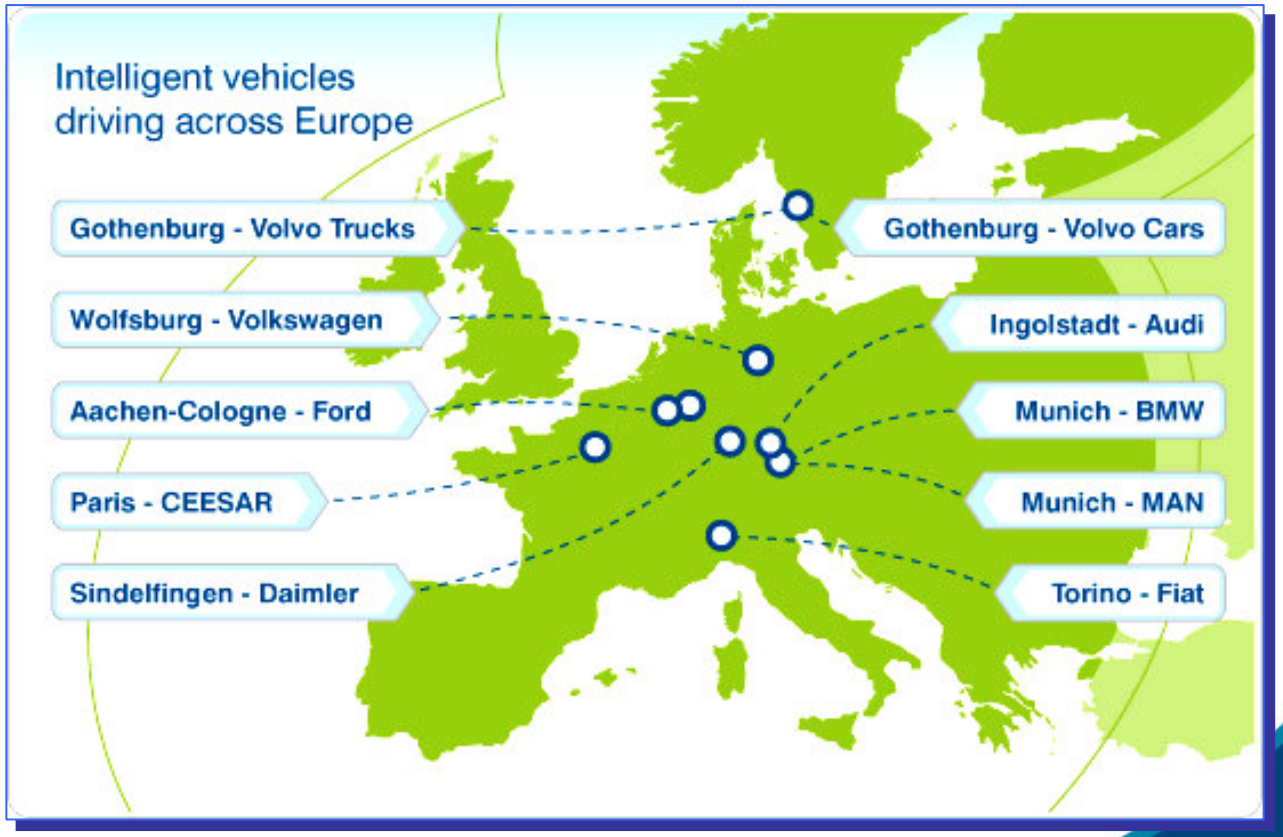
euroFOT Objectives (2)

- Consolidate a common European approach for FOTs
- Improve public awareness on the potentials of driver support functions



