



International Association of Traffic and Safety Sciences

A Conceptual Framework for Road Traffic Safety

International Comparison and
Future Challenges in Japan

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Project leader of Global Research Alliance
on Traffic and Safety (GRATS) in IATSS



1. Background

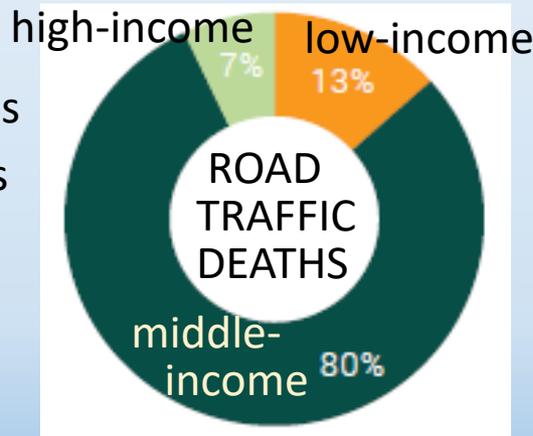
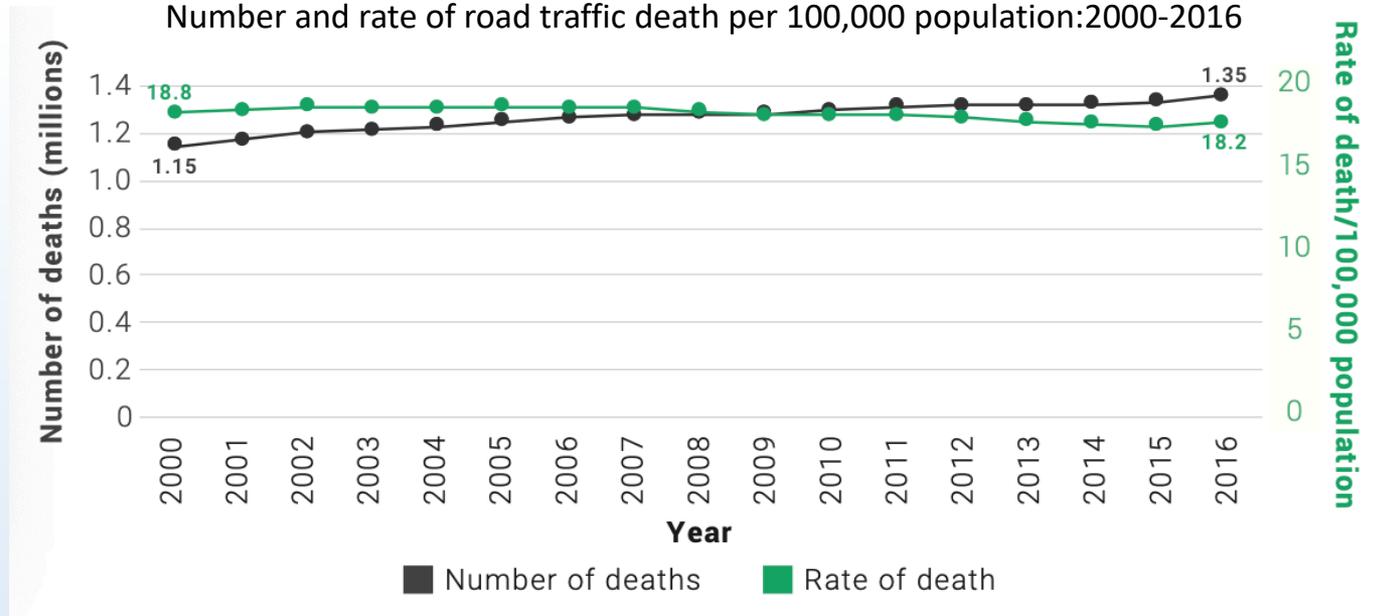
1.35

million **deaths** each year

8th

leading **cause** of death for people of all ages

93% of the world's fatalities on the roads occur in **low- and middle-income countries**

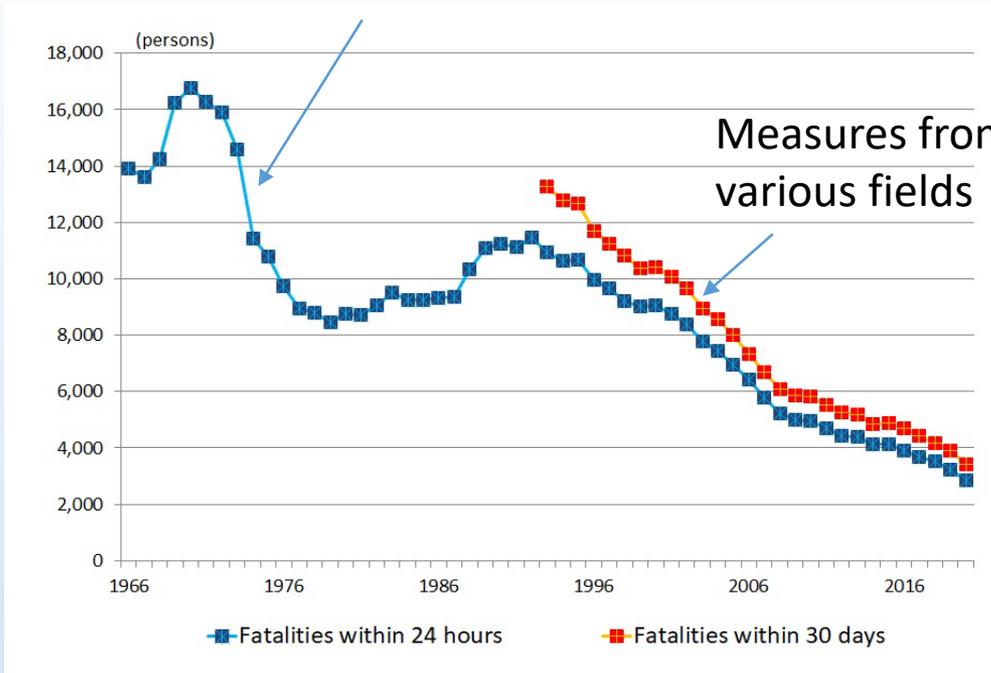


Although the rate of road traffic death is not worsening recent years, the number of road traffic deaths on the world's roads remains **unacceptably high.**



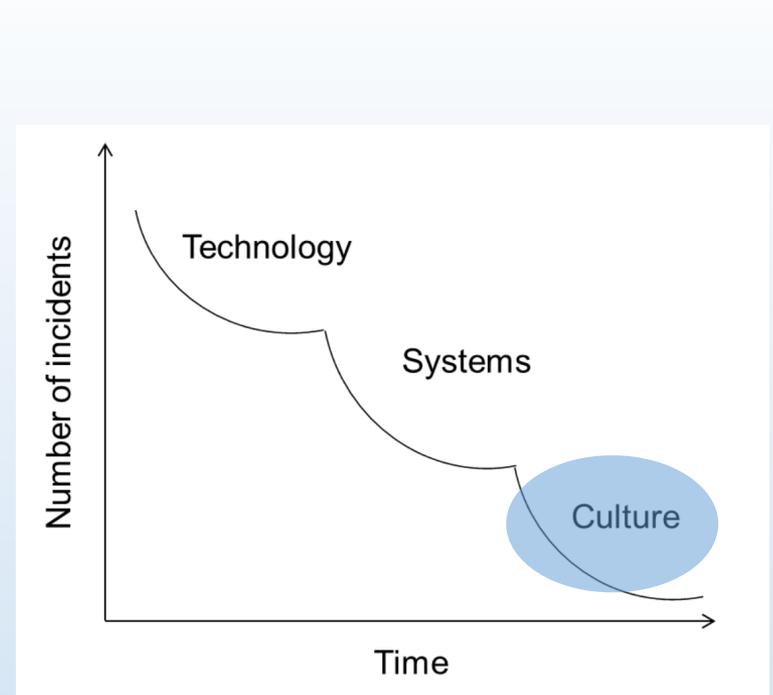
Trend of Road Traffic Fatalities in Japan

