3rd Asia Automobile Institute Summit
2-4 December 2014, Bangkok

Technical Session #2
Standardization for
Charging Safety of EV

Advanced Safety Vehicle Research Activities

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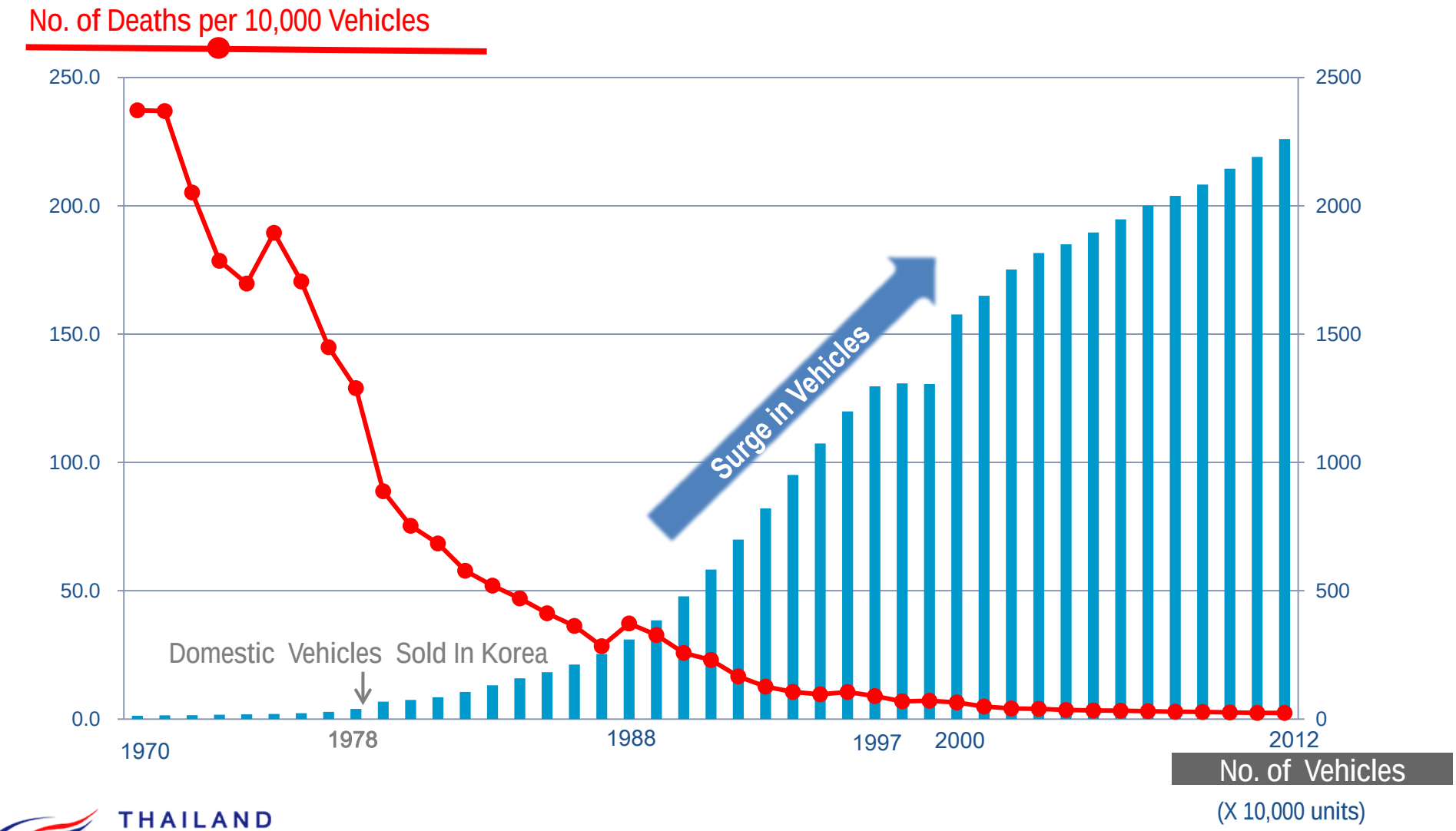
Background

