TOGETHER FOR® SAFER ROADS

Governing Board Meeting
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Global Road Safety Landscape

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Presentation Outline

1. Basic Global Road Safety Facts
Worldwide, Progress, Regions

2. Current Road Safety Concepts
Safe System Approach, Vision Zero

3. Global Road Safety Policy
UN Sustainable Goals, EU RS Policy, UN Global RS Trust Fund, Global Stakeholders

4. Global Road Safety Systems
Observatories, Decision Support Systems, Regional Observatories

5. Road Safety Data
Road Safety Data, Big data

6. Technology Challenges
ADAS, Connected Vehicles, Automation

7. Perspectives and Opportunities
Global perspectives, TSR opportunities

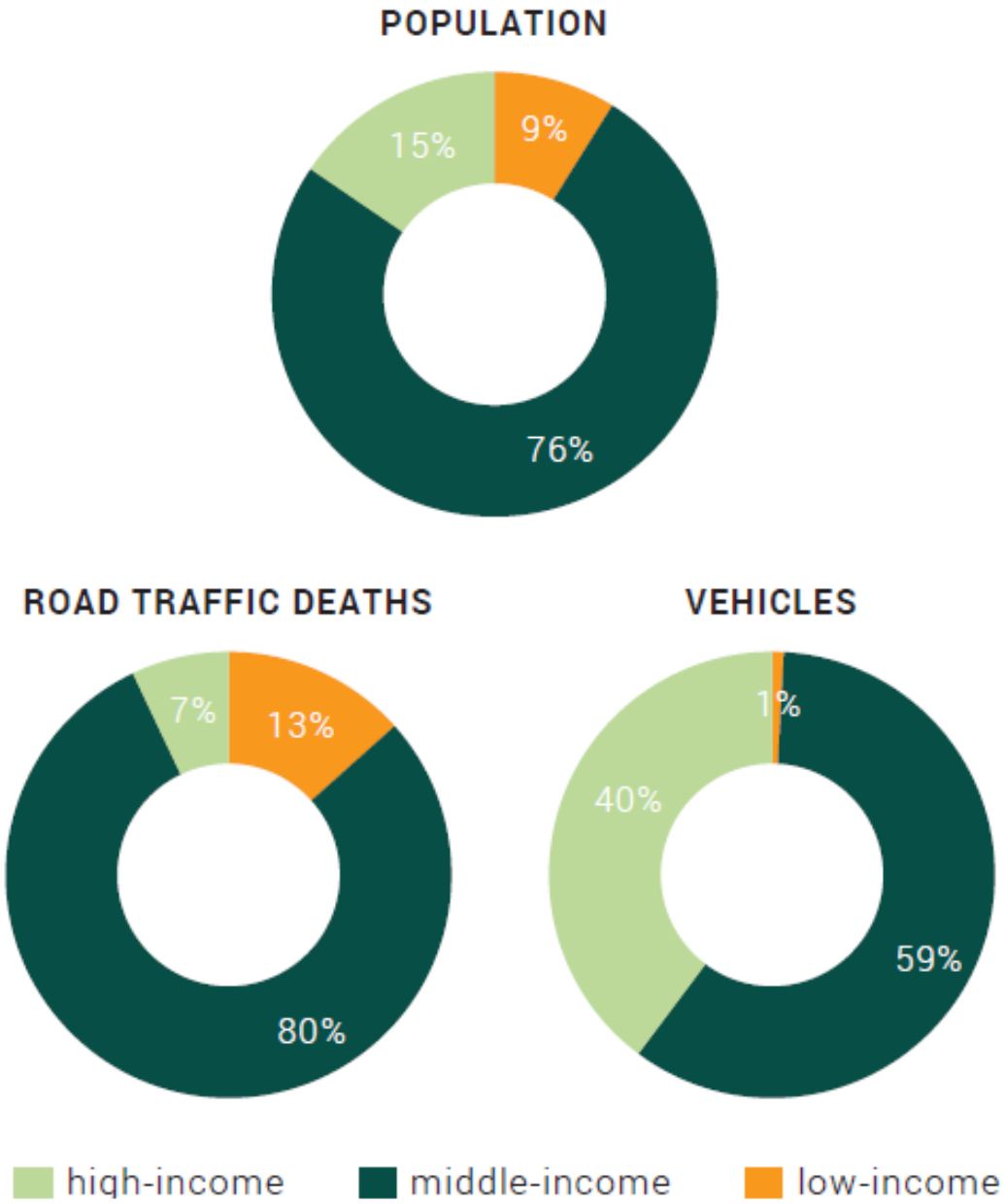
Basic Global Road Safety Facts

Road Safety Worldwide

- **1,35 million road traffic deaths** per year (World Health Organisation 2018).
- Road traffic injuries are:
  - the **8th leading cause** of death worldwide
  - the 1st cause of death among **children and young adults** (5-29 years old).
- SDG 3.6 **target to halve road deaths and injuries by 2020 will not be met** without drastic action.
- Instead a **7% fatalities increase** was observed between 2013 and 2016.