All countermeasures with a focus on technology



Road traffic death in Japan (1966-2020)

<https://www.npa.go.jp/english/bureau/traffic/index.html>

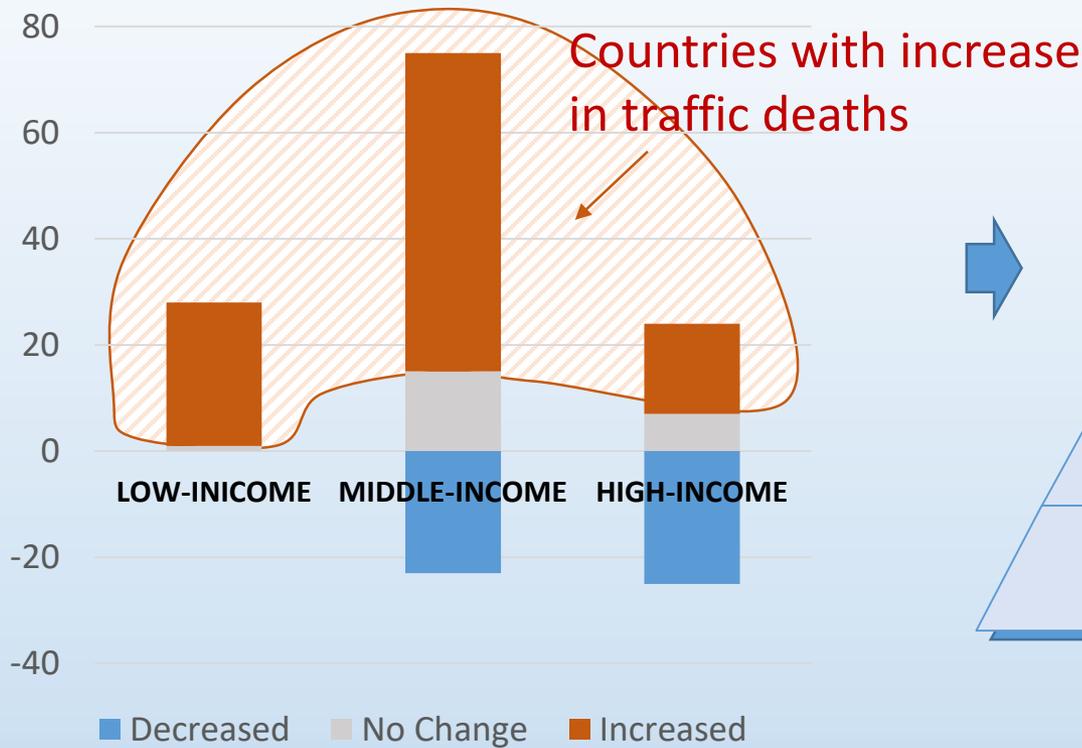


Three periods in traffic safety development (Özkan, 2018)

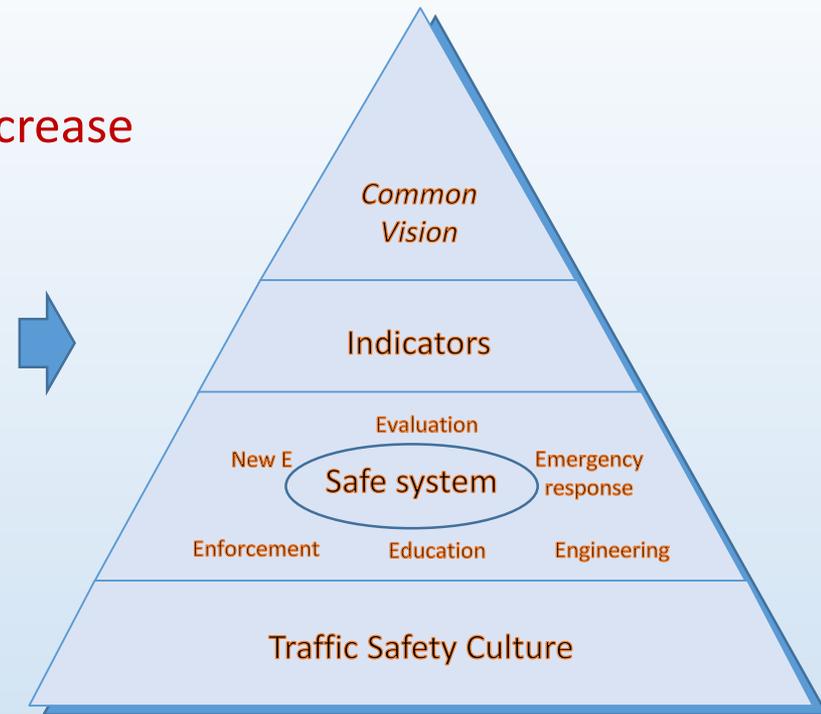


Toward a common understanding

Number of countries where a change in the number of road traffic deaths has been observed since 2013



Proposals to reduce road traffic accidents from **four levels**



A conceptual framework for road traffic safety

Source: WHO, Global status report on road safety 2018



2. Toward a common vision



Period	1990–2000	2001–2010	2010–Present
Development of Traffic Safety	Technology - System approach - Traffic Safety Culture		
Sweden		Vision Zero (1997)	
The Netherland	Functionally divide the urban area into traffic areas and residential areas	Sustainable Safety Start-up (1998)	Road Safety Strategic Plan 2008–2020
Australia		First National Road Safety Strategy (1992)	Safe System Approach (The National Road Safety Strategy 2001–2010)
New Zealand			Road to ZERO New Zealand’s Road Safety Strategy 2020–2030
Norway			National Plan of Action for Road Safety 2018–2021 Short Vision
International organization			Global Plan for the Decade of Action for Road Safety 2011-2020 (UN) Together with UNECE on the road to safety- Cutting road traffic deaths and injuries in half by 2020 (2015) Global Plan of Action for the 2021-2030 Decade of Action for Road Safety (UN) (draft on April 16, 2021)



Basic principle of the plan for countries and international organization



Countries/International organizations	Basic principles of the Plan
Vision Zero (1997) Sweden	The long-term goal for road safety is proposed to be that no one should be killed or seriously injured as a result of traffic accidents within the road transport system.
Sustainable Safety (2018) Netherlands	A sustainably safe road traffic system prevents road deaths, serious road injuries, and permanent injury by systematically reducing the underlying risks of the entire traffic system.
Road to ZERO (2019) New Zealand	A New Zealand where no one is killed or seriously injured in road crashes.
National Plan of Action for Road Safety (2018) Norway	Our road safety work will be based on the vision of no one being killed or seriously injured within the road transport system .
National Road Safety Strategy (2011-2020) Australia	It is firmly based on Safe System principles and is framed by the guiding vision that no person should be killed or seriously injured on Australia's roads.
Road Safety Commission National Action Plan (2013-2020) Denmark	To ensure that errors by road users do not cause serious accidents , and also limit dangerous driving as far as possible. We all have a responsibility .
The 11th Fundamental Traffic Safety Program (2021) Japan	Aiming to a society without traffic accidents.



