

Benefit of SIP Automated Driving Systems

November 18, 2014

Seigo Kuzumaki

Toyota Motor Corporation

Workshop on Connected and Automated Driving System 2014



SIP Automated Driving systems

SIP : Cross-Ministerial Strategic Innovation Promotion Program

Social benefits

- Drastic reduction of traffic fatalities
- Enhanced mobility for the aged
- Reduction of traffic congestion
- Reduction of driving workload

Technology innovation

- Highly advanced driving assistance
- Innovative transportation systems with information and communication technologies

Automated Driving System
(built-in and connected)

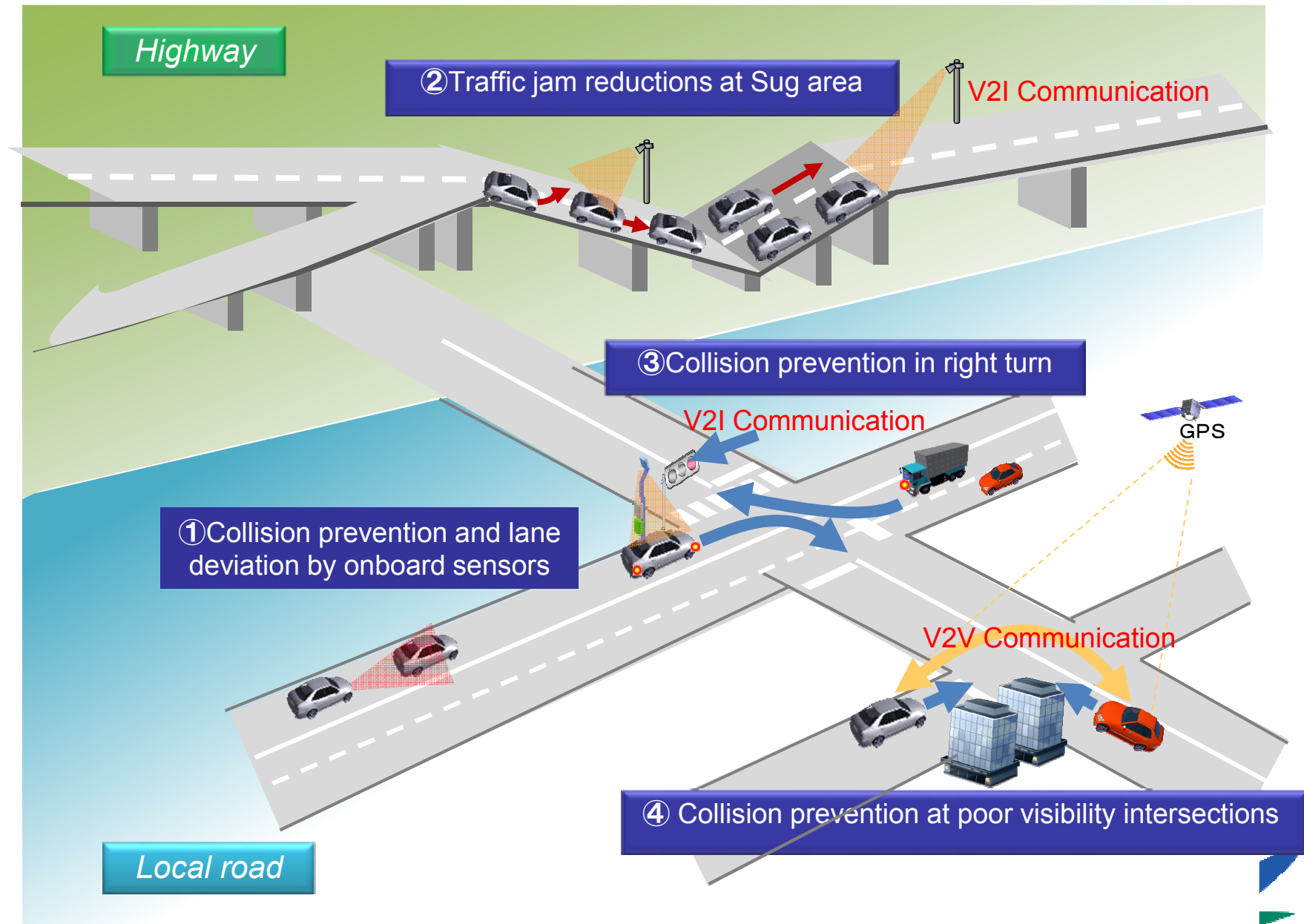
Business incubation

- Automotive and electronic industries
- Creation of new industrial sectors

To achieve the goal of national traffic fatality reduction nationwide is our main purpose.