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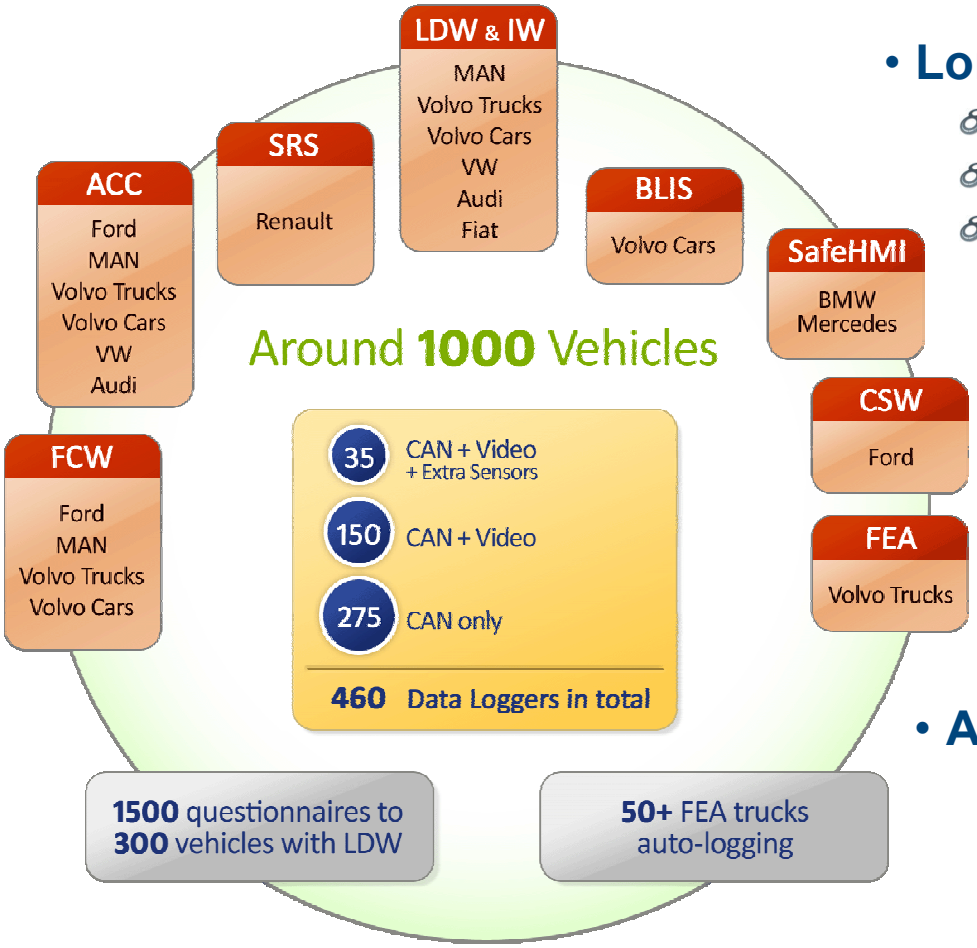
Functions under test



- **Longitudinal control functions**
  - Forward Collision Warning (FCW)
  - Adaptive Cruise Control (ACC)
  - Speed Restriction System (SRS)
- **Lateral control functions**
  - Blind Spot Information System (BLIS)
  - Lane Departure Warning (LDW)
  - Impairment Warning (IW)
- **Advanced applications**
  - Curve Speed Warning (CSW)
  - Fuel Efficiency Advisor (FEA)
  - Safe Human Machine Interaction (SafeHMI)