Basic principle of the plan for countries and international organization



Countries/International organizations	Basic principles of the Plan
Global Plan for the Decade of Action for Road Safety (2010) UN	The guiding principles are those included in the "safe system" approach. It starts from the acceptance of human error and thus the realization that traffic crashes cannot be completely avoided.
Sustainable & Safe: A Vision and Guidance for Zero Road Deaths (2018) World Bank	The "Safe System" approach outlined in this report starts from the basic premise that human error is inevitable but traffic fatalities and serious injuries are not.
EU Road Safety Policy Framework (2020) European Commission	The premise that no loss of life is acceptable needs to inform all decision making on road safety. The Safe System approach aims for a more forgiving road system. Shared responsibility.
Global Plan of Action for the 2021 – 2030 Decade of Action for Road Safety (Drafted 2021) UN	It draws further attention to effective governance as a central aspect of implementation of the safe system.



Road Traffic Safety in the SDGs



SDGs: Goal 3.

Ensure healthy lives and promote well-being for all at all ages

SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



Targets

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

Indicators

3.6.1 Death rate due to road traffic injuries

Sources: http://www.unic.or.jp/files/sdg_logo_en_2.png Ministry of Foreign Affairs of Japan (2019)

Shareable common vision



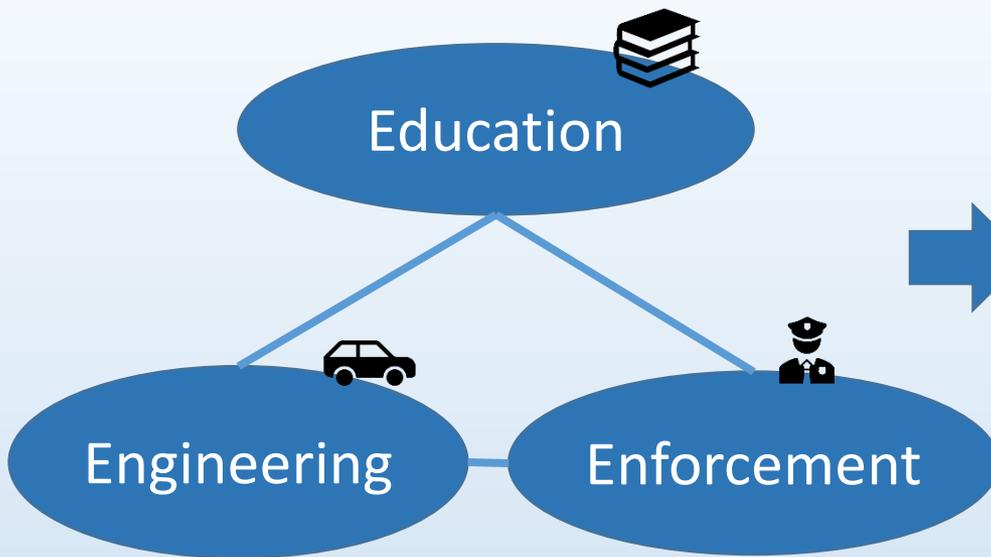
We all share a common responsibility to create a safe traffic society where no one is left behind.



3. Organizing Indicators

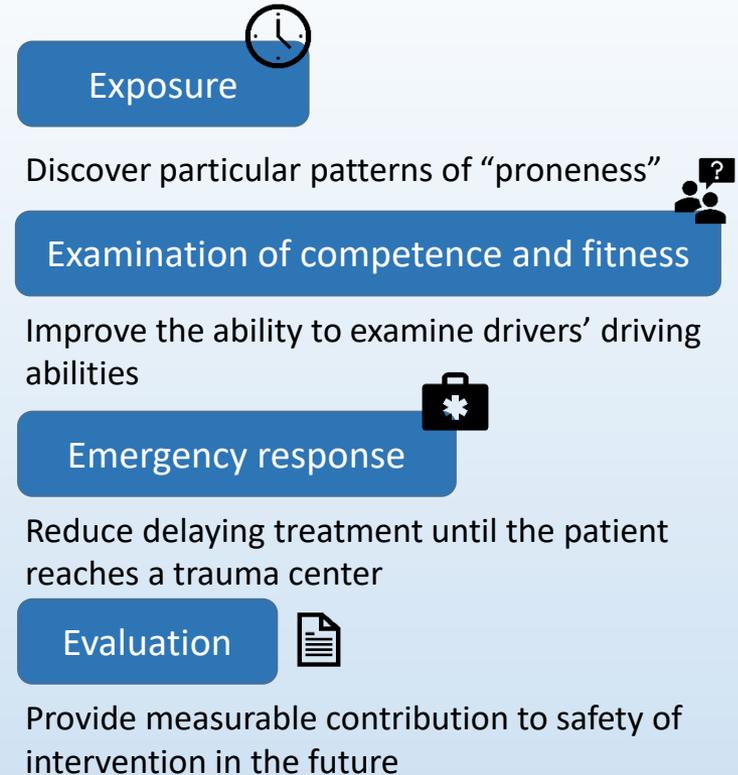


“e” in Traffic safety



The traditional 3E concept

✓ New discovered problems and challenges with the progress of the times & Detailed analysis



Source: Groeger, J.A. (2011) How many E’s in road safety? In B.E Porter (Ed.), Handbook of traffic psychology, pp.3-12. London: Academic Press.



Road traffic safety indicators (int. org.)



Int.org.	Name of goals	Target year	Traffic safety outcome		E1*	E2*										E3*	E4*	E5*	E6*	E7*
			RTA ¹ fatalities	RTA ¹ injuries		Regulations														
						R1*	R2*	R3*	R4*	R5*	R6*	R7*	R*	V*						
UN	SDGs	2020	*	*																
UN	Decade of Action for Road Safety 2021-2030	2021-2030	*			○	○	○	○	○			○	○		○				○
WHO	12 voluntary global performance targets for road safety	2020-2030				○	○	○	○	○	○		○	○		○				
OECD	TOWARDS ZERO Ambitious Road Safety Targets and the Safe System Approach		*	*		○	○	○					○	○	○	○				
WB	GRSF in Action: Effective Delivery of Global Road Safety Solutions					○							○	○		○				○
UNECE	Together with UNECE on the road to safety	2020			○	○	○	○	○	○			○	○		○				
European Commission	EU road safety policy framework 2021-2030	2021-2030				○	○	○	○				○	○		○				

¹RTA: Road traffic accident

*E1: Education; E2: Engineering; E3:Enforcement; E4:Emergency Response; E5: Exposure; E6: Examination of competence; E7: Evaluation & Reliable data

*R1: Speeding; R2: Drink-driving; R3: Seatbelt use; R4: Child Restraint System; R5: Helmet use; R6: Mobile phone use while driving; R7: Fatigue; R: Road infrastructure management; V: Vehicle standards



Road traffic safety indicators (country)



