SUSTAINABLE CITIES
Viewpoints of the Pioneer Alliance
IoT for Smart Cities School Open session
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New Data for Urban Road Safety

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Presentation Outline

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Background

- Road transport is responsible for the majority of transport fatalities, with 1,35 million fatalities worldwide each year.
- In 2019, about 22.800 road traffic fatalities were recorded in the 27 EU Member States.
  - Almost 40% of road fatalities occur in urban areas.
  - Vulnerable road users account for 70% of road deaths in urban areas.
- Innovative data-driven solutions could contribute to a proactive approach of addressing urban road safety problems, being a core principle of the Safe System.
- The rise of smartphones, sensors and connected objects offers more and more transport data.
- The interpretation of these data can be made possible thanks to progress in computing power, data science and artificial intelligence.

Need for New and Big Data

- Alternative data that could lead to new advanced road safety analyses in order to:
  - more efficiently identify key road risk factors
  - address road user behaviour and errors
  - address proactively critical traffic, infrastructure and vehicle risk factors.

- Continuous driver support with aim to improve driver behavior and develop better road safety culture at all road users.

- Great new potential for evidence based public and private road safety decision making at all levels.

Urban Road Safety Big Data (1/2)

- Mobile Phone Data
  - Sensor Based Data (e.g. Google Maps, Waze)
  - Cellular Network Data (e.g. Cosmote, Vodafone, Wind)
- Vehicle On-Board Diagnostics Data
  (e.g. OEM industry)
- Data from Cameras
  - On-vehicle (inside and outside)
  - On the road (cities, operators)
- Data from Car Sharing Services
  (e.g. Uber, Lyft, Bla bla car)
- Data from Bike Sharing Services
  (e.g. 8D Technologies, Mobike)
- Social Media Data
  (e.g. Facebook, Twitter)

Urban Road Safety Big Data (2/2)

- Telematics companies
  (e.g. OSeven, ZenDrive, Octo)
- Private Agencies' Sensor Data
  (e.g. INRIX, Waycare)
- Travel Cards Data
  (e.g. Oyster card, Opal card)
- Public Authorities Sensor Data
  (e.g. Ministries, Public Transport Authorities, Cities, Regions)
- Weather Data
  (e.g. AccuWeather, ClimaCell)
- Census Data
  (e.g. Eurostat, National Statistics)

Accident Data Collection (1/2)

- Automatic data collection is possible through
  - instrumented floating vehicles and/or
  - smartphones (hard braking, poor road surfaces, speed).

- Active safety systems can also be considered among surrogate safety metrics, such as:
  - ABS for anti-lock braking,
  - ESP for electronic stability control and
  - AEB for autonomous emergency braking

Accident Data Collection (2/2)

- Technologies like automatic crash notification and event data recorders propose data-driven responses to post-crash problems.
- Street imagery, also collected by floating vehicles, supports the assessment of road safety performance (star-rating for roads).
- Drones and satellites complement the range of data, capture solutions and play an increasing role.

Intelligent Transport Systems

- Urban infrastructure based systems:
  - Speed management system,
  - Dynamic traffic management and hazard warning systems,
  - Automated enforcement of traffic rules etc.
- Cooperative systems, which use both infrastructure and vehicles with appropriate communication links:
  - Intelligent Speed Adaptation (ISA),
  - Ecall,
  - Adaptive Cruise Control,
  - Collision avoidance systems at junctions etc.
- Urban infrastructure design for the better coexistence of vehicles (Autonomous, Connected, Electric) with vulnerable road users:
  - Smart street signs
  - Smart pedestrian crossing
  - Electric roads
  - Smart pavement with sensors

Telematics (1/2)

- A range of telematics solutions already exist for:
  - fleet management,
  - usage-based insurance,
  - eco-driving and
  - safe driving coaching.

- Smartphones are becoming increasingly popular in those applications.

- Current technological advances make data collection and exploitation substantially easier and more accurate through mobile phones.

Telematics (2/2)