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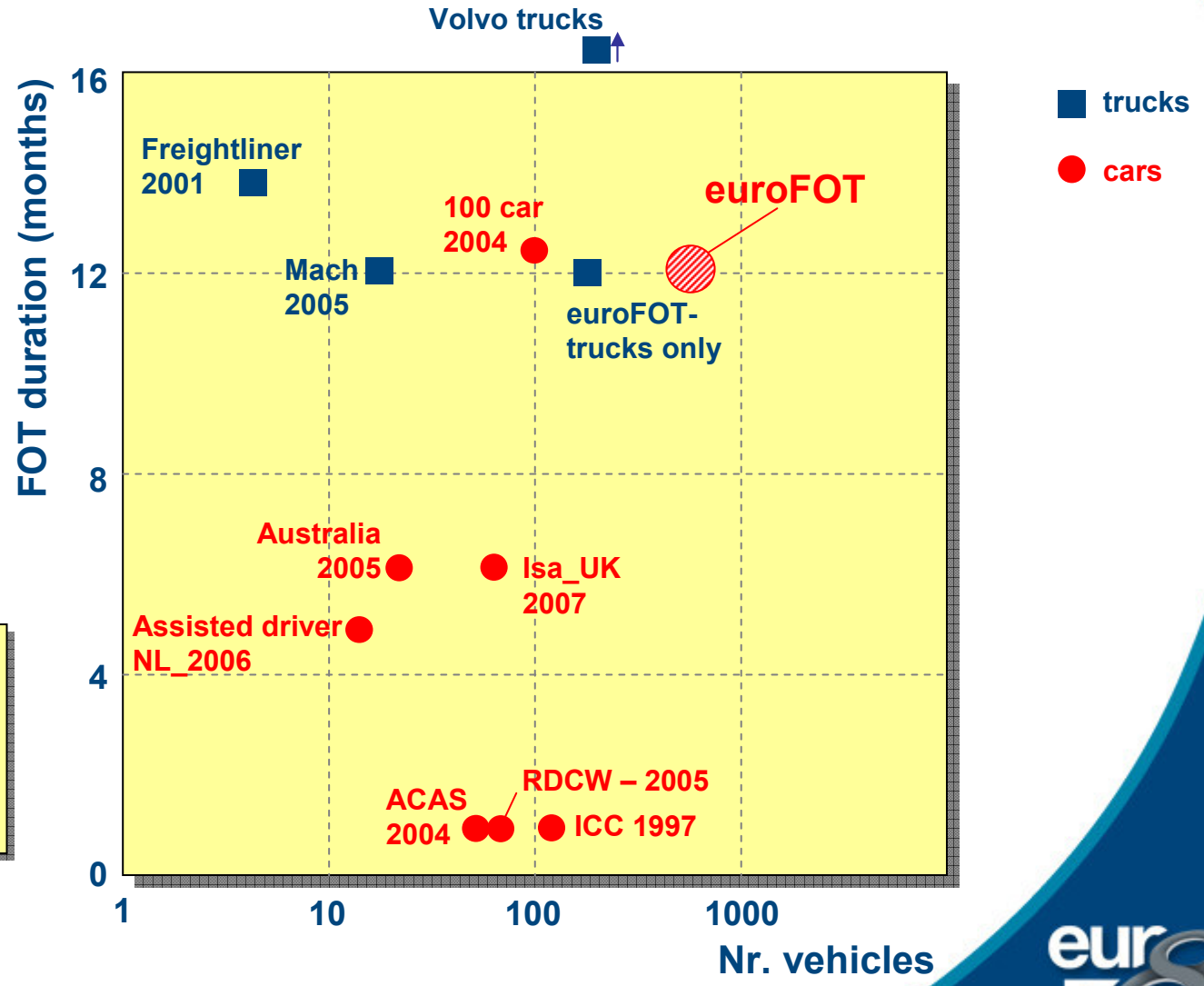
Exposures in different FOTs



Within euroFOT:
180 trucks
810 cars
~18,5 Mil. km

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.... and the euroFOT approach

- Well developed ADAS and sensors on vehicles
- Reliable Data Acquisition systems based on partners' experience
- Harmonised research questions / hypotheses for all fleets
- Common definition of scenarios and performance indicators: specific approaches when necessary
- Framework of guidelines for the operation of the different Vehicle Management Centres