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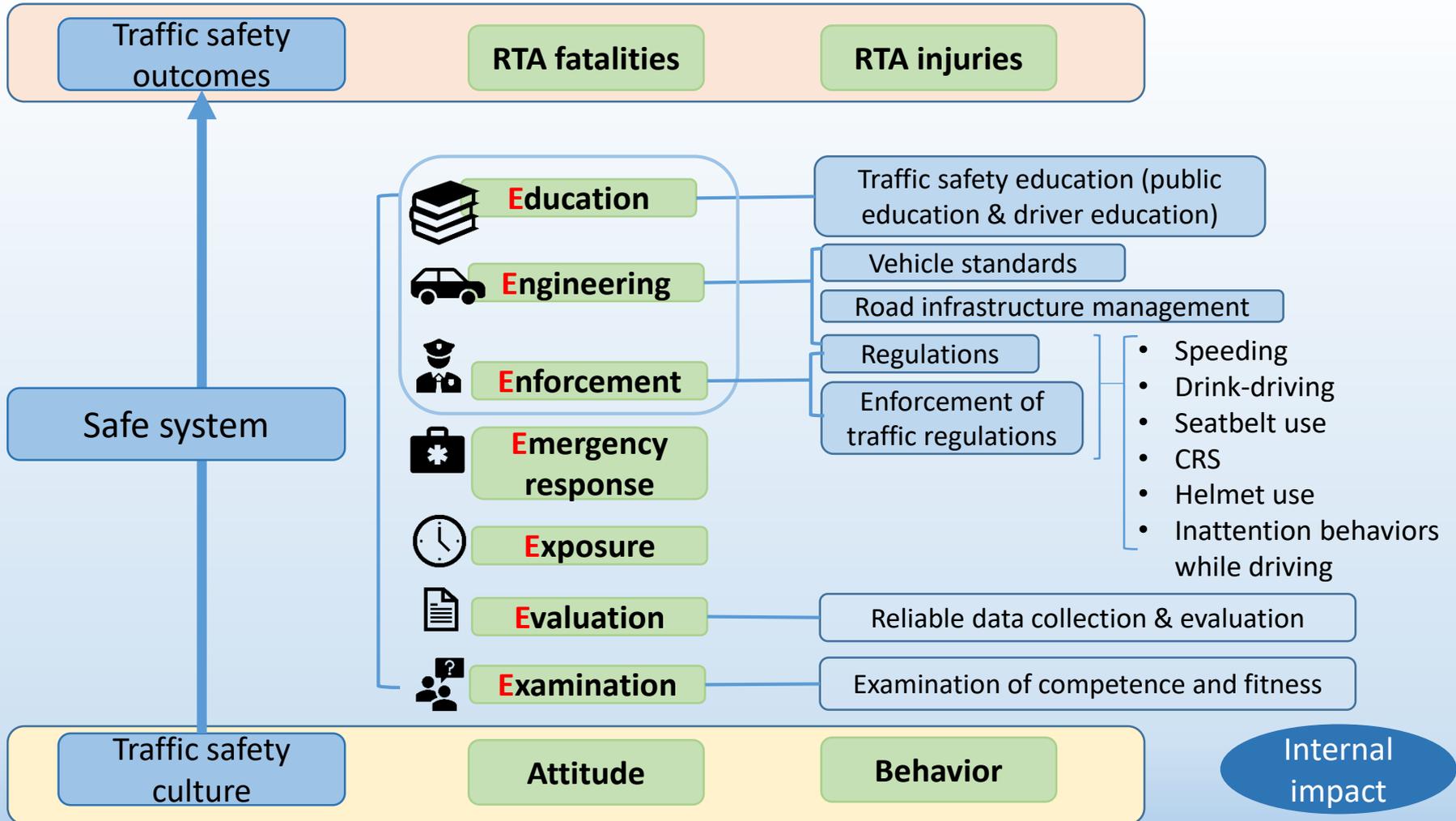
Countries	Name of goals/Indicator system	Target year	Traffic safety outcome		E1*	E2*										E3*	E4*	E5*	E6*	E7*
			RTA ¹ fatalities	RTA ¹ injuries		Regulations														
						R1*	R2*	R3*	R4*	R5*	R6*	R7*	R*	V*						
	Norway National Plan of Action for Road Safety	2018-2021	*	*	○	○	○	○	○					○	○	○		○		
	Sweden Vision zero	2020	*	*		○								○	○			○		
	Sweden Action plan for safe road traffic 2019-2022	2019-2022	*	*		○	○							○	○	Technical systems			○	
	the UK Strategic Framework for Road Safety				○	○	○							○	○			○	Casualty Forecasts	
	Japan 11th Fundamental Traffic Safety Program	2022-2026	*	*	○	○	○	○	○	○				○	○	○	○	○	○	
	Israel Towards Safer Roads National Road Safety Plan	2020	*		○	○	○	○	○	○	○	○								
	Denmark Every Accident is one too many-a shared responsibility (Danish Road Safety Commission National Action Plan)	2013-2020	*	*	○	○	○	○		○				○	○			○	○	
	The Netherlands Road Safety Strategic Plan 2008-2020	2020	*	*	○	○	○							○	○			○	○	
	German Road Safety Programme 2011	2020	*		pre-test driver training		○	○		○				○	○			○	○	voluntary health check-up
	Australia National Road Safety Strategy 2011-2020	2011-2020	*	*	○	○	○	○						○	○	○		○	○	
	Ireland Road Safety Strategy 2013-2020	2013-2020	*	*	○	○	○	○	○	○	○			○	○	○		○	○	
	Poland National Road Safety Programme 2013-2020	2013-2020	*	*	○	○	○	○	○	○				○	○	○	○	○	○	
	Austria Austrian Road Safety Programme 2011-2020	2011-2020	*	*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	New Zealand New Zealand's Road Safety Strategy 2020-2030	2020-2030	*	*	○	○	○	○	○	○				○	○			○		



Indicator framework



Targets





4. Safe System Approach



- Sweden's **Vision Zero** and the Netherlands' **Sustainable Safety** are the longest established **safe system approaches**. Australia's **road safety strategy** over the past 20 years is also based on a **safe system approach**.(Langford ,2009)
- The effective implementation of this approach needs to be based on a number of key factors, which include obtaining appropriate evidence to support system-based strategic decisions. (Salmon &Lenné , 2009)





GLOBAL PLAN; Decade of Action for Road Safety 2021-2030, UNRSC



The plan was launched on 28 October in 2021

GLOBAL PLAN

DECADE OF ACTION FOR ROAD SAFETY 2021-2030

UN General Assembly Resolution 74/299 declared a **Decade of Action for Road Safety 2021-2030**, with the target to reduce road traffic deaths & injuries

BY AT LEAST 50% during that period

The **Global Plan** describes what is needed to achieve that target, and calls on governments & partners to implement an integrated

SAFE SYSTEM APPROACH





5. Traffic safety culture



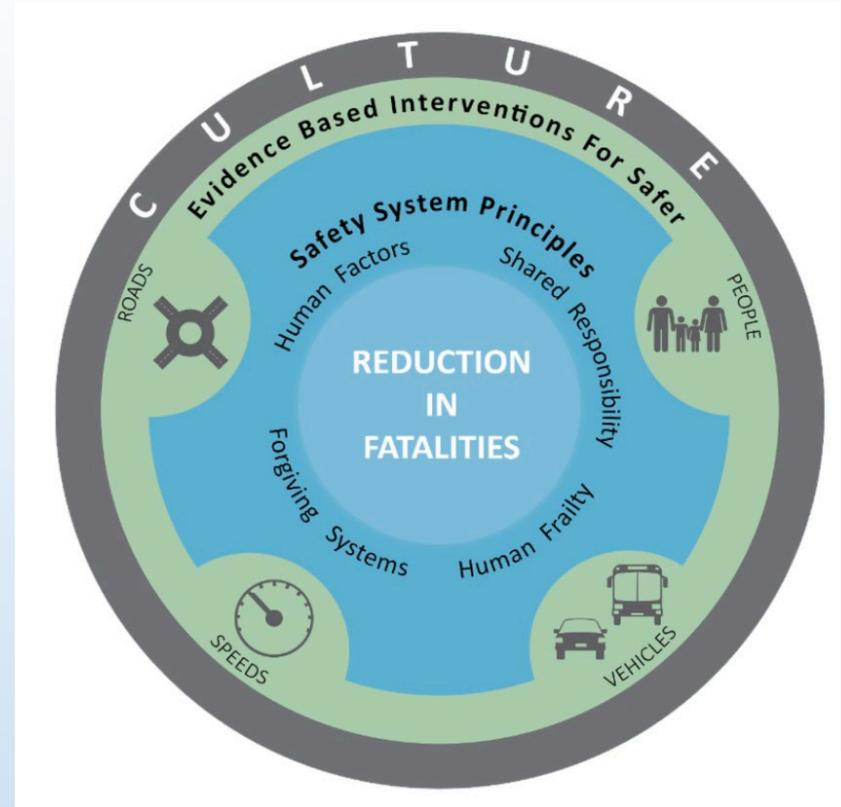
TRAFFIC SAFETY CULTURE

➤ What is traffic safety culture (TSC)?