Road Safety Progress

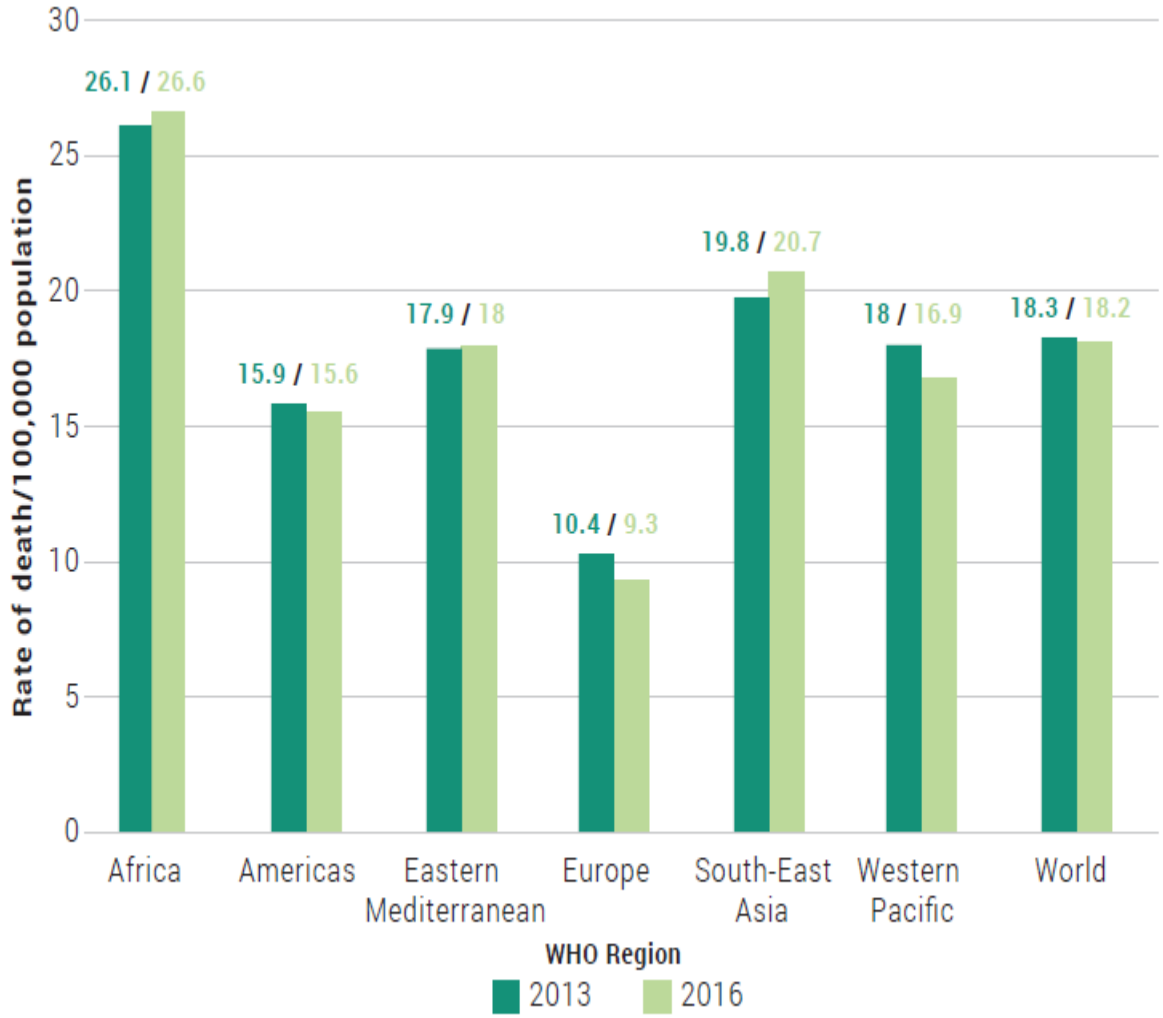
- Progress in road safety is **not uniform** across regions and income levels.
- Although only 1% of the world's motor vehicles are in **low income countries**, 13% of deaths occur in these countries.
- In **high income countries**, 40% of the world's vehicles are in traffic, but only 7% of all deaths correspond to these countries.
- The risk is **more than 3 times higher** in low-income countries than in high-income countries.
- **No reduction** in the number of road traffic deaths in any low-income country has been recorded since 2013.



Source: WHO, 2018

Road Safety in Regions

- The rates of road traffic deaths are highest in **Africa** (26.6/100,000 people) and **South-East Asia** (20.7/100,000 people).
- The rate of road traffic deaths per population generally **decreases as income increases** (after a certain level of motorization: ~220 vehicles per 1000 people)
- More than half of all road traffic deaths are among **vulnerable road users**: pedestrians & cyclists (26%) and motorcyclists (28%).



Source: WHO, 2018

Current Road Safety Concepts

The Safe System Approach (1/2)

- Aims to develop a road transport system better **able to accommodate human error** through better management of crash energy.

- Incorporates strategies for **better management of crash forces** (e.g. road network improvements, speed limits).

- Relies on strong economic analyses to understand the scale of the trauma problem and **apply direct investments to achieve the greatest potential benefit to society**.

The Safe System Approach (2/2)

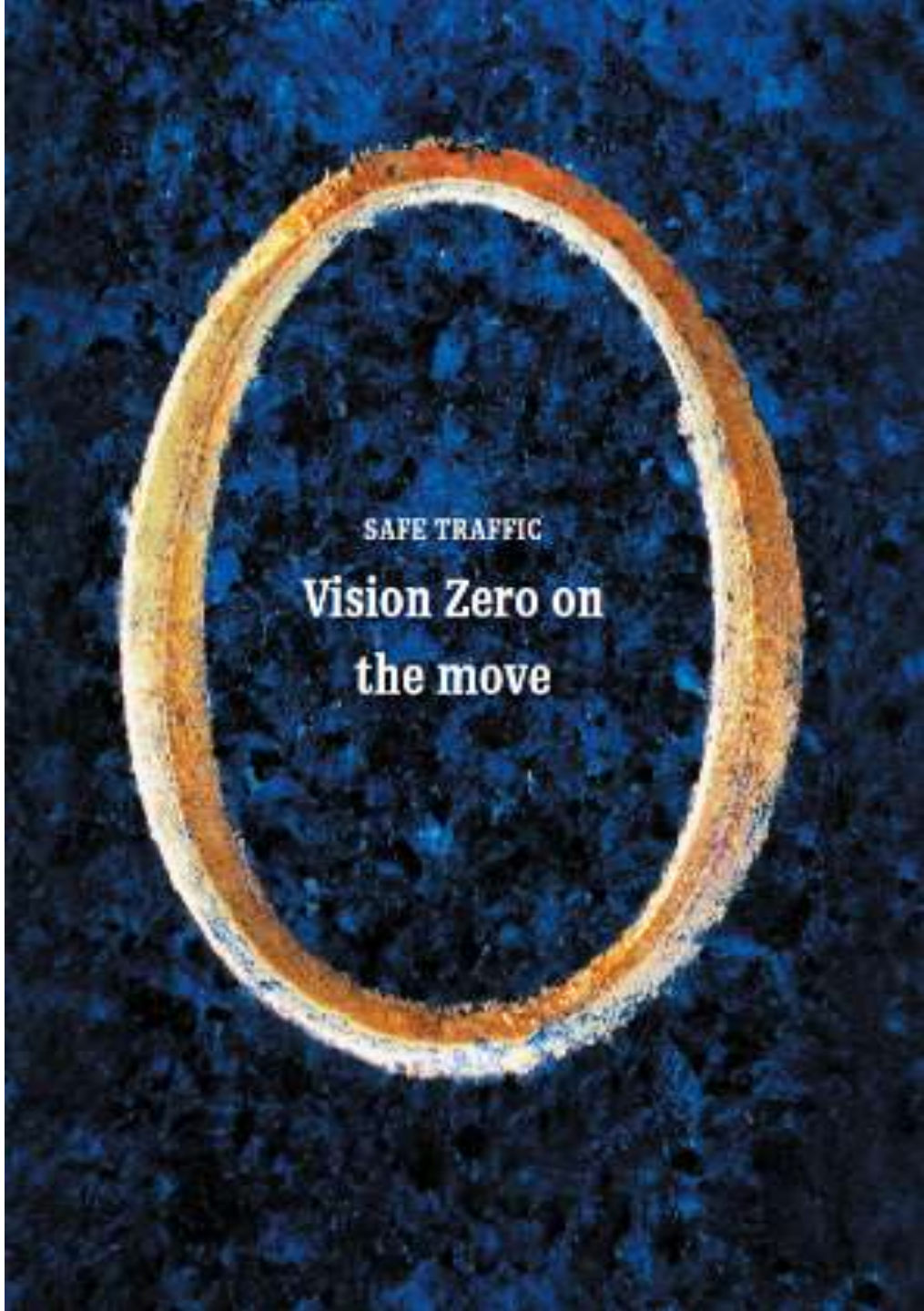
- Key government or not agencies with a role in determining the safe functioning of the transport system are incorporated in comprehensive management and communication structures.