Road Traffic Accidents in Korea



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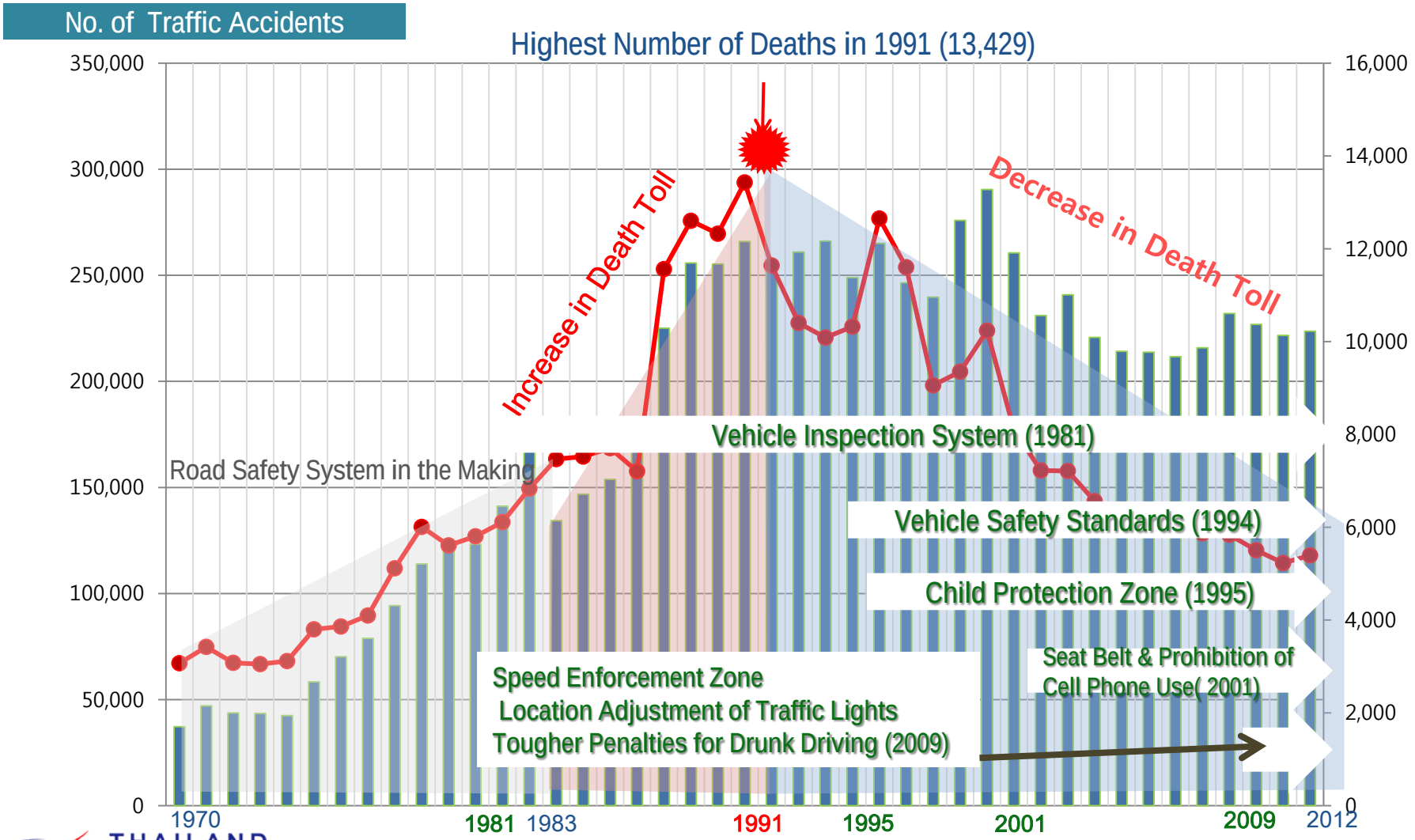
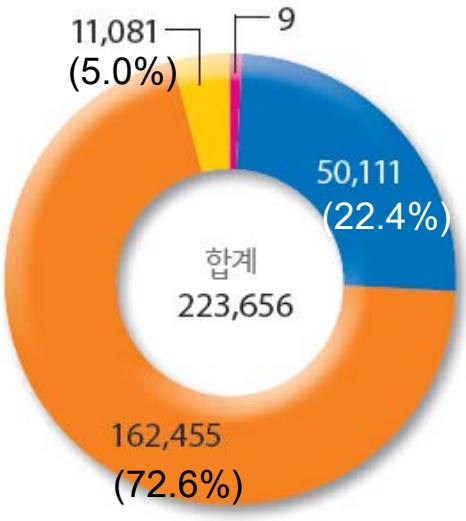
Road Traffic Accidents & Government Policies