The values and beliefs shared among groups of road users and stakeholders that influence their decisions to behave or act in ways that affect traffic safety (Otto, 2016).

The sum of all factors that affect the skills, safety attitudes and safety behavior of road users (Lajunen et al., 2017)

The shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands (US DOT)



Source: <https://chsculture.org/all-publications/how-are-vision-zero-safe-system-and-traffic-safety-culture-related/>



Traffic Safety Culture and the Safe System Approach for Achieving Vision Zero



THE SIXTH GLOBAL INTERACTIVE FORUM ON TRAFFIC & SAFETY, 2020

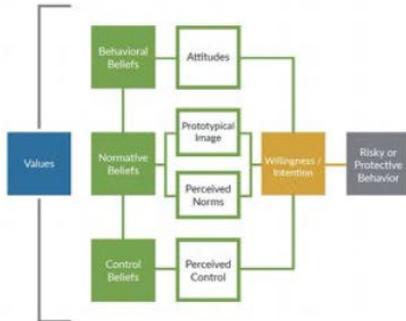
Professor **Nicholas Ward** (Director, Center for Health and Safety Culture)

Shared Understanding:

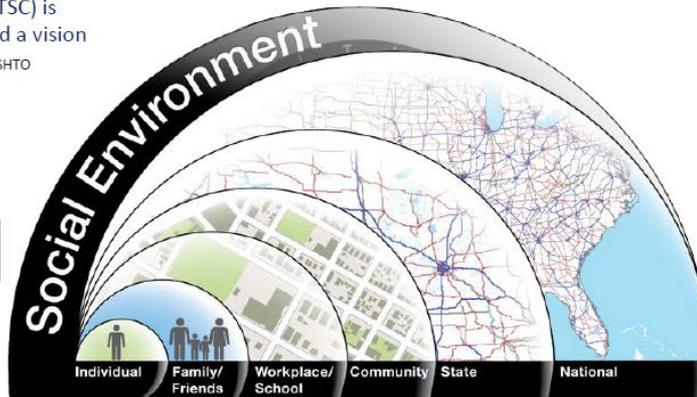
Understanding relationship amongst concepts.

Traffic Safety Culture is our foundation.

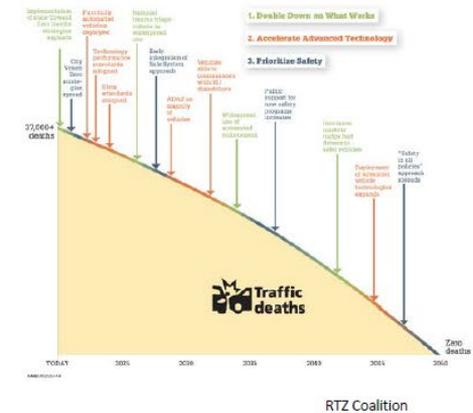
“Creating a positive traffic safety culture (TSC) is integral to helping our nation move toward a vision of a highway system with no fatalities.” AASHTO



The Safe System Approach is our strategy.

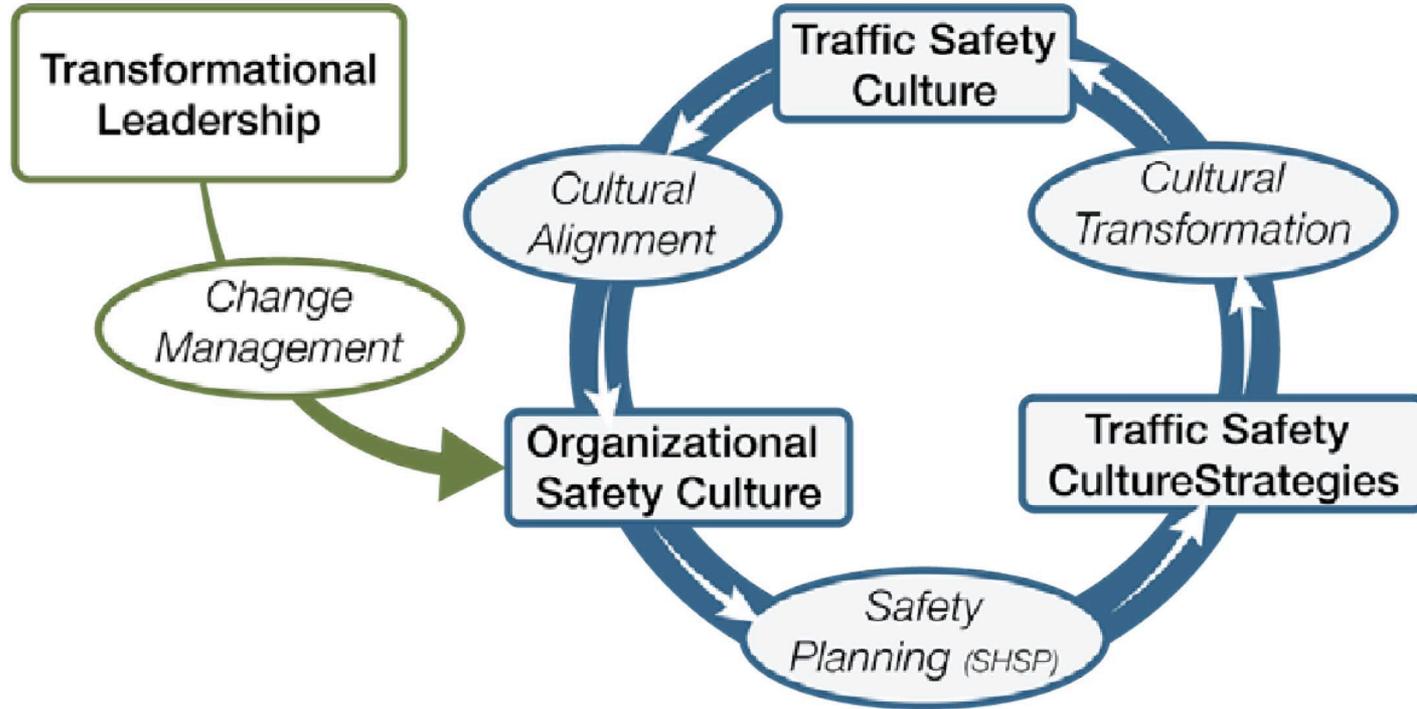


Vision Zero is our target.





Model of possible process to sustain transformation of traffic safety culture



Cultural transformational strategies are expected to be used as part of a strategic plan to integrate all relevant forms of traffic safety intervention. This ideology is embraced by the “safe-system approach”. In this context, new strategies to understand and transform culture will make people “safer by nature” by making safer speeds part of our social identities.

Source: Ward, N. J., Otto, J., & Linkenbach, J. (2014). A primer for traffic safety culture. *ITE Journal*, 84(5), 41-47.