- Safety management decision making is aligned with a broader societal decision making to meet economic goals and human and environmental health goals, and to create a safe commercial transport environment.

- Embraces “shared responsibility” for road safety among the various actors of the road transport system.

The Vision Zero Concept (1/2)

- A traffic safety policy developed in Sweden (1997), expressing an **ethical imperative to eliminate death and serious injury** from the transport system.
- **Responsibility** for crashes and injuries is shared between the providers of the system and the road users.
- The **road user** remains responsible for following basic rules.
- The **system designers and enforcers** are responsible for the functioning of the system.
- When road users make errors or fail to follow the rules, the **responsibility reverts to the system designers** to ensure that these failings do not result in death or serious injuries.



The Vision Zero Concept (2/2)

- **Human beings make errors** and there is a critical limit beyond which survival and recovery from an injury are not possible.

- The road transport system should be able to **take account of human failings and absorb errors** in a way to avoid deaths and serious injuries.
  Crashes and minor injuries need to be accepted.

- The **components of the road transport system** (incl. road infrastructure, vehicles and restraint systems) must be designed so that they are **linked to each other**. The amount of energy in the system must be kept below critical limits by ensuring that speed is restricted.

Vision Zero in the USA

VISION4HRONETWORK

- Vision Zero Network: a collaborative campaign helping communities reach their goals of Vision Zero- eliminating all traffic fatalities and severe injuries- while increasing safe, healthy, equitable mobility for all.
- Vision Zero communities: those who are taking demonstrable and significant actions to advance the principles of Vision Zero to ensure safe mobility for all.
- Vision Zero City minimum criteria:
  - ✓ Set clear goal of eliminating traffic fatalities and severe injuries/
  - ✓ The Mayor publicly, officially committed to Vision Zero.
  - ✓ A Vision Zero plan or strategy is in place, or the Mayor has committed to doing so in clear time frame.
  - ✓ Key city departments (incl. police, transportation and public health) are engaged.