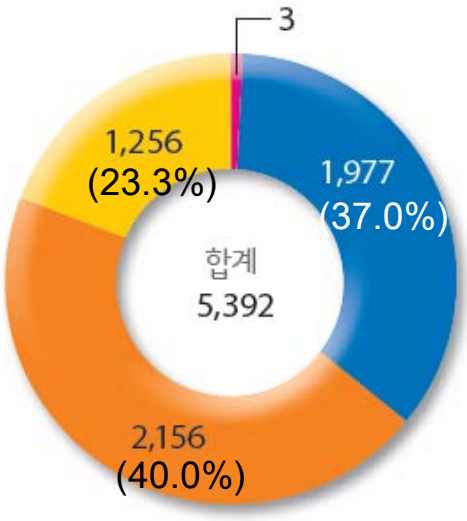


Road Traffic Accidents Data (2012)

No. of accidents



No. of fatalities



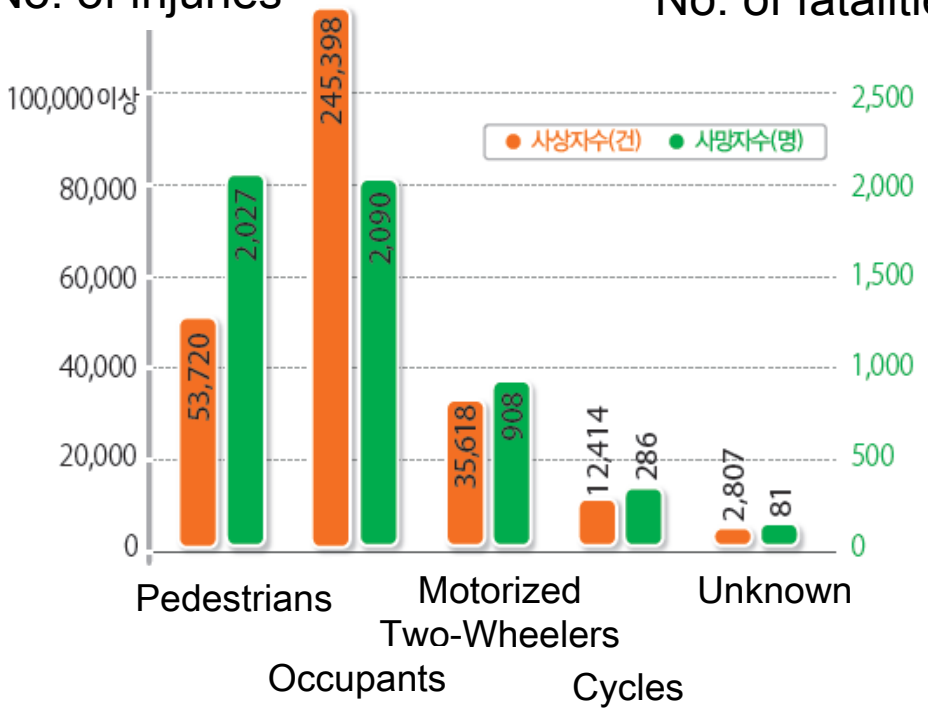
차대사람 차대차 차량단독 건널목

V to P V to V Single V V to Train

No. of accidents & fatalities
by collision types

No. of injuries

No. of fatalities



No. of injuries & fatalities
by collision types

Source: KoROAD 2012 Annual Report

Advanced Safety Vehicle Research Project

Roadmap of ASV Project

Overview

- Type of Research: Consortium(14 organizations), Managed by TS
- Period : Dec. 2009. to June 2016 (7.5years)
- Budget : 28.5million$ (government : 21.3million$, private : 7.2million$)

Year	'09	'10	'11	'12	'13	'14	'15	'16
Government fund (Unit : thousand$)	770	2,450	3,430	3,430	4,900	2,870	2,000	1,450

Goals

- Develop safety assessment technologies for advanced safety vehicle to help reduce deaths and casualties from car accidents

	2009 (1st Stage) 2012	(2nd Stage) 2015	(3rd Stage) 2017
Passive Safety	Impact speed adaptive seat	Passenger safety in the back seats	Car to car crash test
	Side impact protection	Active pedestrian protection	Far side protection
		Dynamic rollover protection	
Active Safety & Fundamental research	ACC / AEBS for commercial vehicle	LKAS	Drowsy driving prevention
	LDWS	AEBS for passenger car	Night vision
	BSD	ESC for commercial vehicle	Autonomous driving safety
	AFLS	In-depth research(1st stage)	In-depth research(2nd stage)
		Alcohol interlock	
		Power measurement	
IT convergence	e-Call	B/C analysis	Active safety assessment
		Devices for active safety assessment	Crashworthiness for ASV
		Electronic safety assessment	