6. Toward a New Transportation Society

19C

20C

21C

Walking → Rail → Car

【Development of transportation technology】

→ Human-centered transportation system

【Development of AI and ICT】

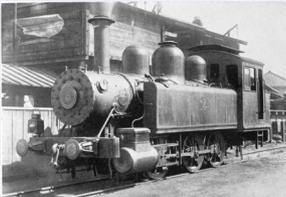
1825 Commercial operation of a steam locomotive (UK)

1920s Popularization of the automobile (U.S.)

1970s Spread of LRT and BRT

2010s Sharing of transportation

2020s Widespread use of self-driving cars



Source: Akinori Morimoto: Human-Centered Transportation Systems and Transportation Nodes, Transportation Engineering 56-4, p.1, 2021

A variety of next-generation transportation systems have emerged in the past half century.

→ The next generation of transportation is a “Human-centered transportation system”.

An era when people are free to choose transportation according to their needs



Realizing seamless mobility through ICT

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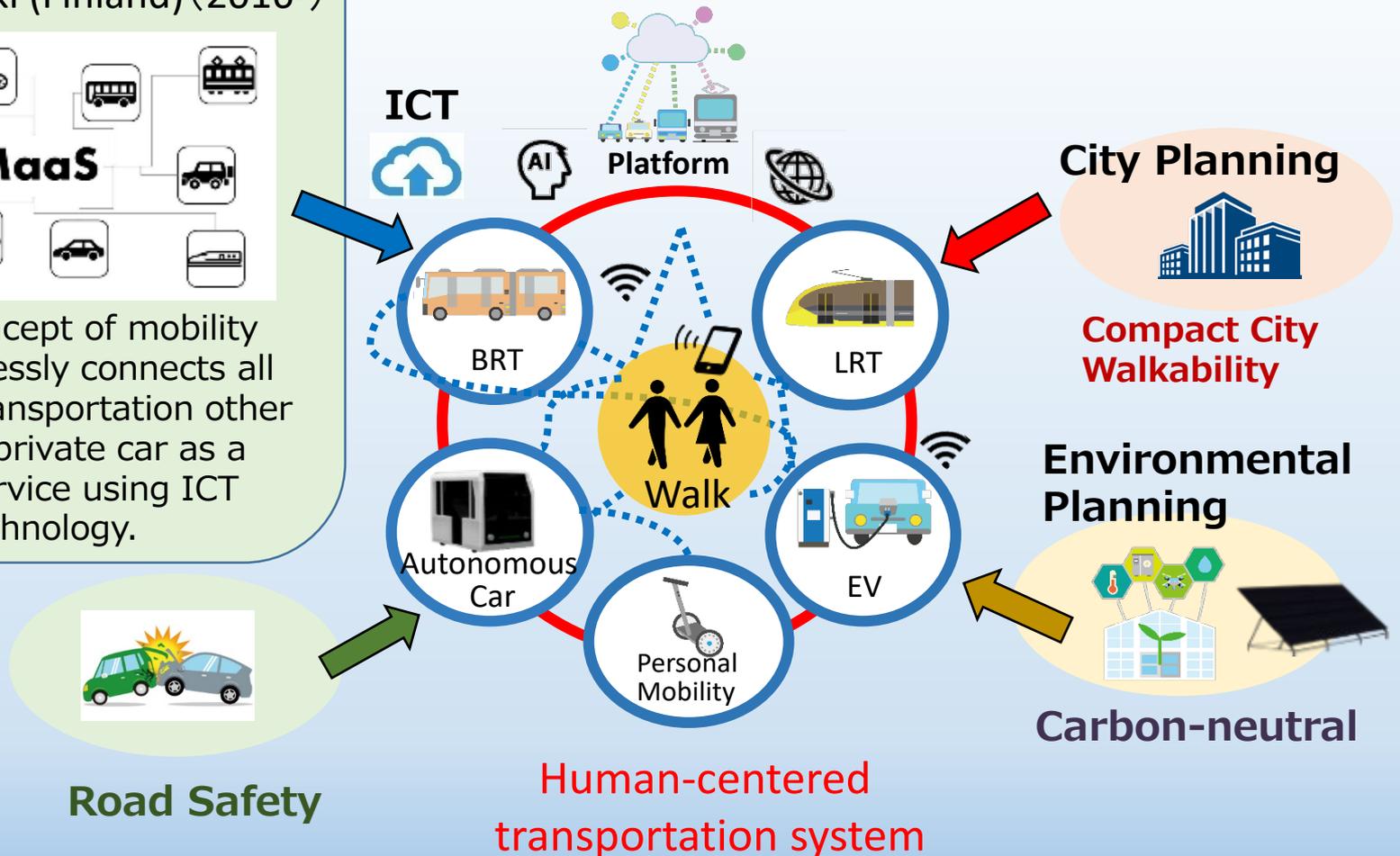
Mobility as a Service

Helsinki (Finland) (2016-)



A new concept of mobility that seamlessly connects all modes of transportation other than the private car as a single service using ICT technology.

Linkage to diverse urban policies





Multimodal transport and land-use planning

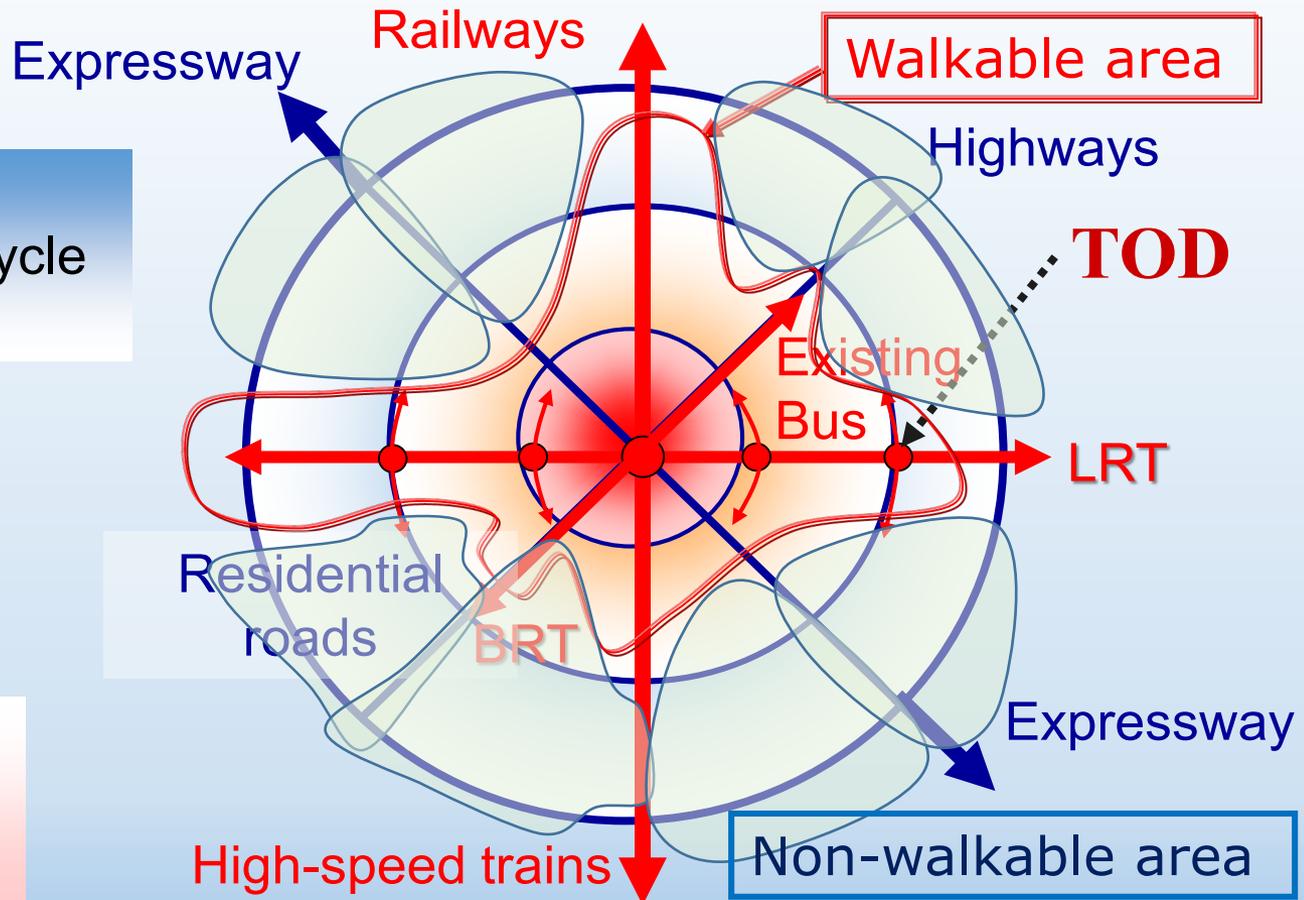
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Multimodal transport and land-use planning is an important starting point for implementing a Safe System. GLOBAL PALN; Decade of Action for Road Safety 2021-2030, UNRSC