Global Road Safety Policy

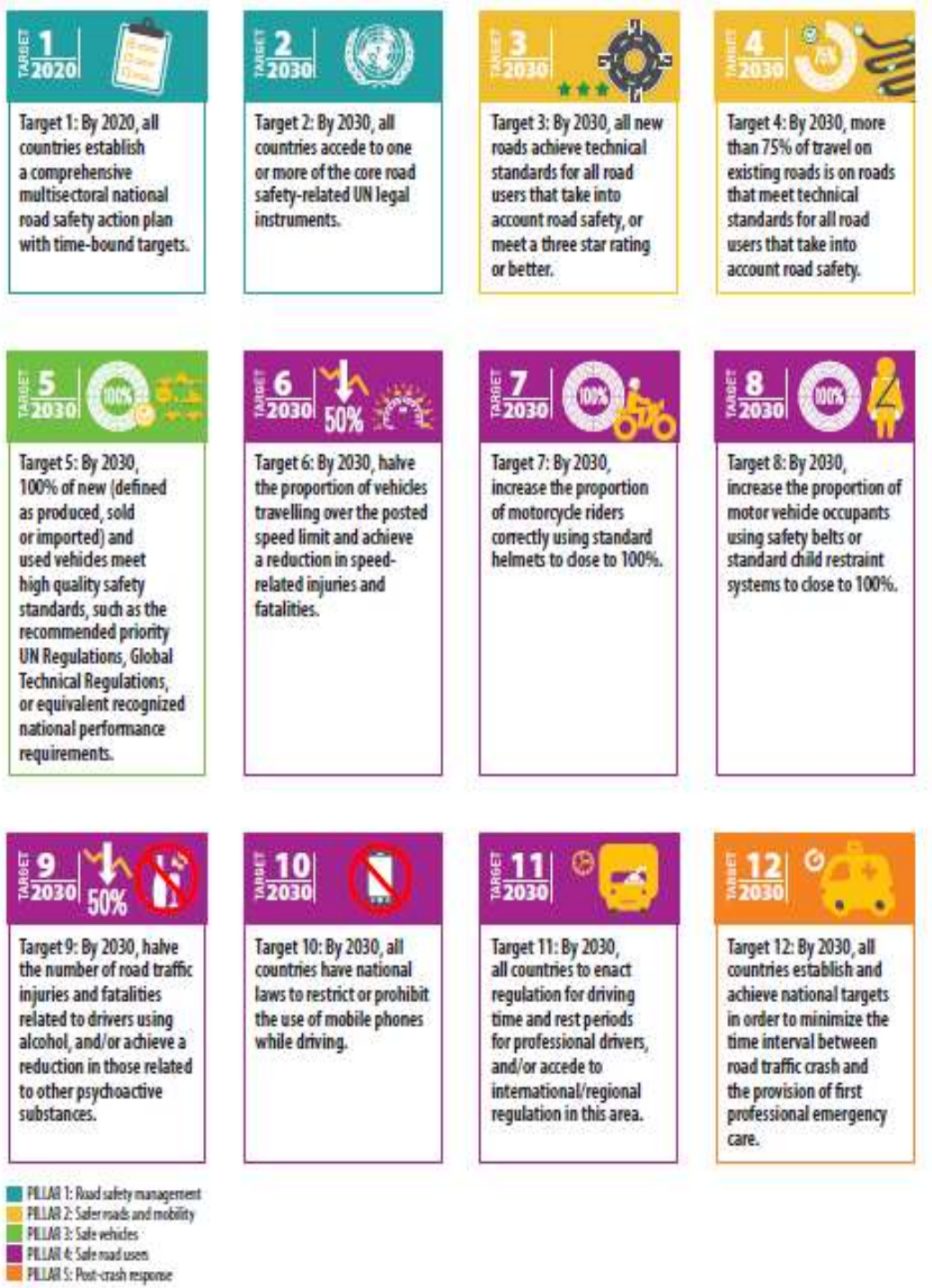
UN Sustainable Development Goals

- In 2015, the United Nations General Assembly adopted a series of SDGs as part of the 2030 Agenda for Sustainable Development.
- Target 3.6: By 2020, **halve the number of global deaths and injuries** from road traffic accidents.
- Target 11.2: By 2030, provide access to **safe, affordable, accessible and sustainable transport systems for all**, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Global Performance Targets

- In 2017, Member States, with the support of WHO, the UNECE, UNICEF, World Bank and other agencies reached consensus on a set of **12 Voluntary Global Performance Targets for Road Safety Risk Factors** and Service Delivery Mechanisms.

- Targets are divided in **5 pillars**:
  - Road Safety Management
  - Safer Roads and Mobility
  - Safe Vehicles
  - Safe Road Users
  - Post-crash response



EU Road Safety Policy

- The EU has **adopted the Vision Zero and Safe System approach**, to eliminate deaths and serious injuries on European roads.

- The EU **works closely on road safety with the authorities in its member countrie**s by building on national initiatives, setting targets and addressing all factors that contribute to road accidents (infrastructure, vehicle safety, driver behaviour, emergency response).

- EU work on road safety includes legislative proposals, public education campaigns, assisting member countries share relevant experience and funding provision.

EU Strategic Action Plan for Road Safety

- On 17 May 2018, the European Commission adopted its **EU Strategic Action Plan for Road Safety** with an outline of actions planned for the 2021-2030 period.
- The EU Strategic Action Plan was published as part of the **3rd mobility package**, which also includes a revision of the directive on road infrastructure safety management and a strategy for connected and automated mobility.
- It includes **actions within eight pillars** to be set out into a specific target time frame:
  - Enhanced road safety governance
  - Stronger financial support for road safety
  - Safe roads and roadsides
  - Safe vehicles
  - Safe road use
  - Fast and effective emergency response
  - Future-proofing road safety
  - The EU's global role: exporting road safety

UN Global Road Safety Trust Fund (1/2)

UNITED NATIONS
ROAD SAFETY TRUST FUND

- Established in April 2018, it aims to contribute to two major outcomes, assisting UN Member states to:
  a. substantially **curb the number of fatalities** and injuries from road traffic crashes
  b. **reduce economic losses** resulting from these crashes.

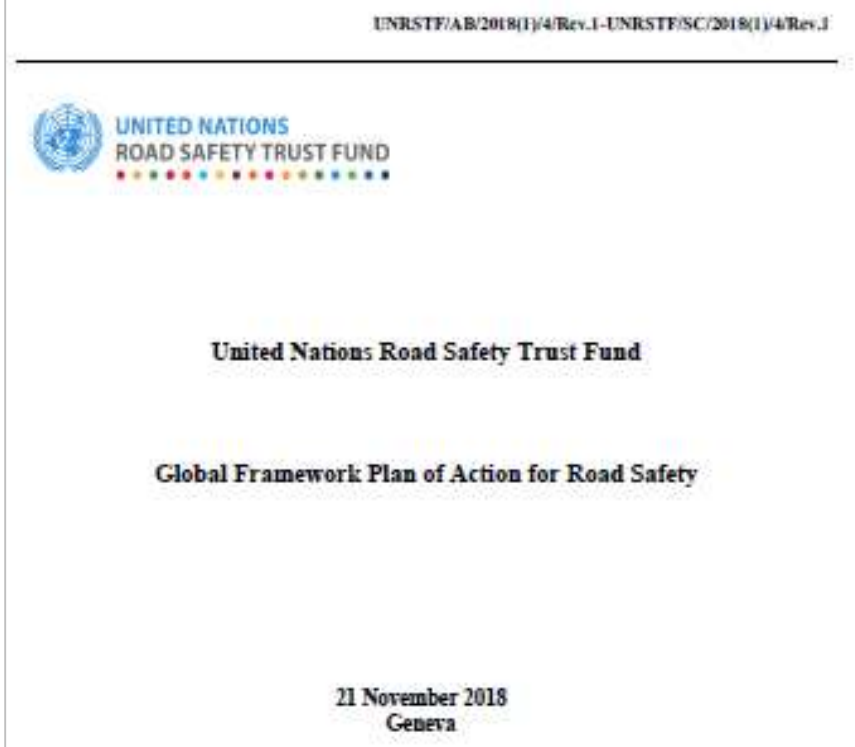
- Building on the best practices and expertise developed through the Decade of Action for Road Safety, the Trust Fund will focus on **supporting concrete actions** helping to achieve the road safety-related targets of the Sustainable Development Goals (SDGs).

- **Participating organizations:** UNECA, UNECE, UNELAC, UNESCAP, UNESCWA, UNDP, UNEP, UN-Habitat, UNICEF, WHO

UN Global Road Safety Trust Fund (2/2)

- The **Global Framework Plan of Action for Road Safety** (November 2018) is designed to serve as benchmark for the development of sound national road safety systems.