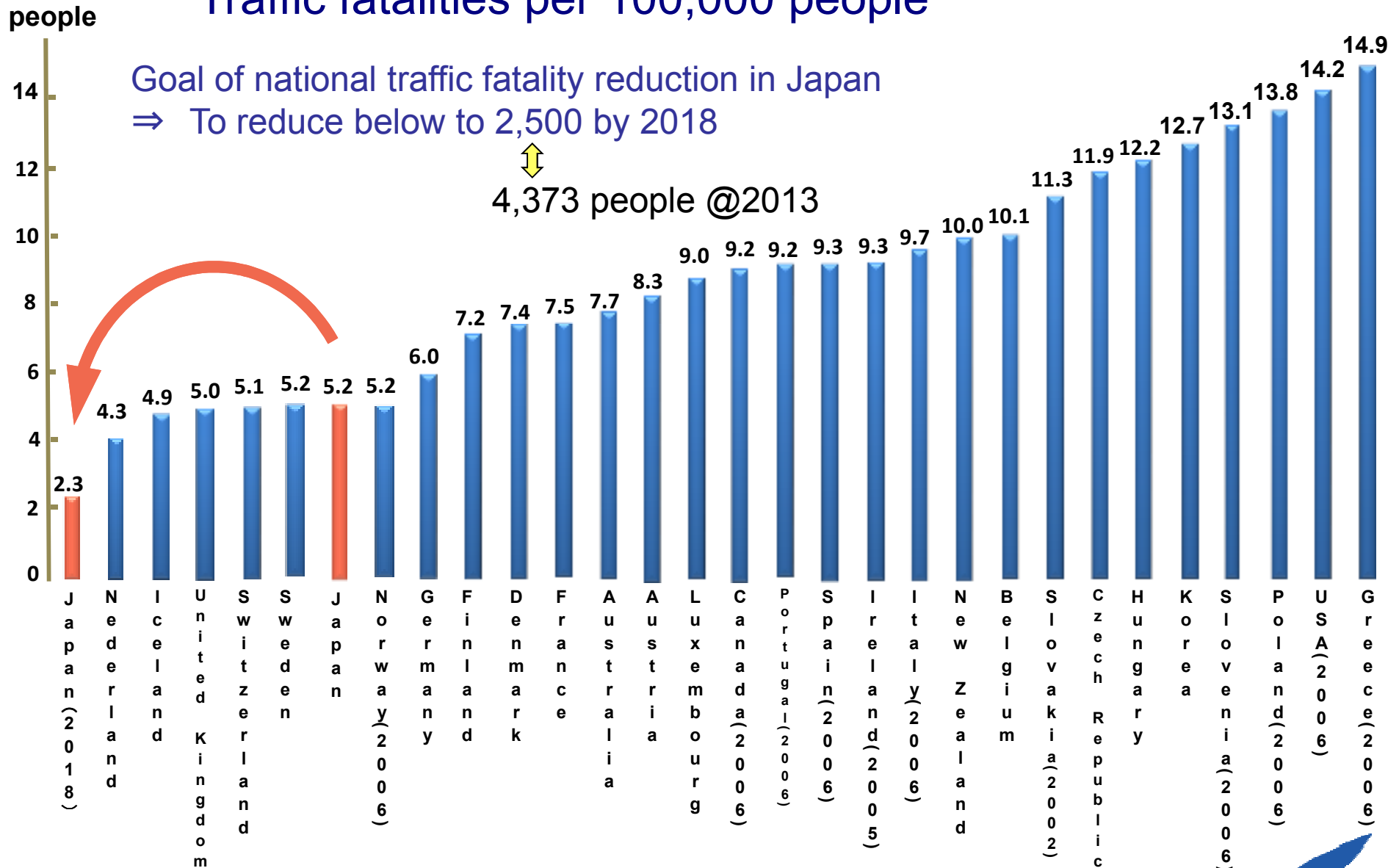


Fatality and CO₂ reduction with Automated driving technology



Traffic accident fatalities in the world

Traffic fatalities per 100,000 people

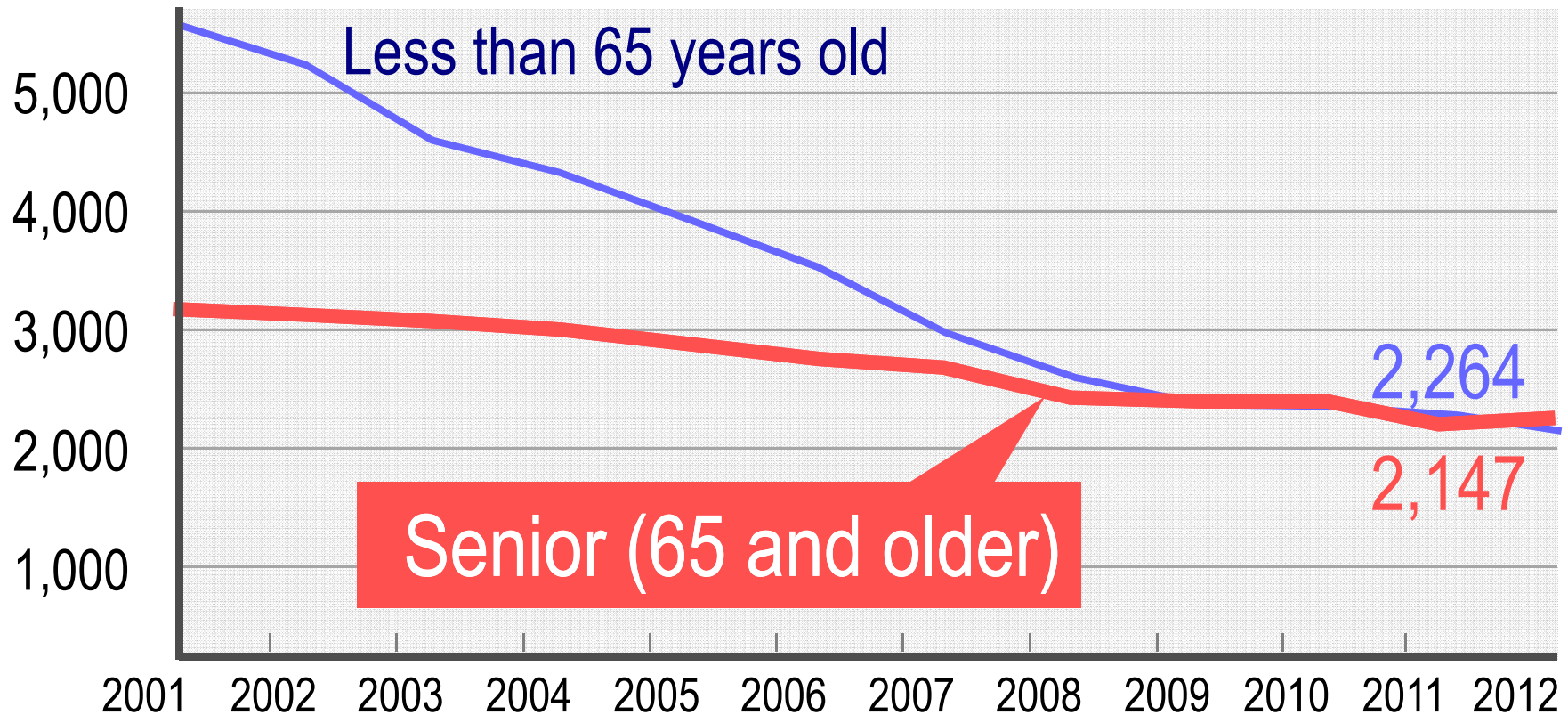


source: Cabinet office material (2009)