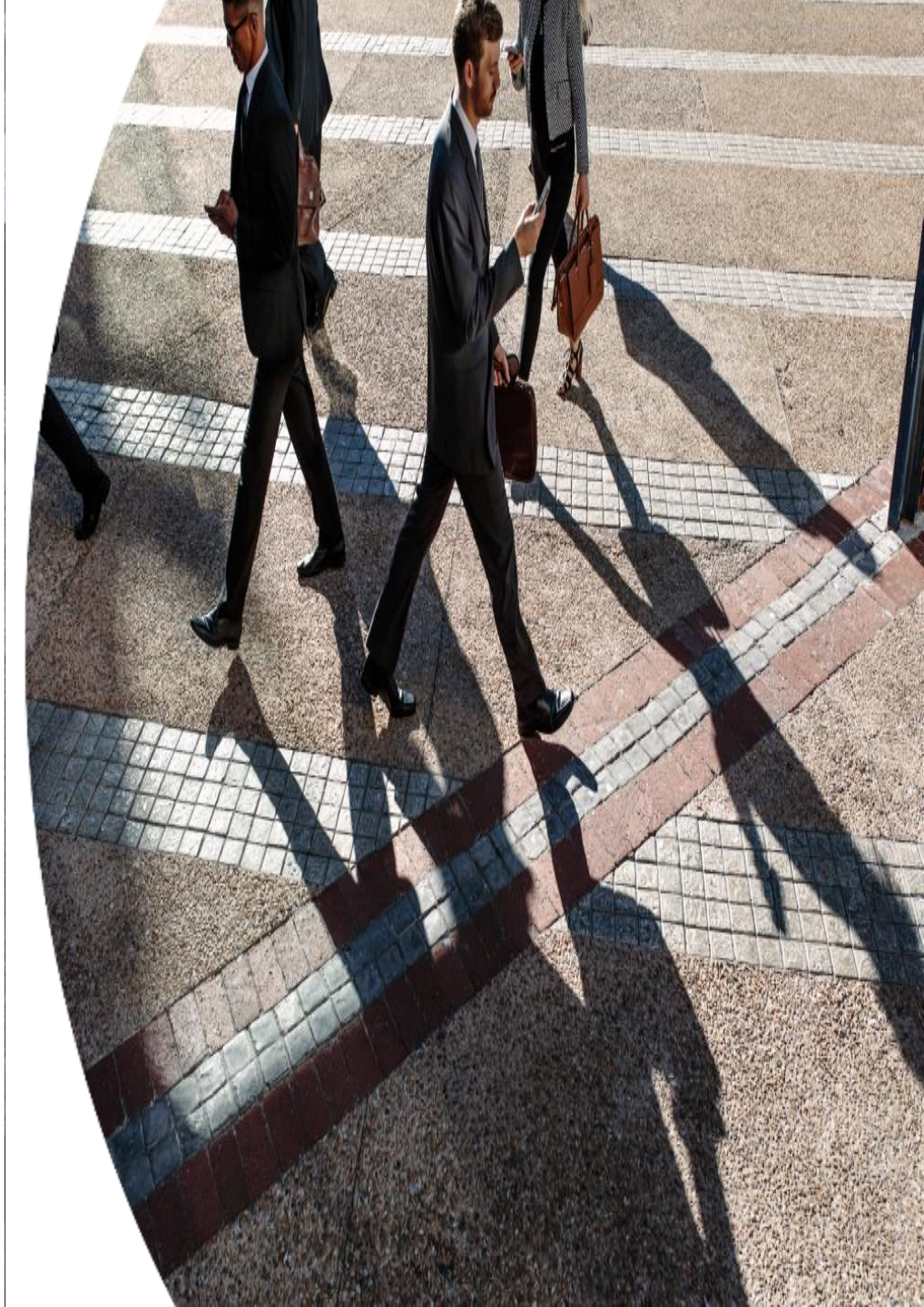
- Feedback to the driver through the Driver Performance Telematics (vehicle or smartphone)
- Real time feedback
  + avoid distraction
  - produce distraction
- Safety performance star rating
  + engage in the long term
  + great motivation to improve driving behaviour
  + identification of need for re-training
  - demotivation in case of non progress
  - demotivation when non favorable comparison with peers
- The feedback loop should be optimized.

VRU Data Crowdsourcing

- Cyclists and Pedestrians report:
  - safety problems (roads, behavior)
  - exposure (routes, traffic, etc.)
  - crash data (with injuries, material damage only)
  - star rating.

- Not uniform nor systematic reporting practices though.

- Feedback on network safety performance
  - useful for the cyclists
  - useful for the decision makers (all levels)
  - useful for business



Critical Issues

- Punishment Vs Positive Feedback (Incentives)
- Regulatory and Voluntary Data
- Secure anonymisation might increase penetration (e.g. blockchain)
- Ownership of data
- Exploitation of data (charging schemes)
- Sharing of safety data (EU legislation)
- Harmonisation and compatibility of:
  - data
  - metrics
  - data collection methodologies
  - data processing methodologies

Conclusions

- Digitalization opens great new data possibilities for:
  - road user support and guidance
  - evidence based public and private road safety decision making at all levels
  - support smart cities applications
- New great potential for seamless data driven procedures from safety problems identification to selection and implementation of optimal solutions
- New increased net present value of road safety data, available for (real-time) early problem detection and prompt and customized decision support

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