- Global Framework Plan of Action for Road Safety actions across **areas** and **pillars**:
  1. Road Safety management (management, monitoring)
  2. Safe User
  3. Safe vehicle
  4. Safe road
  5. Effective post-crash response
     legislation, enforcement, education, technology and international regulatory support actions for pillars 2-5.


UNRSTF/AB/2018(1)/4/Rev.1-UNRSTF/SC/2018(1)/4/Rev.1

UNITED NATIONS
ROAD SAFETY TRUST FUND

United Nations Road Safety Trust Fund

Global Framework Plan of Action for Road Safety

21 November 2018
Geneva

Key Global Road Safety Stakeholders

- WHO
- ITF
- GRSP
- World Bank-GRSF
- UN Envoy
- FIA
- IRF
- IRAP
- GlobalNCAP
- Global RS NGOs

Global Road Safety Systems

Global Road Safety Information Systems (1/2)

Road Safety Observatories

- ERSO, European Road Safety Observatory
- OISEVI, Ibero-American Observatory
- African Road Safety Observatory
- IRTAD, ITF Road Traffic and Accident Group
- Dacota, EC Project – Knowledge Centre
- NRSO – NTUA Road Safety Observatory

Global Road Safety Information Systems (2/2)

Road Safety Decision Support Systems

- SafeFITS, UNECE-Global Road Safety Model
- SafetyCube, EU Road Safety DSS
- iRAP, Road Safety ToolKit
- PRACT, CEDR
- PIARC, WRA Road Safety Manual
- US NHTSA/FHWA CMF Clearinghouse
- AustRoads Road Safety Engineering Toolkit

WB / FIA / ITF Regional Observatories

- MoU signed at the ITF Summit 2018 by the **World Bank, the FIA and the ITF**
- Objective: work together towards the **establishment of regional road safety observatories**
- Main targets:
  - Strengthening of **OISEVI** in Latin America
  - Establishment of a road safety observatory in **Africa**
  - Establishment of a road safety observatory in **South East Asia**

The Role of Regional Road Safety Observatories

- Existence of a formal platform to **foster international co-operation** on a regional basis.
- Provide tool for the **collection and analysis of harmonized safety data**, both accident data and SPIs.
- A **great discrepancy** between official accident statistics and WHO estimates exists.
  - e.g. in Africa, 63.000 fatalities have been recorded according to the official national statistics, while 240.000 fatalities are estimated by WHO.
- Experience in Latin America (OISEVI) has shown **benefits**:
  - road safety higher and more visible on the political agenda
  - positive emulation between countries

Road Safety Data

Why road safety data?

- Road Safety is a typical field with high risk of **important investments not bringing results**.
- Absence of **monitoring** and accountability limits seriously road safety performance.
- Decision making in road safety management is highly dependent on appropriate and **quality data**, at both micro- and macro- scopic levels.
- Very often we look where the data are and **not where the problems and solutions are**.

Critical Data Properties

- Crash data are meaningful only if they are combined with **exposure data** (crash per km driven, per traffic characteristics, per time, etc.)
- Crash causalities are revealed when crashes are correlated with **safety performance indicators** (behaviour, infrastructure, traffic, vehicles)
- The **evaluation of safety measures** effectiveness provides valuable information, necessary for matching problems with solutions
- Analysis of **high resolution data** reveals hidden and critical crash properties

Big Data & Road Safety (1/2)

- Mobile Data
  - Sensor Based Data (e.g. Google Maps, Waze)
  - Cellular Network Data (e.g. AT&T)
- Vehicle On-Board Diagnostics Data
  (e.g. BMW, Mercedes-Benz, Volvo)
- Data from Car Sharing Services
  (e.g. Uber, Lyft)
- Data from Bike Sharing Services
  (e.g. 8D Technologies, Mobike)
- Social Media Data
  (e.g. Facebook, Twitter)

Big Data & Road Safety (1/2)

- Government Agencies' Sensor Data
  (e.g. United States Department of Transportation)
- Private Agencies' Sensor Data
  (e.g. INRIX, Waycare)
- Travel Cards Data
  (e.g. Oyster card, Opal card)
- Weather Data
  (e.g. AccuWeather, ClimaCell)
- Census Data
  (e.g. United States Census Bureau, Office of National Statistics)