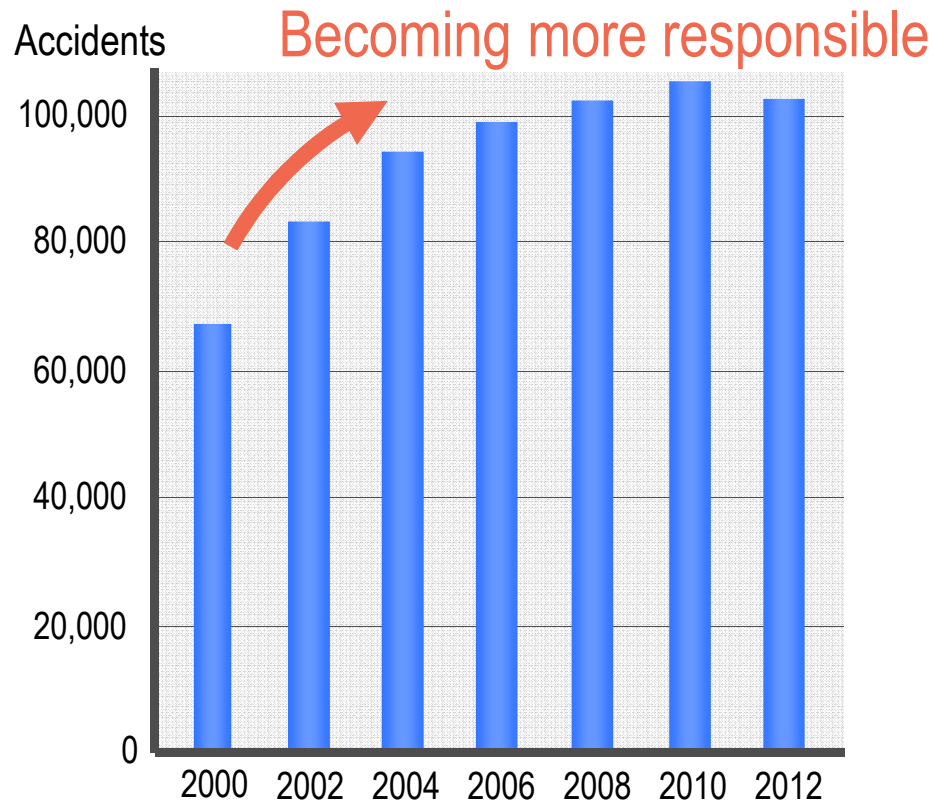
Traffic accidents in Japan; Senior Issue

Number of traffic fatalities (age of victim)



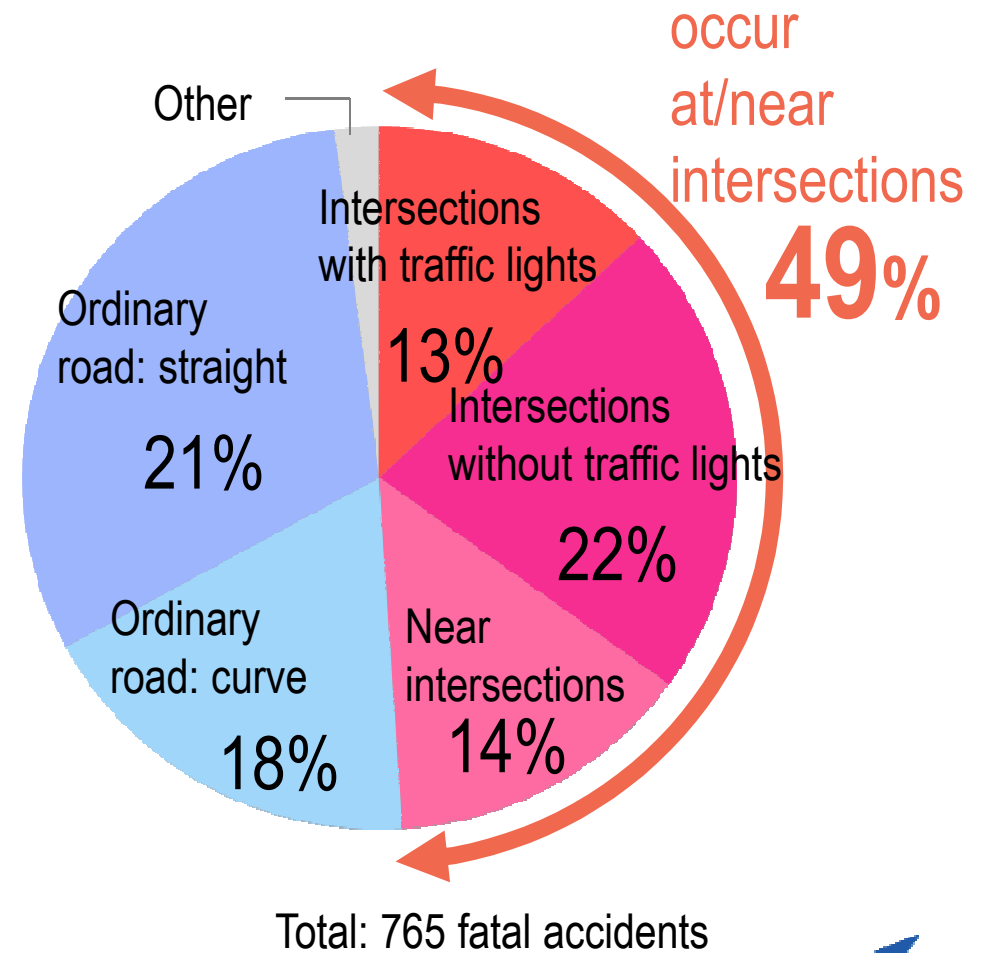
Traffic accidents in Japan; Senior Issue