Personal usage
Personal vehicle, Bicycle
Autonomous Car

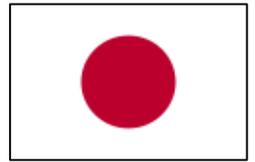


Transit usage
LRT, BRT, DRT
based on walking





7. Our roles and challenges



The 11th Fundamental Traffic Safety Program (2021), Japan

2022 – 2026 FY

Basic principles

Ultimately, we aim to make a giant leap toward the realization of **a society without traffic accidents** and a traffic safety society that leads the world.

Target

To achieve the safest road traffic in the world, with less than **2,000 fatalities** per 24 hours.

2,839 (2021) → (30% reduction) → 2,000 (2026)

If we can reduce it by 30% in 5 years, we can halve it in 10 years.

UN Road Safety Collaboration

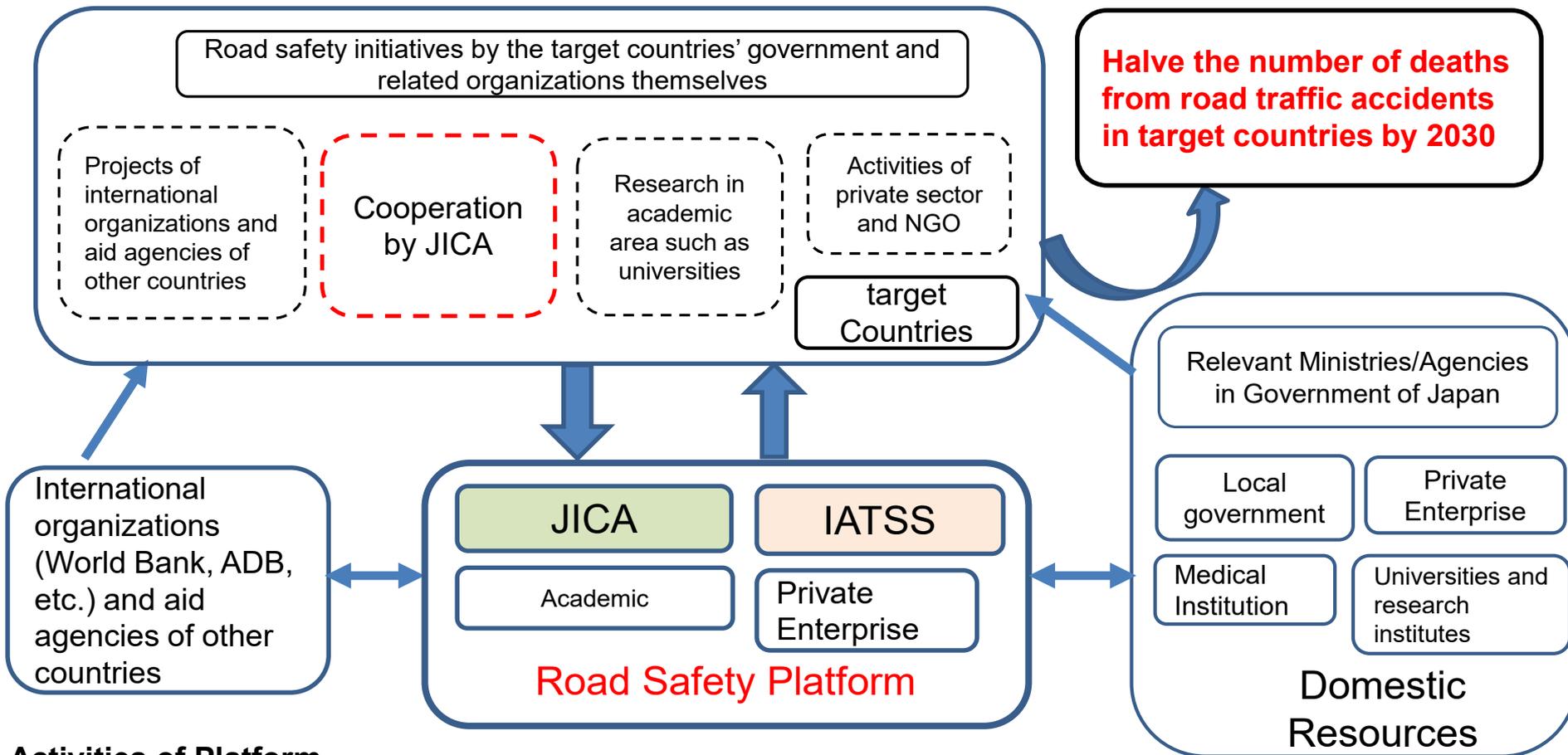
GLOBAL PALN; Decade of Action for Road Safety 2021-2030

BY AT LEAST 50% during that period

Matters of Cross-cutting Importance

In Japan, the number of road traffic accidents has been greatly reduced thanks to a wide range of measures and the efforts of related parties over the past half century. However, when we look at the world, more than 1.35 million people are killed annually by road traffic accidents. In order to reduce the number of road traffic accidents, it is important to **share and utilize Japan's knowledge** with the rest of the world, and to **promote international cooperation and collaboration**.

Traffic Safety Platform Concept



Activities of Platform

- Collecting information on projects and initiatives in the field of road safety in the target countries and verifying the effectiveness of the projects
- Consideration of new assistance to increase development effectiveness
- Collaboration and information sharing with international organizations and bilateral aid agencies

JICA's vision for "Road Safety"

1. Objective:

To contribute to the international goal of halving the number of traffic accident fatalities and injuries in target countries by 2030.

2. Assumed target Countries

Thailand, Malaysia, Cambodia, Bangladesh, and Kenya

3. The "Four E's" approach to cooperation

Area	Concrete Item
1. Enforcement	<ul style="list-style-type: none"> ✓ Traffic regulations and traffic enforcement ✓ Formulation of road safety policy and plan ✓ Arrange laws and policy related to road safety ✓ Establishment of Accident Data
2. Education	<ul style="list-style-type: none"> ✓ Road safety education at school and local communities ✓ Driver's license training associated with the driver's license system ✓ Safety education for drivers
3. Engineering	<ul style="list-style-type: none"> ✓ Maintenance roads and bridges (including sidewalk) ✓ Construction road safety facilities such as traffic control systems and traffic lights ✓ Construction and maintenance of Junctions and flyover ✓ Inspection of Vehicle based on appropriate inspection system
4. Emergency	<ul style="list-style-type: none"> ✓ Arrange ambulance cars and emergency medical facilities ✓ Improvement of emergency Medicine technologies, etc.