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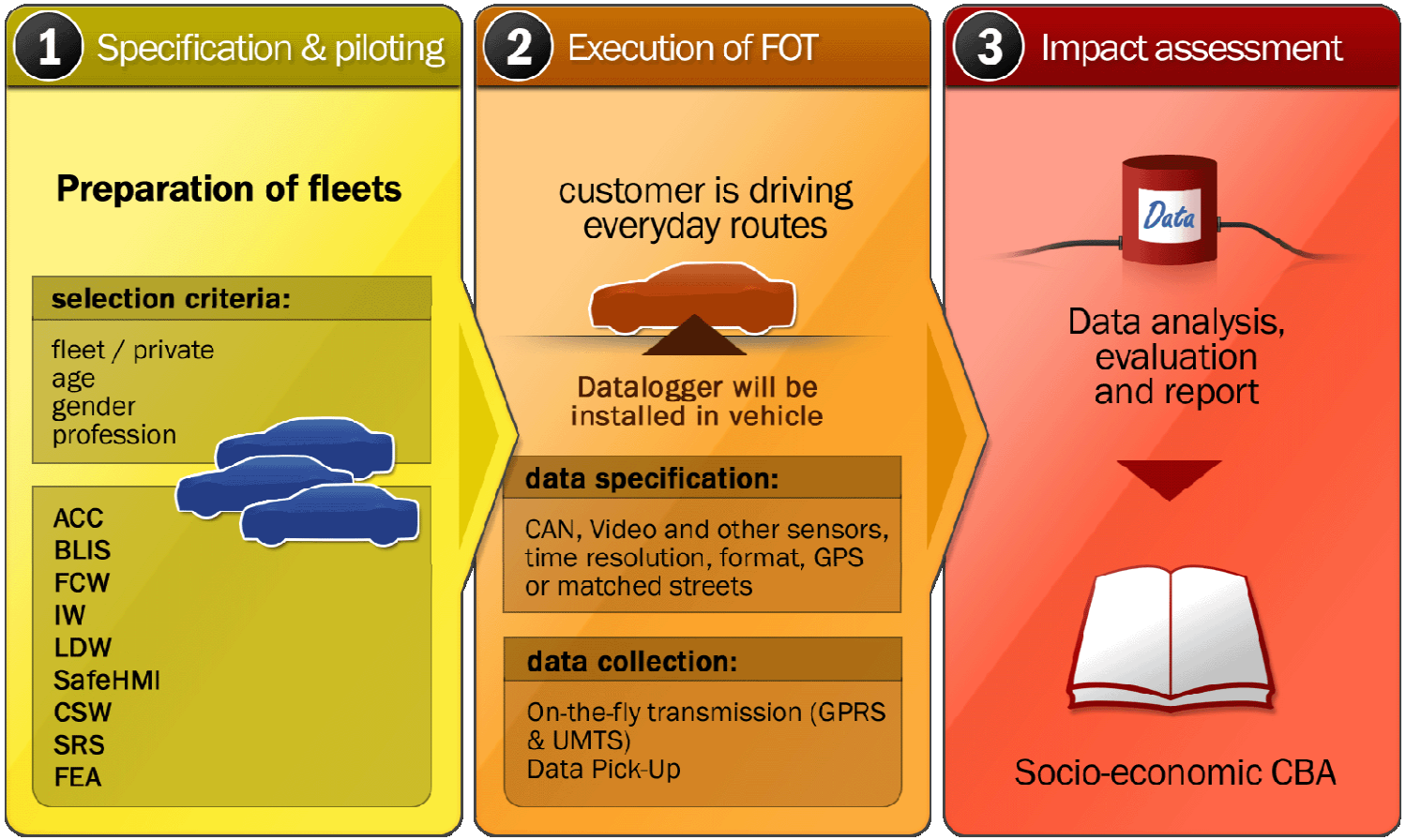
Project plan



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Highlights for on-going activities

Research Questions & Hypotheses (example)

- A research question is general, and has a question mark:
  Does FCW decrease incidents?
- Hypotheses are either true or false
  FCW reduces occurence of decelerations above 5 m/s^2
- Hypotheses can only be tested by means of reasonable indicators
- Hypotheses are statistically testable
- euroFOT examined >100 hypotheses for FCW/ACC
  (only top-hypotheses selected)