No. of accidents caused by seniors (65+)



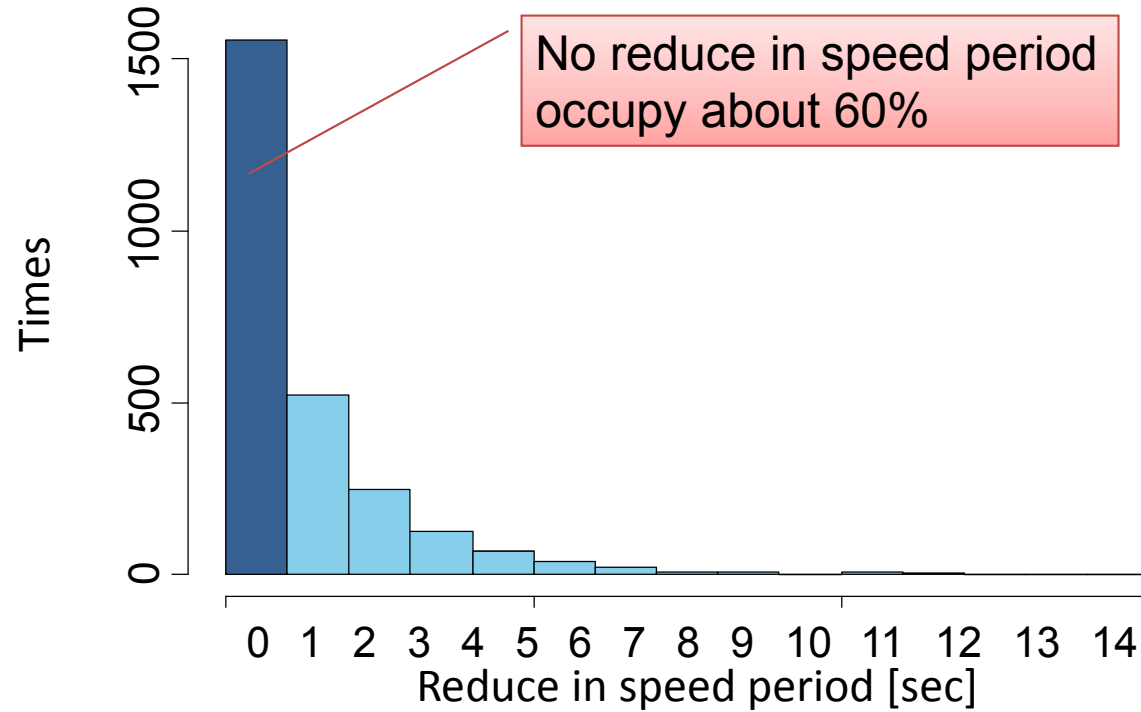
Source: Occurrence of Traffic Accidents in 2012
(National Police Agency Traffic Bureau)