Technology Challenges

Advanced Driver Assistance Systems

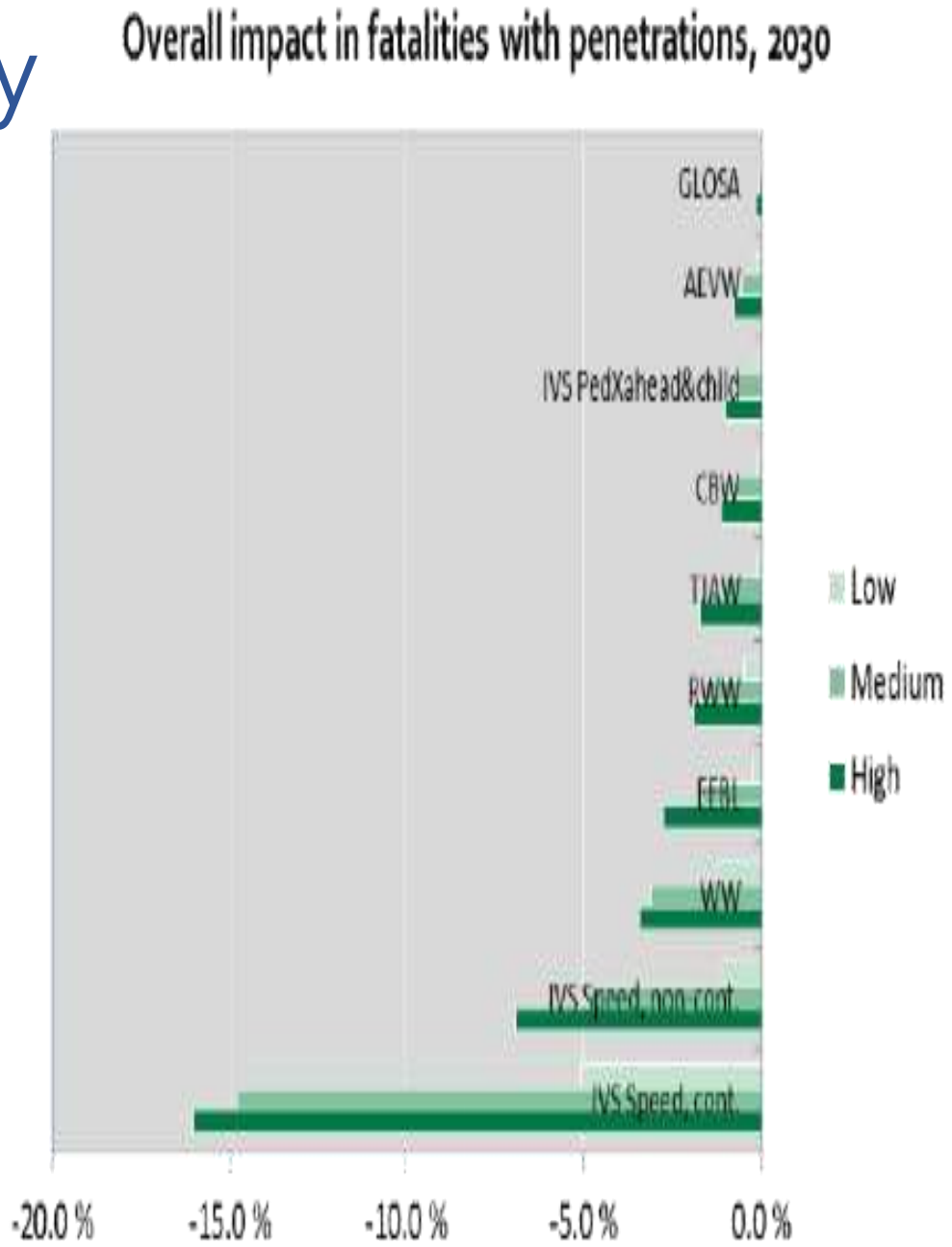
- Several ADAS **already in use:**
  - Cruise control
  - Electronic stability control
  - Lane keeping/departure warning systems
  - Adaptive Cruise Control, Intelligent Speed Adaptation, Autonomous Emergency Braking & Collision Warning systems

- Two approaches:
  - **'Sensor-based' technology:** Focus on devices to observe the road environment
  - **'Connectivity-based' technology:** Communicate in real-time with road environment
  - Convergence is desirable for **optimal road safety**

Category / Domain	System / Mechanism
Perception - Information	Surround view
	Parking assist
Collision avoidance	Collision warning – avoidance
	Cross traffic warning
	Autonomous emergency braking
	Pedestrian detection
Navigation control	Intelligent speed adaptation
	Lane departure warning
	Adaptive cruise control
	Traffic sign recognition
Safety augmentation	Seatbelt reminders
	Electronic stability control
	Alcohol interlock systems
Post-crash aid	E-call
	In-vehicle event data recorders

Connected Vehicles and Road Safety

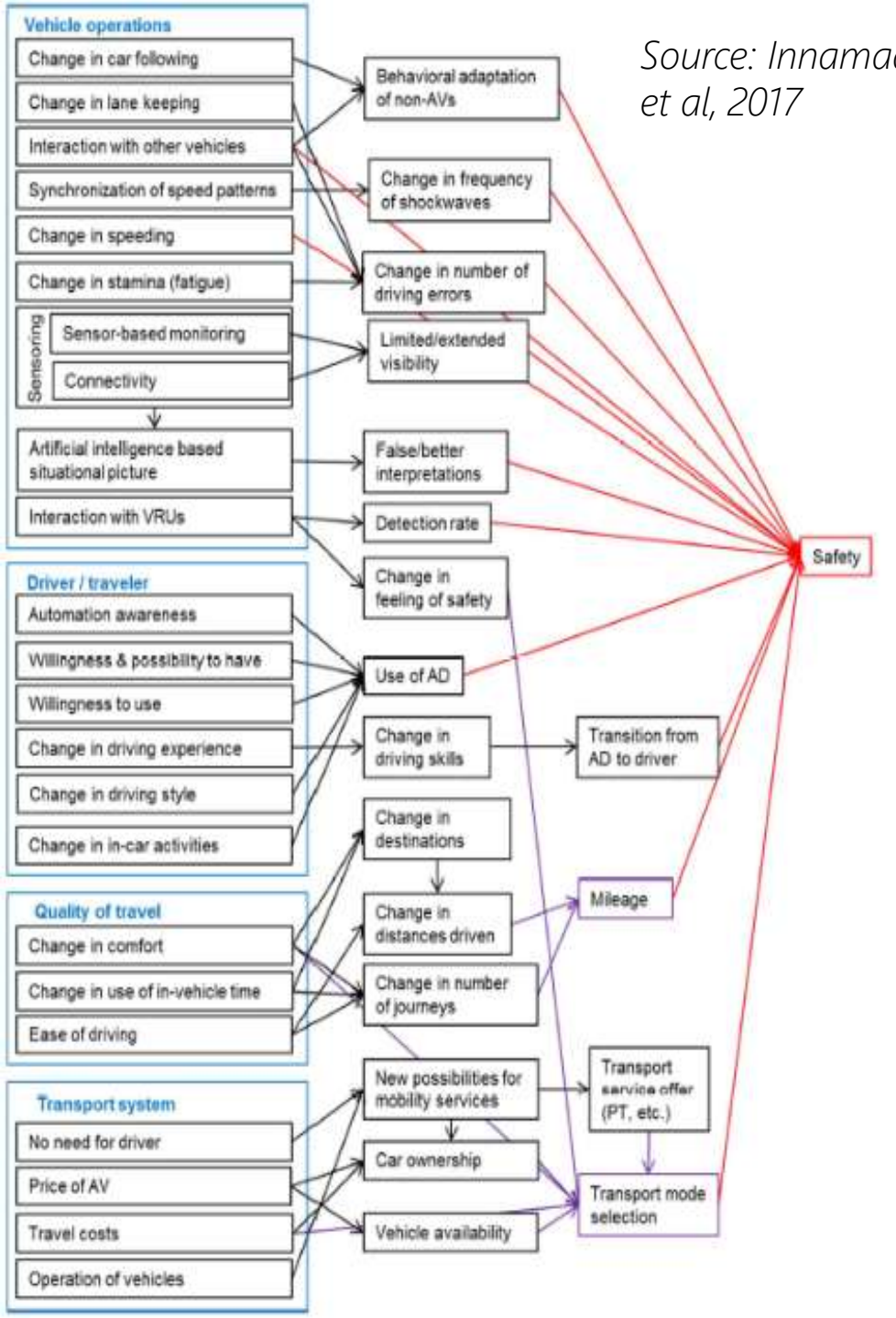
- **Crash avoidance technologies** have considerable potential for preventing crashes of all severities (>1,000,000 crashes in the US annually).
- **Lane keeping/departure warning** systems show similar but smaller effects.
- **Cooperative Intelligent Transport Systems** have been assessed from Field Tests in EU, USA, Australia and Japan
- **Autonomous Emergency Braking** systems were effective in preventing 38%-44% of rear-end collisions
- **Intelligent Speed Adaptation** reductions in fatalities estimated between 19-28%
- All effects highly dependent on **penetration rate** and exposure parameters (e.g. see right)