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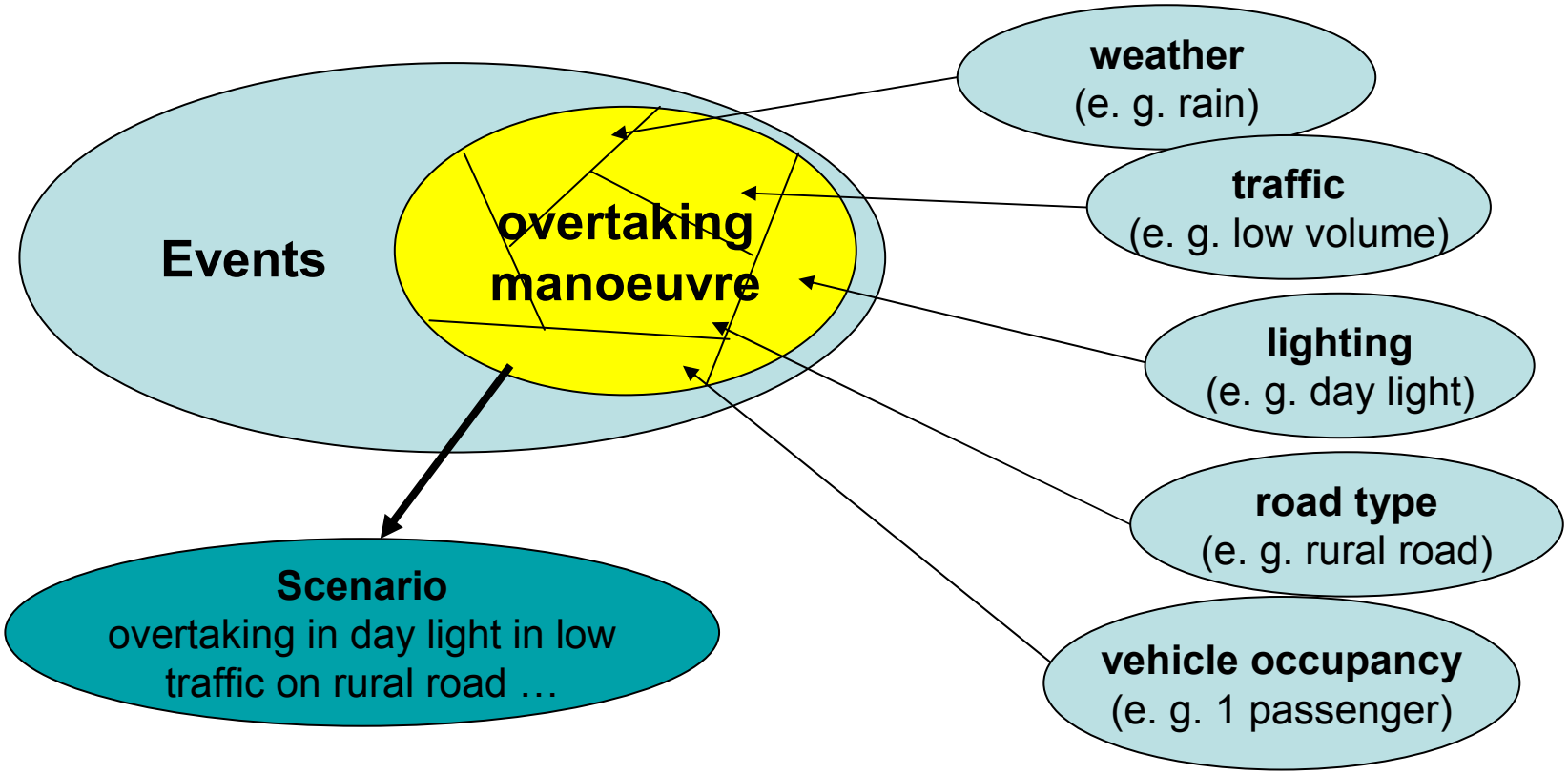
Events and situation variables



For euroFOT:

- **25 events selected / 27 situation variables**
- **81 performance indicators**
- **About 110 corresponding measures**

