National Technical University of Athens
Road Safety Observatory

Online workshop in the framework of

6TH UN GLOBAL ROAD SAFETY WEEK
17 - 23 May 2021
Streets for Life
#Love30
DECADE OF ACTION FOR ROAD SAFETY 2021 - 2030
30 KM/H

Thursday 20 May 2021

Innovation in Road Safety Research

Smartphone applications for driver safety behaviour support

Armira Kontaxi
Transportation Engineer, Research Associate

Together with:
Apostolos Ziakopoulos, George Yannis

BESMART

The BeSmart project

BESMART

- **Project partners**:
  - National Technical University of Athens, Department of Transportation Planning and Engineering www.nrso.ntua.gr
  - OSeven Private Company www.oseven.io
- **Duration of the project**:
  - 36 months (July 2018 – July 2021)
- **Operational Program**:
  - "Competitiveness, Entrepreneurship and Innovation" (EPAnEK) of the National Strategic Reference Framework (NSRF)
- **Project Website**:
  - www.besmart-project.gr

European Union
European Regional Development Fund

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ ΕΡΕΥΝΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ

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ΕΙΔΙΚΗ ΓΡΑΜΜΑΤΕΙΑ ΕΤΠΑ & ΤΣ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ ΕΠΑνΕΚ

EPAnEK 2014-2020
OPERATIONAL PROGRAMME
COMPETITIVENESS • ENTREPRENEURSHIP • INNOVATION

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Background

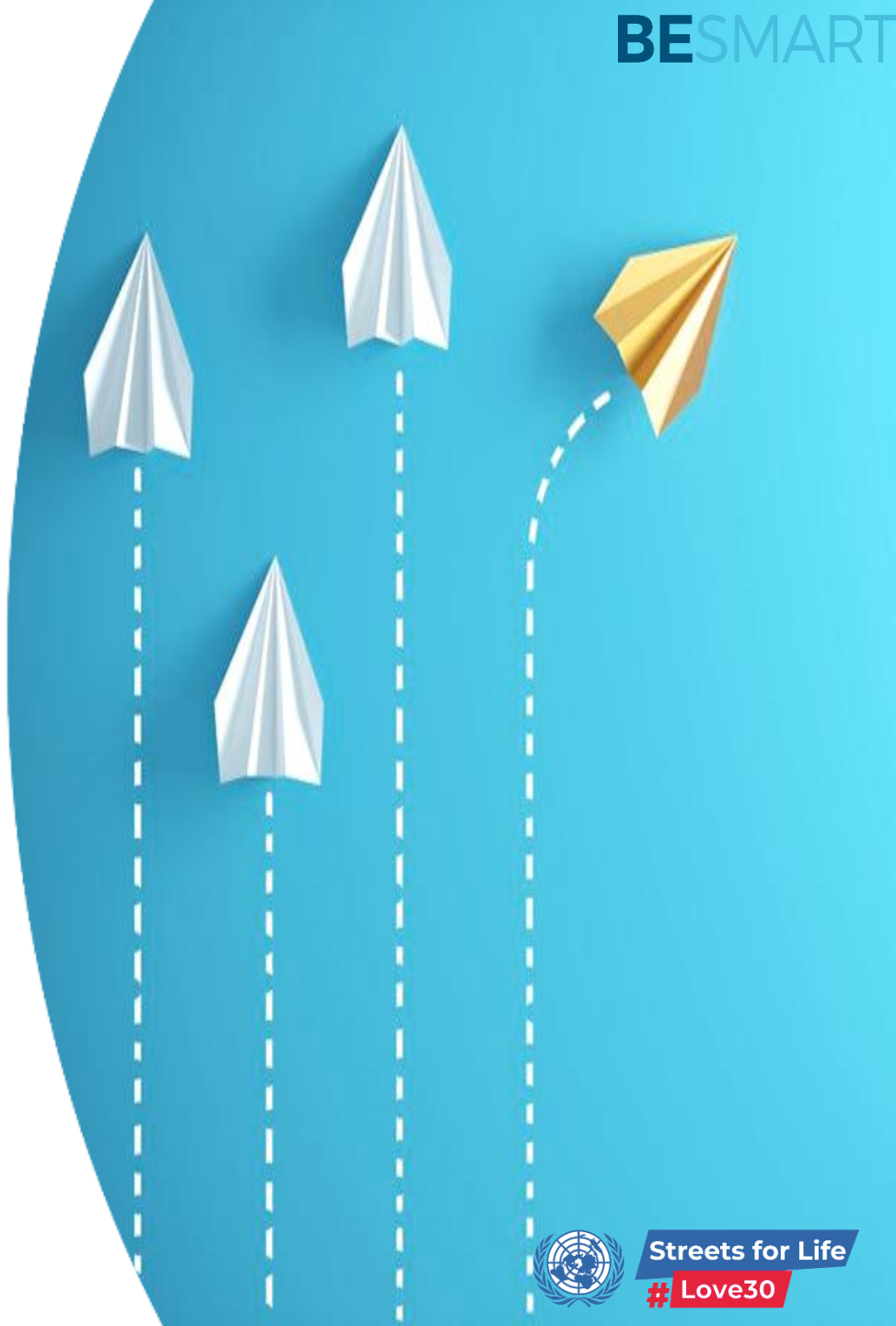
- Accurate monitoring of driver behaviour is progressively established in the transportation field
- The high penetration rate of smartphones and social networks provide new opportunities and features to monitor and analyze driver behaviour by adopting low-cost collection and processing methods
- Naturalistic driving experiments by means of mobile phone allow researchers to examine the effect of various risk factors on driving performance, identify aggressive and dangerous driving profiles and provide driver feedback