Source: Malone, 2014

Automation and Road Safety (1/2)

- Too complex impacts to describe casually!
- For AV penetration rates of 10%, 50% and 90%, Fagnant and Kockelman (2015) **project** 1.100, 9.600 and 21.700 lives saved/year (for USA)
- **Behavioral adaptations** for human drivers as well from AV interaction
- Personal driving styles will be suppressed (perhaps '**manufacturer styles**'?)
- Best case scenario:
  a virtuous circle of increased safety-trust-safety
  - Currently many unknown parameters



Source: Innamaa et al, 2017

Automation and Road Safety (2/2)

- Behavioural adaptation more imminent with CVs
  - Positive effects (e.g. increased speed reductions and sign compliance rates in Japan with C-ITS)
  - Must tackle rebound effects (driver overreliance on a system and not paying attention)
- Forward (in)compatibility must be avoided
  - Absence of important human cues and mannerisms
- Need to anticipate unconventional road user behavior. (e.g. Wheelchair users, School zones, Skateboarders)
- Application issues:
  - Temporal and spatial headways will be minimized
  - Gradual increased exposure from increased demand.
  - New non-driver AV users (children, elderly, etc.)
  - Infrastructure adaptation probable

Perspectives and Opportunities

Overall Key Remarks

- **Speed** is highly misunderstood by all
- **Vulnerable road users** are not accommodated
- Logically inconsistent statement of **safe system approach** everywhere
- Unrealistic expectations of **technology** (especially of automated vehicles)
- Too much **data**, too little usage

Road Safety Policy Perspectives

- Focus on the **key road accident risk factors**:
  - Speed, Speed and Speed
  - Drink and Drive
  - Distracted Driving
  - Not use of seat belt and helmet

- Adapt **urban mobility management** to accommodate and balance current and future mobility and safety needs of the vulnerable road users (pedestrians, cyclists, motorcyclists): Reduce Speed everywhere.

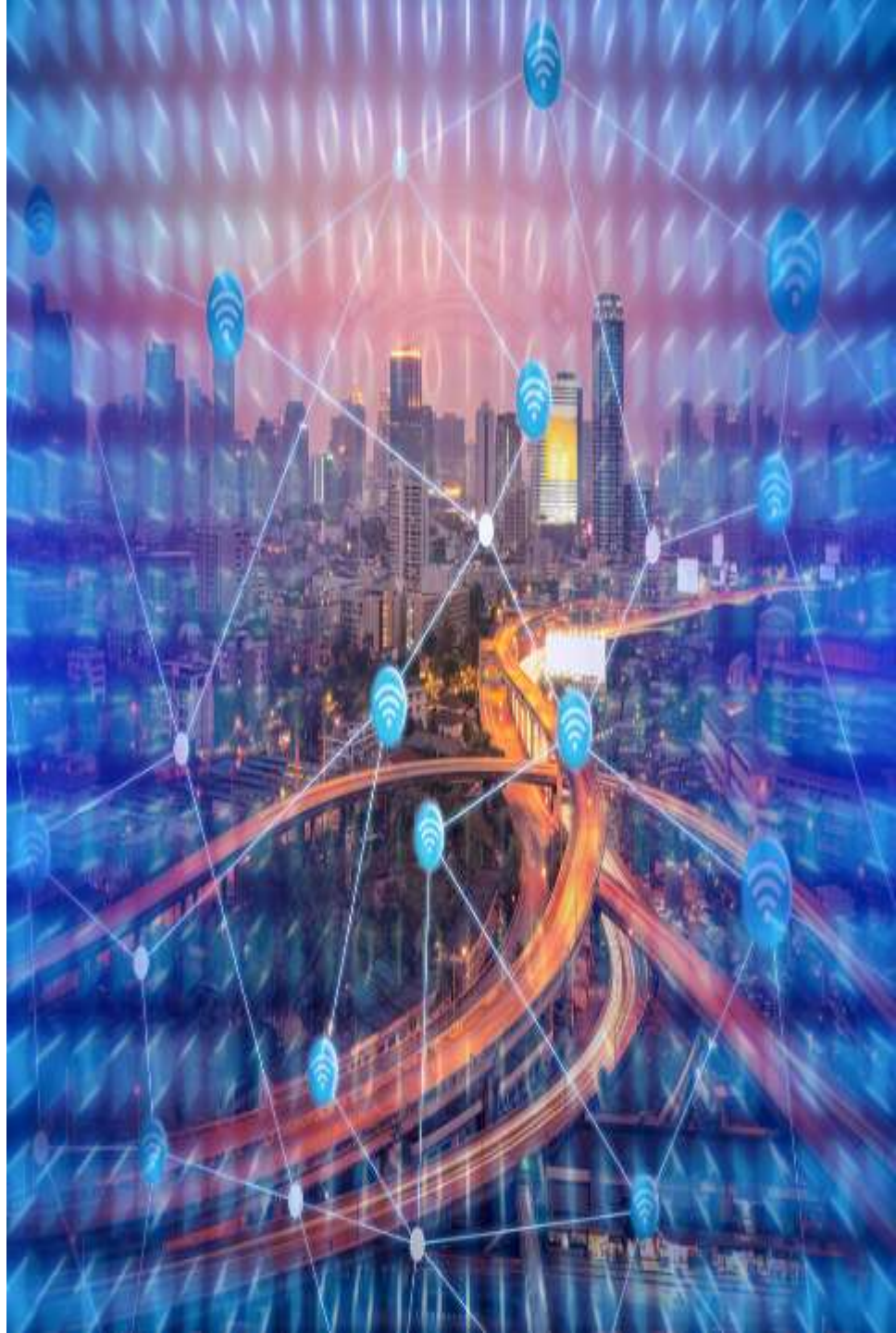
- Develop strong **road safety culture** of the Authorities and the Stakeholders (safe system approach) and the whole population.