Breakdown of fatal accidents caused by seniors (65+)



Case example; Senior driver behavior

Reduced speed period (under 5km/h) around a stop signs
(from 20 meters before stop line to 15 meters after)



	(
)

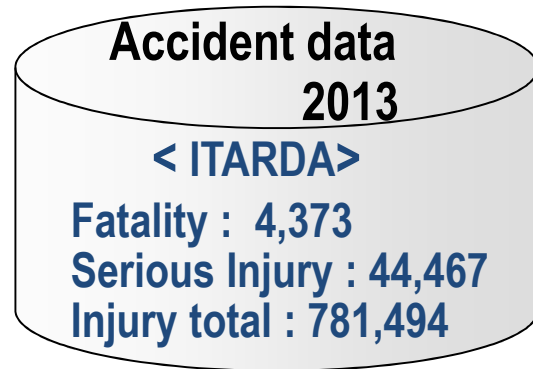


Approach of establishing a traffic simulation

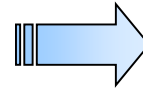
1. To Determine accident scenarios

Macro Data Analysis

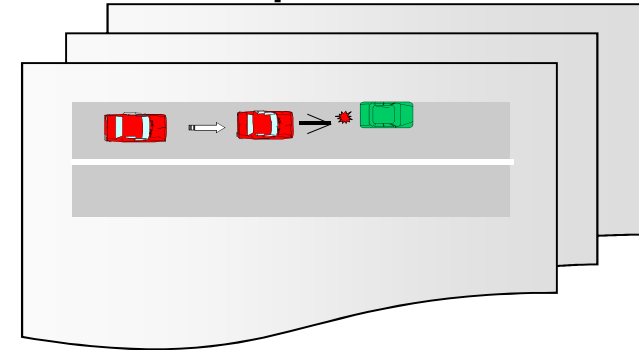
ITARDA Macro database



Pattern
classification



Accident patterns



(Approximately 250 patterns)