Research Questions

- Identification of critical risk factors affecting driver behaviour and road safety through smartphones under naturalistic driving conditions

- Investigation of the impact of speed (inappropriate speed, percentage of time exceeding speed limits, etc.) and harsh events (harsh acceleration, harsh deceleration, harsh turn) on road safety

- Examination of the impact of different types of personalised feedback on driving behaviour and the influence of its evolution over time on drivers through smartphones



Methodological Challenges

- Development of the BeSmart application
  - International literature review on driver behaviour monitoring and feedback tools
  - Adaptation requirements for accurate recording of powered-two-wheelers behaviour
- Organization and exploitation of a naturalistic driving experiment of 200 drivers for 12 months
  - Different types of drivers (cars, vans, PTW, cyclists)
- Implementation of algorithms and statistical analyses
  - Machine Learning
  - Structural Equation Models (SEMs)
  - Road Safety Toolbox

The BeSmart Experiment

- A 200-driver naturalistic experiment
  - 21 months (extension due to COVID-19)
  - 4 driver types included:
    - ✓ Car drivers, powered two-wheelers, cyclists
    - ✓ Professional drivers (Nea Odos fleet)
  - 6 different phases differing in the type of feedback provided to drivers:
    - ✓ No feedback
    - ✓ Personalised feedback with scorecards, statistics and reports
    - ✓ Incentives within a social gamification scheme, with personalised target setting, benchmarking and comparison with peers

Indicative Findings

- There is an overall improvement of driving behaviour in terms of speeding, mobile phone use and harsh events from no feedback to feedback phases

- The greatest improvements were observed during the appearance of the personalised trip scorecard and during an one-month competition for a number of prizes and awards

- Private car drivers and professional drivers: speeding was the most enhanced driving behavioural indicator; 30% of drivers showed a reduction greater than 50%