Road Safety Technology Perspectives

- **Technology** can be the new road safety driver, through:
  - Public private partnerships
  - Clear problem analyses (well defined objectives)
  - Systematic effectiveness monitoring

- Great **need** for:
  - more data and knowledge
  - better exploitation of current and future data
  - broader geographical coverage

- **Data** focus on:
  - more accurate road accident data (LMIC Counties)
  - exposure data and performance indicators
  - measures and policies effectiveness evaluation



Road Safety Digitalization Perspectives

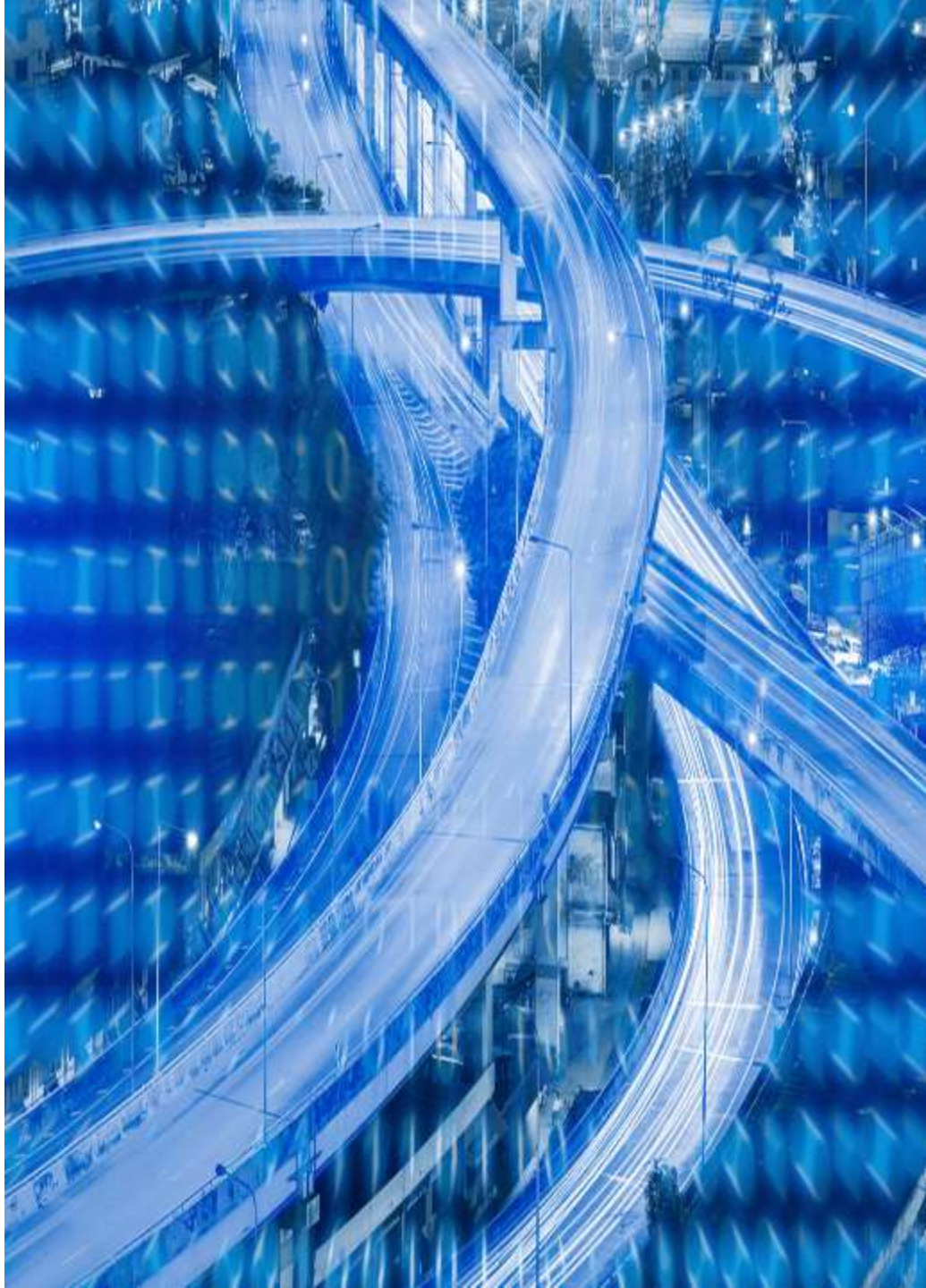
- **Digitalization** opens great new data possibilities for:
  - road user support and guidance
  - evidence based public and private road safety decision making at all levels

- 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

TSR Opportunities (1/2)

- Bridge the gap for efficient and systematic synergies between **private and public** sectors
- Demonstrate the great added value of appropriate exploitation of **technology and data** for road safety improvement
- Be more present at **Global level** through close cooperations with key global road safety stakeholders
- Contribute to improve road safety in **Regions** with lower safety performances



TSR Opportunities (2/2)

- Implement frequent **global road safety campaigns**
  - targeted audiences with targeted messages
  - in cooperation with global players

- Develop highly efficient road safety **technology tools**, and promote them worldwide

- Develop and promote exemplary synergies for building road safety **capacity** at cities

- Mobilise the necessary road safety **budgets**, which are highly profitable in terms of return of investment:
  - with thousands of lives and injuries saved and
  - road safety investments properly exploited

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