Micro Data Analysis

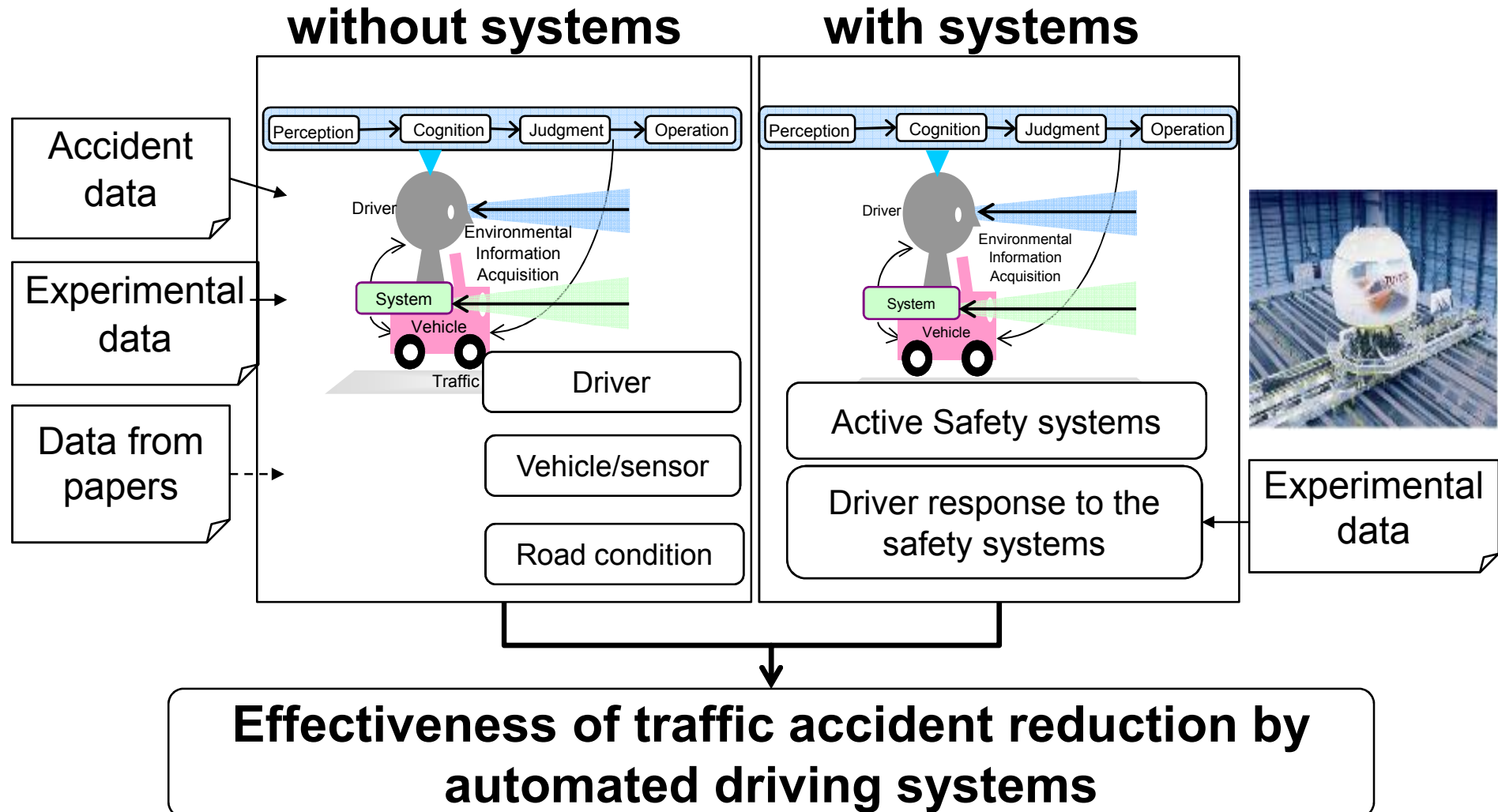
2. To evaluate the benefits of safety systems by traffic accident simulation