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Rear Seat Passengers Safety

Goals

- Develop assessment technologies to improve impact safety for passengers in the back seats

  → Develop assessment technologies to improve impact safety for passengers in the back seats including children and adults

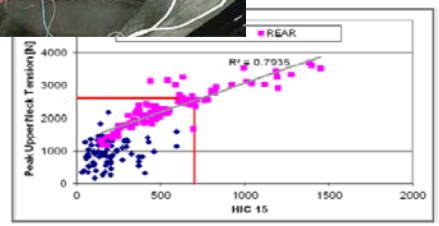
Work scopes

- Analyze data on accidents involving passengers in the back seats
- Analyze injury mechanism for passengers in the back seats, including children and adults
- Research into how to assess impact safety for passengers in the back seats, including children and adults
- Develop draft assessment standards for impact safety for passengers in the back seats

Research into injury standards to assess impact safety for passengers in the back seats

Methods and standards to assess impact safety for passengers in the back seats

Review of assessment methods and pilot application



Pedestrian Safety : Active Hood & Pedestrian Airbag

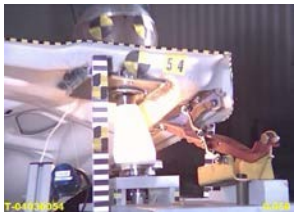
Goals

- Develop assessment technologies for active pedestrian protection systems
  - ➡ Active hoods and pedestrian airbags

Work scopes

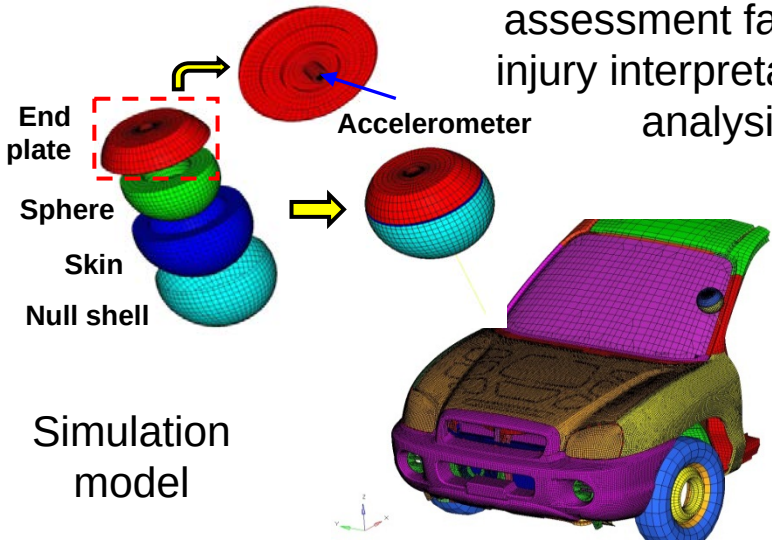
- System design and production
- Assessment and testing on real cars
- Determination of assessment factors for injury interpretation and analysis
- Development of interpretation model

System design/production



Assessment and testing on real cars

Determination of assessment factors for injury interpretation and analysis



Simulation model

Dynamic Rollover

Goals

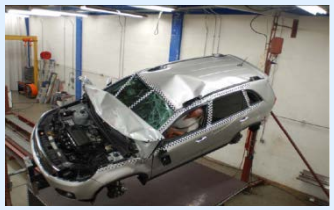
- Reduce injury of occupants in dynamic rollovers

➡ Development of assessment technologies for dynamic rollover safety

Work scopes

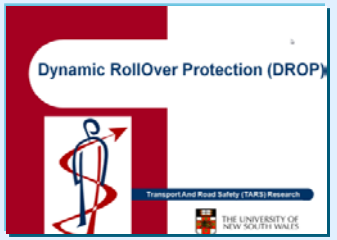
- Rollover test using a real car equipped with dynamic rollover assessment devices
- Test using a real car equipped with static rollover assessment devices
- Development of a model to assess and interpret rollovers