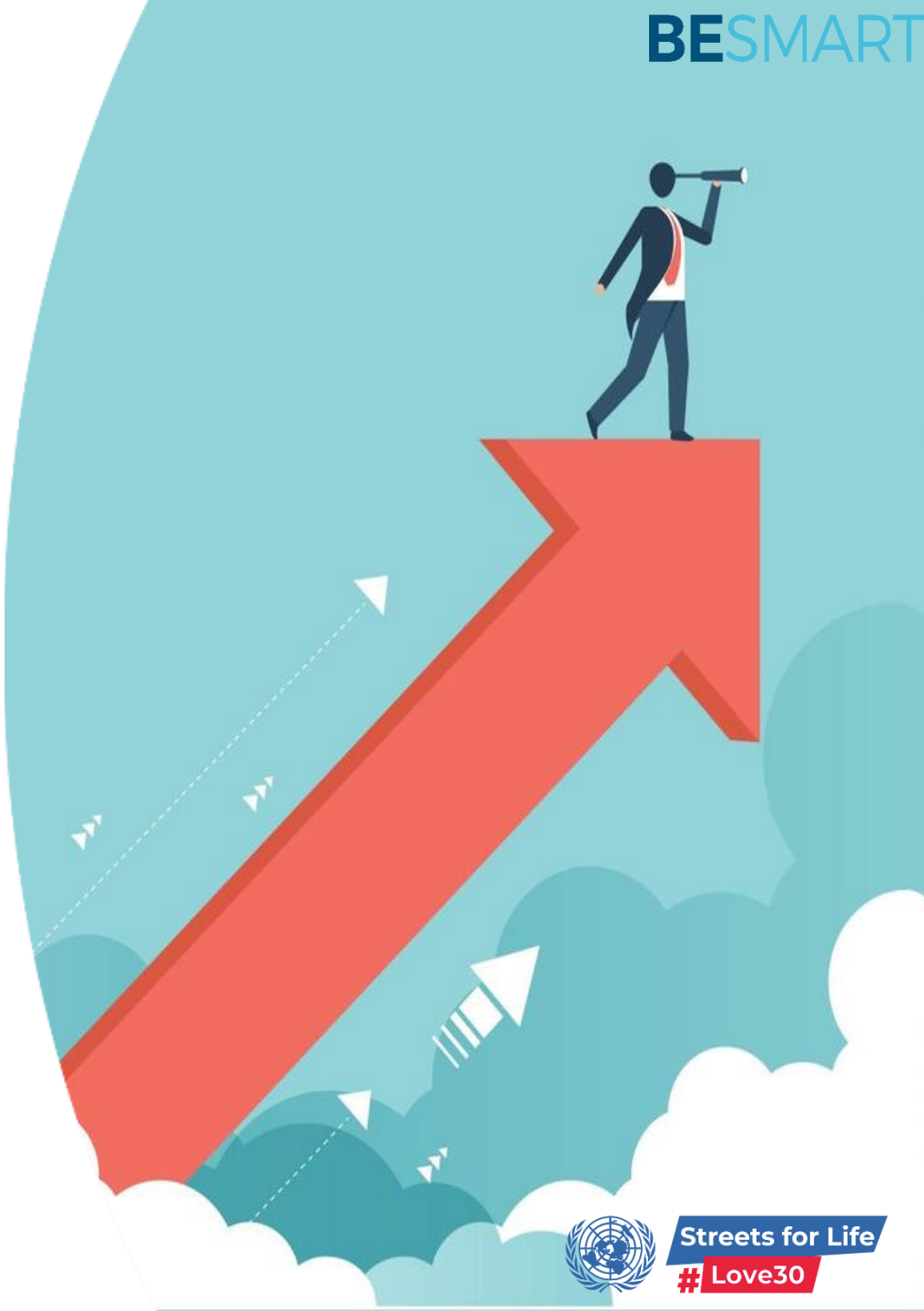
- PTWs: the number of harsh accelerations was the most improved risk factor; an average reduction of 30% for the total of PTWs

Scientific and Social Impact

- Innovative monitoring driver behaviour
  - Seamless behaviour monitoring in all vehicles including vulnerable road users (PTW, cyclists)
- Driver training and support
  - Significant improvement of driver behaviour
  - Continuous driver feedback to achieve road accident reduction over time
  - Development of better road safety culture for all road users

Future Challenges

- Integration of a multitude of IoT technologies, development of advanced know-how
- Development of new smartphone applications, for all road users and all transport modes
- Properly matching telematics metrics with crash risk
- Exploitation of know-how for the safe integration and monitoring of automated vehicles
- Enhancement of innovation capacity and creation of new market opportunities for driver behaviour telematics



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