3. To estimate effectiveness by deduction those two data



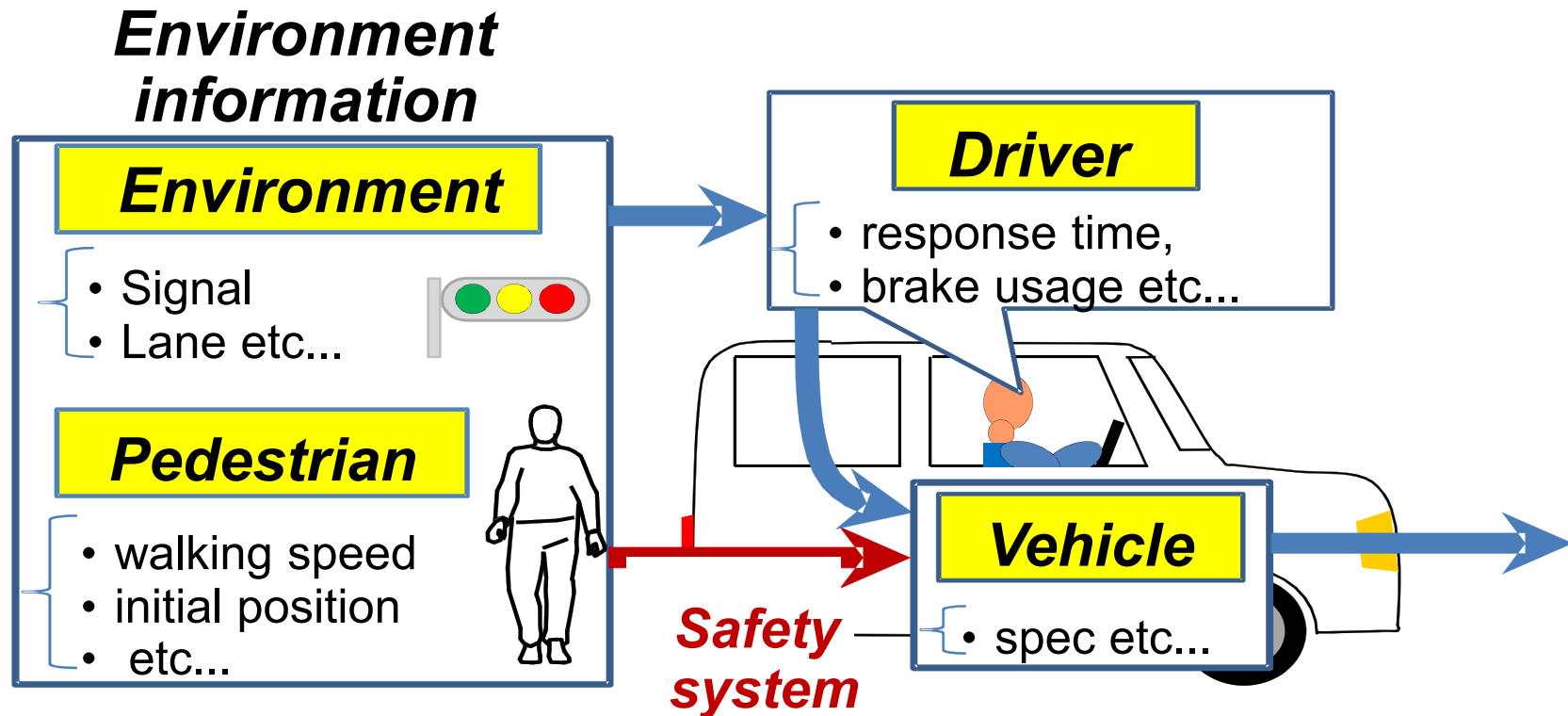
Simulation for an effectiveness evaluation