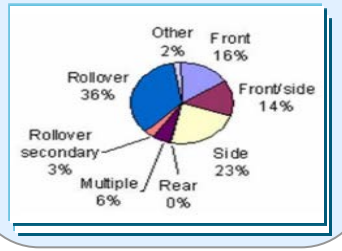
Test using real cars (dynamic)



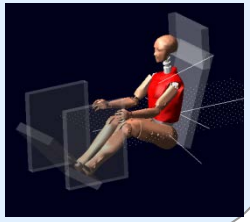
Test using real cars (static)

International joint research





Vehicle body deformation and human injury



In-depth Research for Vehicle Accidents

Goals

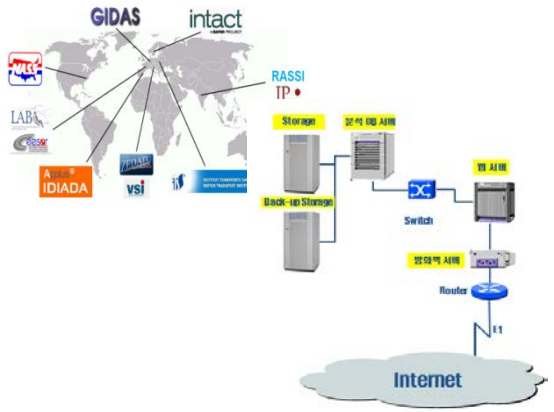
- Build up data from in-depth research and analysis of traffic accidents

  ➡ Establish a system for in-depth study on traffic accidents in Korea and build database

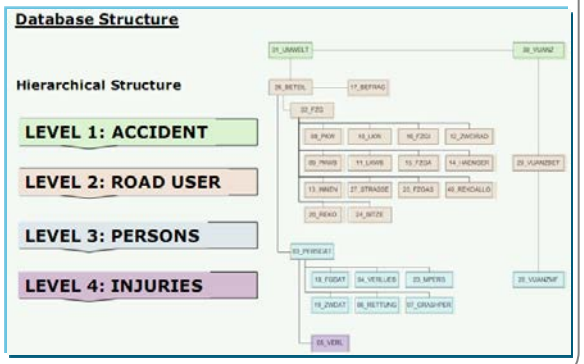
Work scopes

- Cooperation with GIDAS and iGLAD and establishment of an in-depth analysis system for local traffic accidents
- Defining standardized methods to determine and record the degree of injuries of accidents
- Collection of data on accidents and injuries for storage in database

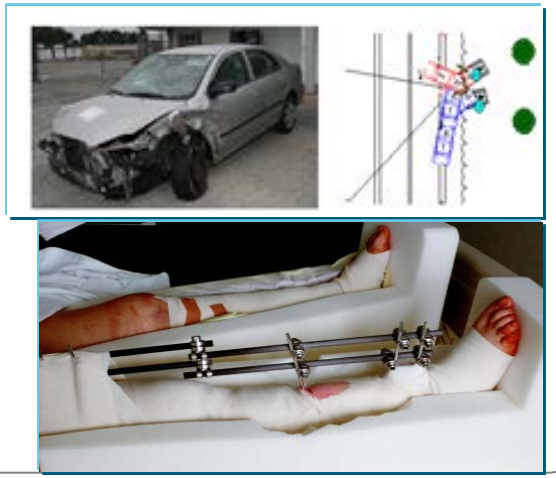
International cooperation and installation and operation of DB server system (hardware)



Development of database (software) that allows for world-class, in-depth research and analysis of car accidents



Building up database containing accident types and medical records



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B/C Analysis of Safety Features

Goals

- Benefit-cost analysis for advanced safety vehicles
  - ➡ Calculate social and economic cost and benefits for advanced safety vehicles and study their feasibility

Work scopes

- Effect assessment of active pedestrian safety protection
- Effect assessment of system integration for advanced safety vehicles
- Effect analysis of human injury database and application

Effect assessment of active pedestrian safety protection

- Effect assessment using test data that is Real car and simulation
- Economic feasibility study based on cost and benefits in terms of road safety
- Sensitivity analysis based on changes in costs for pedestrian protection systems

Effect assessment of system integration for advanced safety vehicles

-Assessment of effects of system integration for advanced safety vehicles

Effect analysis of human injury database and application

- Development of a model to estimate AIS index using human injury database
- Estimation of injury AIS index using existing traffic accident data and use the index

Automatic Emergency Braking System

Goals

- Develop safety assessment technologies for AEBS installed on passenger cars
  - ➡ Develop assessment system for passenger car AEBS and recommend safety standards