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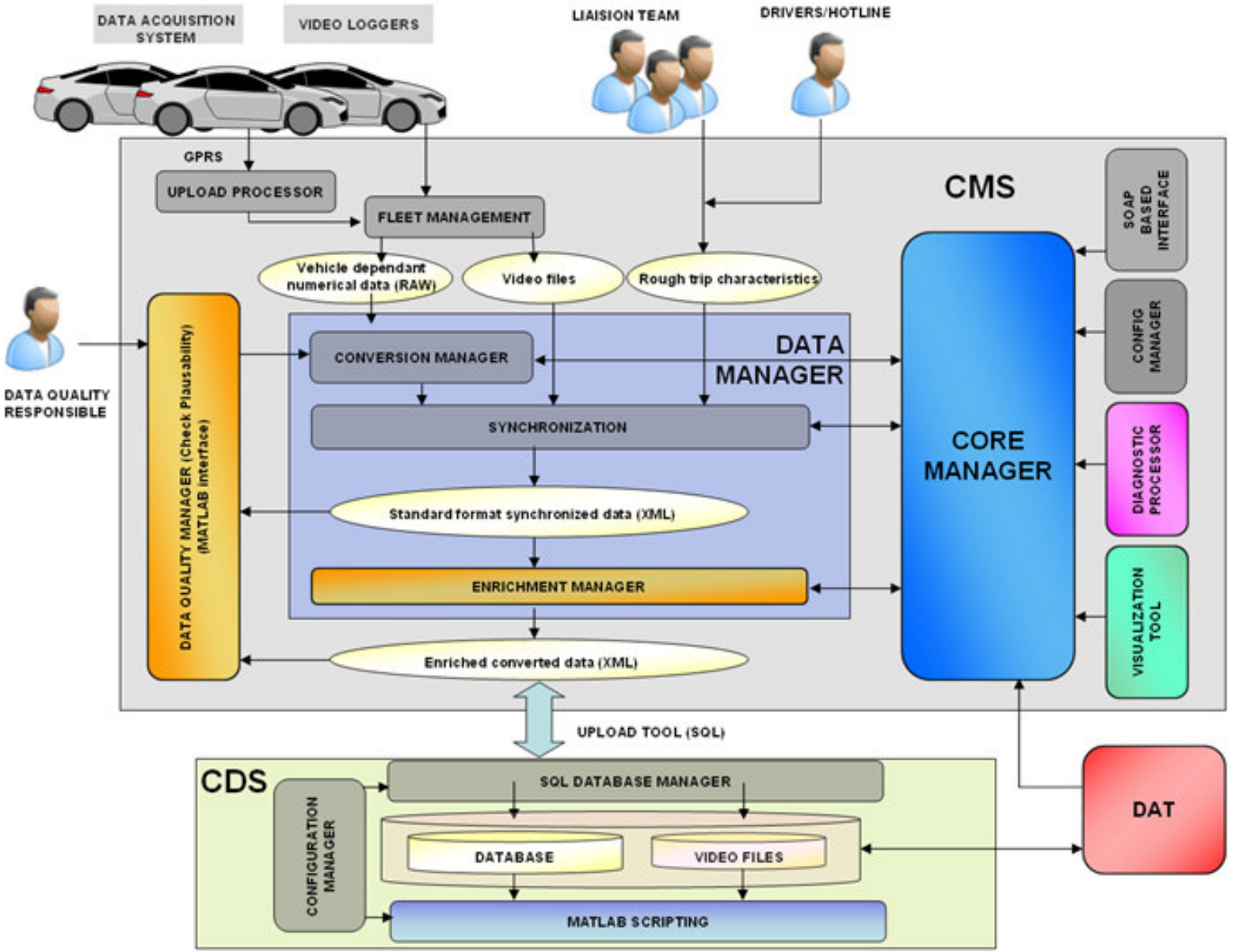
Data Acquisition Systems

Some specific issues:

- Low energy consumption in sleep mode
- Transmit data before entering sleep mode
- Fully OEM-tested and compatible
- Protection of proprietary data
- Encryption of data
- Driver annotation interface
- Possibility of audio recording
- Synchronisation with GPS

Data chain


DATA ACQUISITION SYSTEM
VIDEO LOGGERS
LIAISION TEAM
DRIVERS/HOTLINE
GPRS
UPLOAD PROCESSOR
FLEET MANAGEMENT
CMS
SOAP BASED INTERFACE
Vehicle dependant numerical data (RAW)
Video files
Rough trip characteristics
CONFIG MANAGER
DATA QUALITY RESPONSIBLE
DATA QUALITY MANAGER (Check Plausability) (MATLAB interface)
CONVERSION MANAGER
DATA MANAGER
SYNCHRONIZATION
CORE MANAGER
DIAGNOSTIC PROCESSOR
Standard format synchronized data (XML)
ENRICHMENT MANAGER
VISUALIZATION TOOL
Enriched converted data (XML)
UPLOAD TOOL (SQL)
CDS
SQL DATABASE MANAGER
DAT
CONFIGURATION MANAGER
DATABASE
VIDEO FILES
MATLAB SCRIPTING

Design of experiment

Drivers

- Represent as much as possible the population of buyers
- Professional drivers in the case of trucks
- Performance compared with and without the system (Baseline)
- Control group introduced for several functions