Simulated Accident scenes



Driver Model

In order to reproduce various accident scenarios in the simulation, it is necessary to have at least 4 components.



Relationship between each model



Driving Simulator



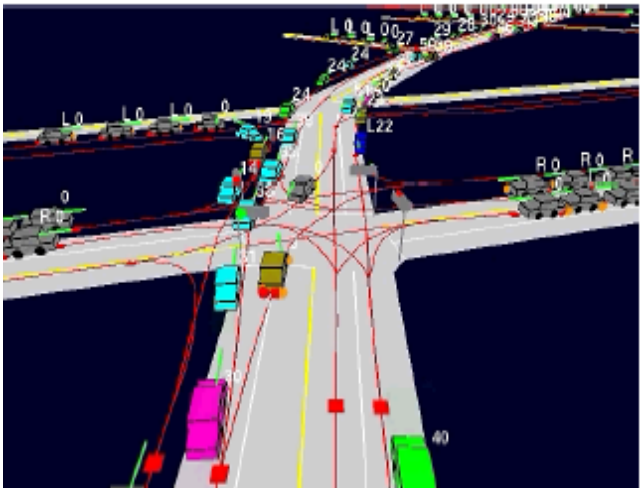
Field test



Applicability to other estimations

Extendibility and versatility to the other function (e.g. traffic jam, environment burden estimation) are also investigated.

Estimation of traffic accidents



+ Driver response to

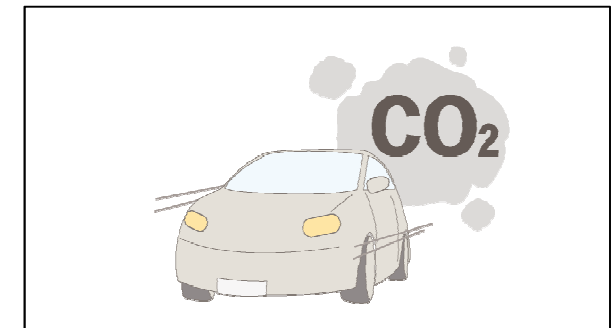
{ Traffic sign
ITS system

+ { Gas pedal usage
Engine output
Gas consumption

Estimation of traffic jam



Estimation of environment burden



Summary

- Main goal of SIP Automated driving system is to reduce traffic accident fatalities nationwide.
- A simulation methodology which can evaluate effectiveness of automated driving systems expects to be established in this project.
- PDCA cycle will be practiced by adopting those simulation models in selected cities.

Thank you for your attention!

See you next year again!

