



# Naturalistic Riding in 2 BESAFE

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- ✓ 2BESAFE (naturalistic study) overview.
- ✓ Objectives and approach.
- ✓ Recorded parameters and tools.
- ✓ Data download and privacy.
- ✓ Data processing and reduction.
- ✓ Results.
- ✓ Future perspectives.

# What is 2BESAFE?



- 2BESAFE is a cooperative research project on behaviour and safety of riders.
- WP2 is dedicated to Naturalistic Riding Study.
- NRS budget: 750 k€ (approx.)
- 6 months of data acquisition / 19,000 km (approx.)
- Status: 4 months to go.

# What is NRS in 2BESAFE?



## 5 bikes



## 7 partners



IFSTAR

Foundation  
**cidaut**  
Transport and Energy Research and Development



- **Objectives:**

- to design and test a NRS focused on data collection of events critical for rider safety (e.g. near-missed accidents);
- to perform a preliminary data analysis to support the design of a large scale study.

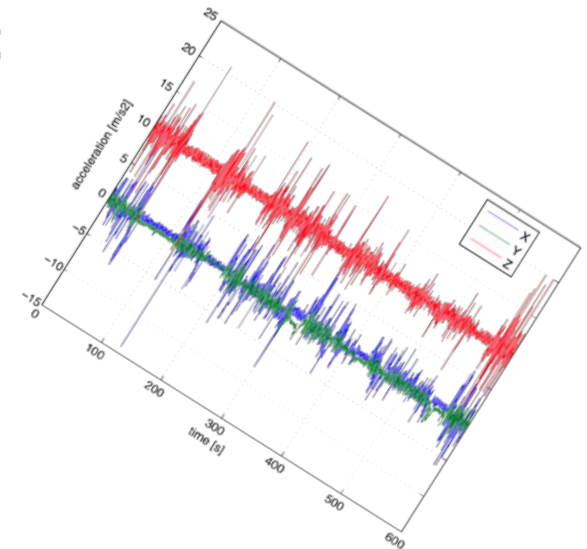
- **Approach:**

- to follow all the steps necessary for a large scale NRS;
- to set high level specifications and leave the adaptation to the local context at the national research teams.



- Different countries and PTW usage patterns.
- Decision to focus the available resources on the most relevant PTW type and scenario, through an appropriate selection of candidate riders, e.g.:
  - Italy: scooter and commuters;
  - UK: motorcycle and recreational riders.

- Data acquisition at 100Hz –except GPS data–;
- Set of mandatory signals:
  - linear acceleration (three components);
  - roll, yaw and pitch angles;
  - longitudinal speed;
  - brake activation;
  - throttle position;
  - steering angle;
  - GPS position;
  - turn signals;
  - 2 video signals: frontal environment and the rider's face.
- Optional signals: brake pressure and wheel speeds.





- Verbal tools:
  - rider profiling questionnaire;
  - weekly interviews (optional);
  - travel diaries.
- Hardware DAS:
  - Same performances but different solutions:
    - 1 in-house (installed on 2 PTWs);
    - 3 off-the-shelf (Delta, IMC, Race data).
  - Video signals recorded separately and synchronized with other signals.

- **Download:**

- data are downloaded manually each week;
- data integrity is immediately verified for an early detection of sensor failure (**efficient!!!**).

- **Privacy:**

- personal data stored separately from the acquired data;
- correlation performed through a primary key;
- protected servers and limited data access;
- each participant signed an informed consent form according to EC directives.

- Raw data are processed to identify relevant events:
  - different approaches are used in the project (triggers or Bayesian networks);
  - an evaluation of the efficiency of the different methods is in progress.
- Data reduction:
  - a single database was created and shared among the partners;
  - the data structure integrates definitions from accidentology databases to increase complementarities.



- Data reduction is performed by each research unit following a unique protocol.
- Event severity is:
  - assessed subjectively by reductionists;
  - a remote training session comprised of:
    - a blind assessment;
    - a panel discussion;was organized to have a uniform judgement.



- A NRS design to collect data in safety critical events (near-missed and incidents) was proposed and positively tested.
- A full set of procedures and tools is available for the implementation of a large scale study.
- Developed a set of recommendations for the implementation of a large scale study.

- For a future large scale study:
  - improvements are necessary to increase the reliability of the instrumented PTWs;
  - sensor installation would benefit from a close cooperation with manufacturers;
  - consider local seasonal factors, which may reduce the efficiency of data collection in some countries;
  - importance of travel diaries for event detection;
  - difficulties to record eye glance because of different light conditions.



- Performed an assessment on the frequency of relevant events (0,024 to 0,470 event/km depending on the event severity).
- Maximum core event duration is approx 10s.
- Initial data processing has identified patterns in riding behaviour:
  - moving obstacle:
    - beginning: rear brake activation in high speed;
    - incident: the rider will activate both brakes and conduct a minor maneuver in very low speed or higher speed.

- The naturalistic methodology applied to PTW is ready to step up size.
- A pan-European NRS would provide an important source of data for development of safety devices and better training programs.
- The cooperation with a NDS would provide beneficial effects both for organization and recorded data.

# Thank you

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