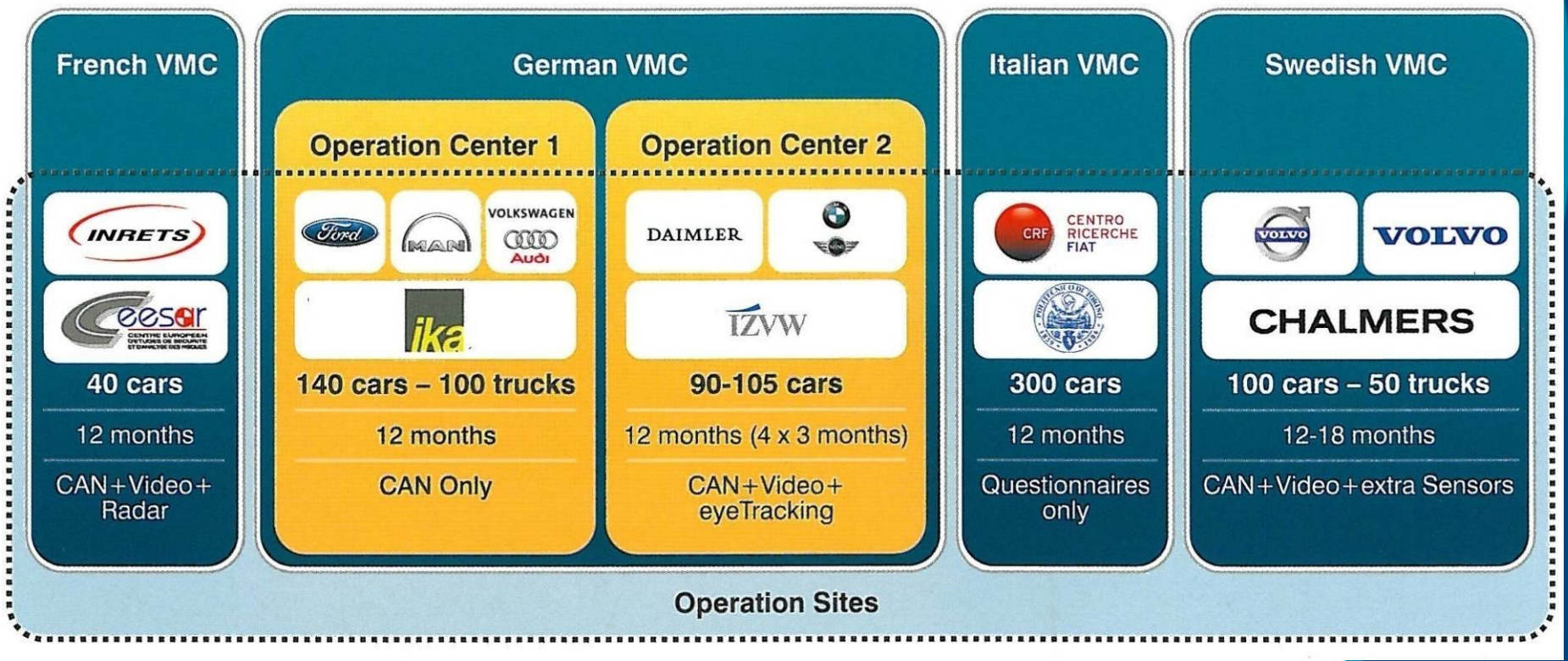
Vehicles

- According to the present EU market, technical feasibility
- Middle+top class cars, heavy trucks

Environment

- Specific events defined (e.g: overtaking manoeuvre)
- Situation variables specified (e.g: weather, visibility, driver status)
- Performance indicators are the basis for the overall evaluation (e.g: mean speed, mean time headway, frequency of braking,…)

Vehicle Management Centres (VMC)



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Selected lessons learned / Conclusions

- Use specific hypotheses; Prioritize hypotheses; Consider also combinations of functions
- Keep it simple
- Include baseline conditions in the FOT
- Define a sound data analysis plan, focused on quality (events, metrics)
- Define how to deal with safety impact analysis (crashes will be a rare, hopefully absent event)
- Anticipate the management of operational aspects (e.g: subject drop-outs, maintenance, assistance to drivers…)
- Plan long pilot tests and check technical / organisational issues
- Acquisition phase is long-winded, difficult and full of real world
- Consider data sharing issues and privacy discussions



The Consortium

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Thanks for your attention

Project coordinator:
Aria Etemad
FORD Research & Advanced Engineering Europe
Email: aetemad1@ford.com
Christoph Kessler ckessle2@ford.com

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