GLOBAL PLAN; Decade of Action for Road Safety 2021-2030, UNRSC

The plan was launched on 28 October in 2021

Role of academia, civil society and youth

Academic and research institutions play **an important role in generating evidence** to help government and other actors understand the nature of the problem as well as to identify effective solutions and strategies.

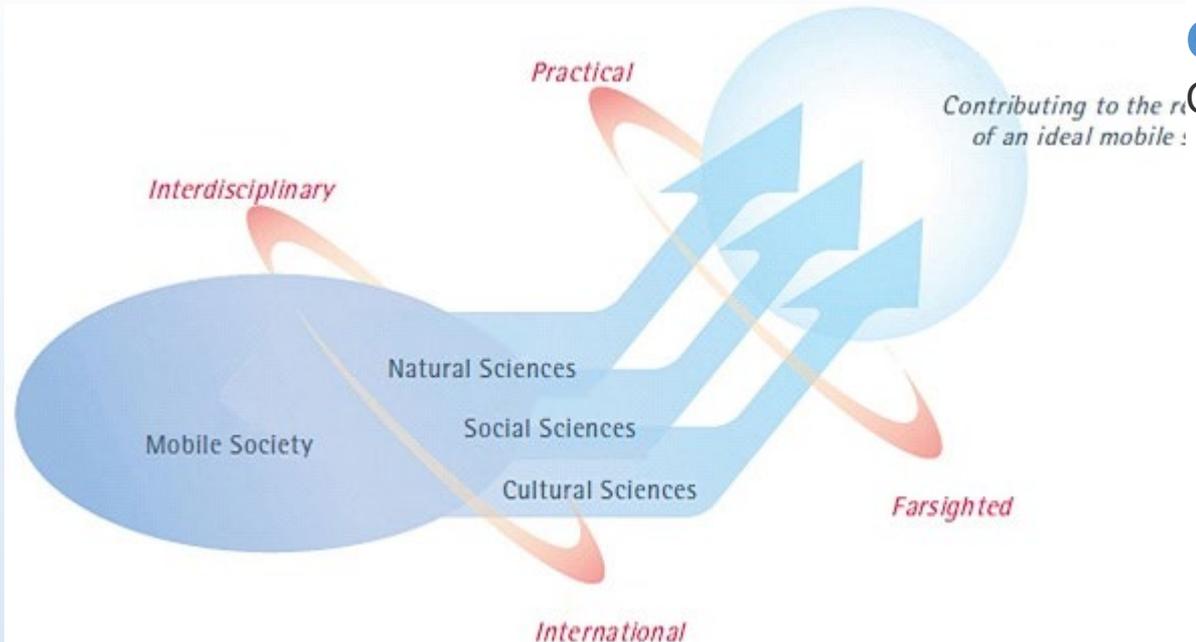


In addition to keeping road safety on the government agenda and uniting stakeholders with a **common goal**, academia and civil society groups can:

- be an important **source of road safety information** for the community and governments;
- help ensure government **accountability** by empowering communities on road safety issues and ensuring good governance; and
- help push for the achievement of the road **safety-related SDGs**.



The International Association of Traffic and Safety Sciences (IATSS)



Goal

Contributing to the realization of an ideal mobile society

Features

Approach:

Interdisciplinary and international approach

Outputs:

Practical and farsighted

Global Research Alliance on Traffic and Safety (GRATS)

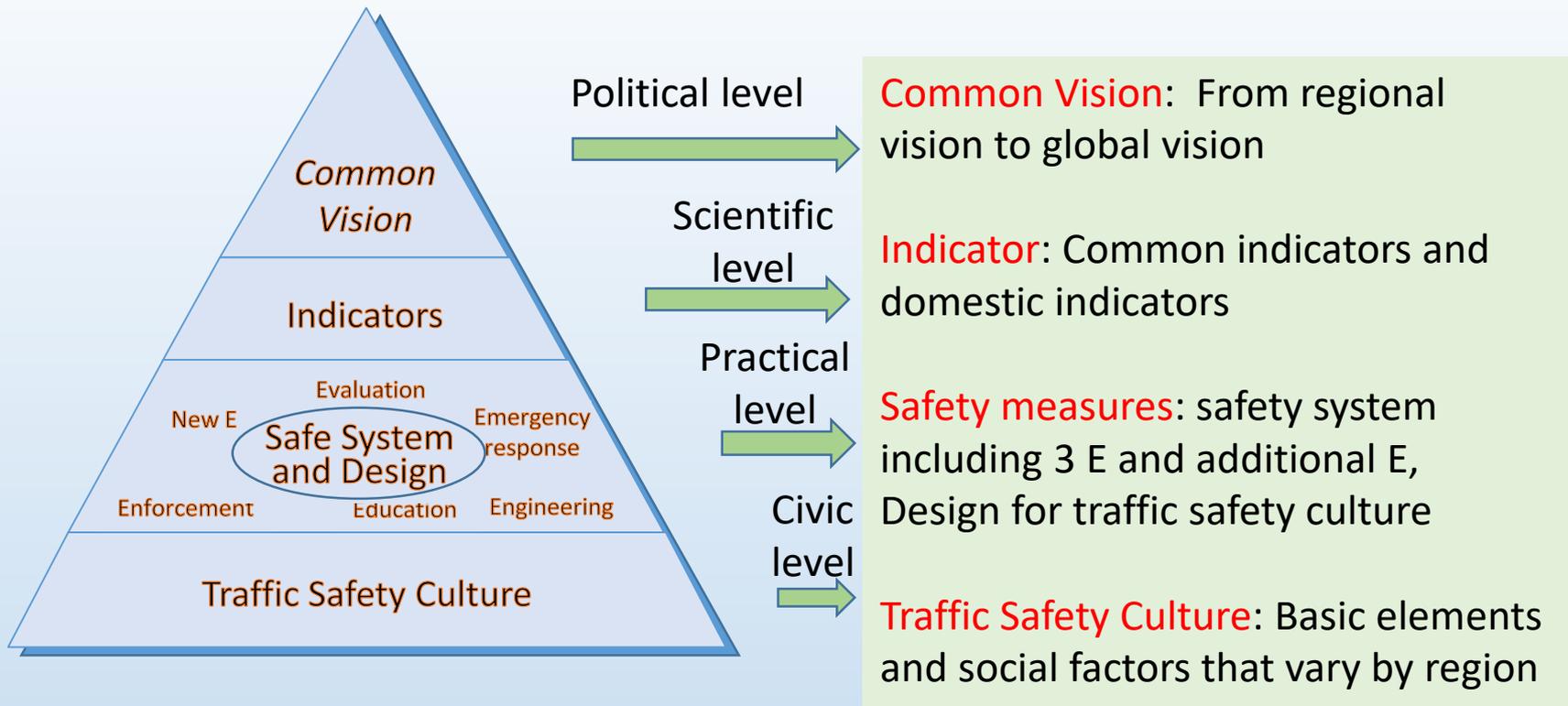
Sharing the vision of road safety and practicing the role of IATSS



A conceptual framework for Road Traffic Safety



We all share a common responsibility to create a safe traffic society where no one is left behind.





Waseda University

Thank you very much for your attention.