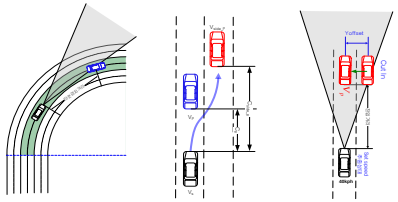
Work scopes

- Research in response to international standards, creating assessment environment
- Developing real car-based AEBS algorithm and defining assessment process
- Production of test vehicle for passenger car AEBS and prototype controls
- Development of standards and technologies for system assessment

Strategy to meet int'l standards

Assessment environment

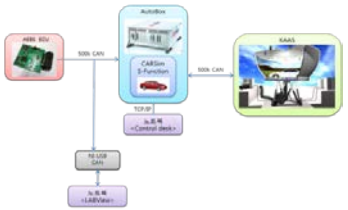
Implementation of real car based ABEBS algorithm



Defining assessment process

Preparation of a test vehicle

Production of prototype controls



Assessment through virtual drive

Assessment technologies using unmanned target vehicles

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Lane Keeping Assistance System

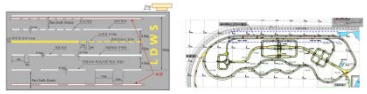
Goals

- Develop assessment technologies for the safety of lane keeping assistance system (LKAS)

  ➡ Develop safety assessment system for LKAS and recommend safety standards

Work scopes

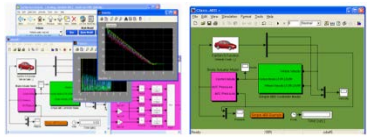
- Establishment of environment for testing and development of assessment & analysis methods
- Development of LKAS assessment modules for development purpose/generic purposes
- Determination of LKAS assessment factors and defining of assessment process

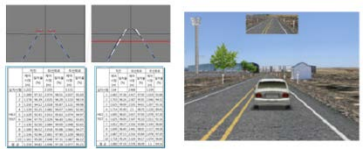


Establishment of test roads using real cars

Securing of equipment and development of analysis methods

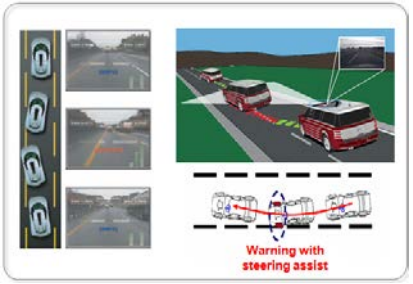
Establishment of SILS-based assessment environment





Analysis of fail-safety assessment technologies

Assessment modules for development and generic purposes



Determination of assessment factors and development of process

Development of LKAS assessment vehicles

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Electronic Stability Control for Commercial Vehicle

Goals

- Develop technologies to assess performance of ESC for commercial vehicles
  - ➡ Develop performance assessment system for commercial vehicle ESC and recommend performance standards

Work scopes

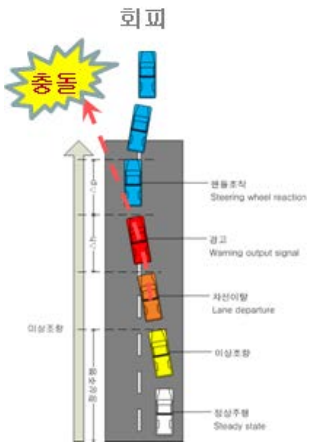
- Testing to verify the performance of ESC for commercial vehicles (vans, trucks)
- Development of simulation model for real-car based ESC testing and algorithm
- Analysis of technologies to assess commercial vehicle ESC performance and fail-safe technologies

Survey of methods to assess ESC for commercial vehicles

Development of local assessment method

Regulatory and technological trend

Vehicle dimensions



Assessment process and algorithm

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Devices for Active Safety Assessment

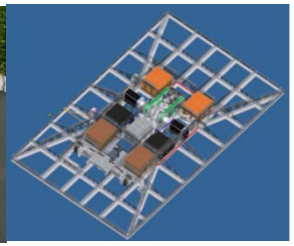
Goals

- Assess the safety of active safety vehicles

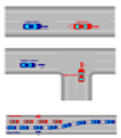
  ➡ Develop a method and a system to assess safety of active safety vehicles

Work scopes

- Production of low speed and high speed target vehicles
- Stabilization of low/high speed target vehicles

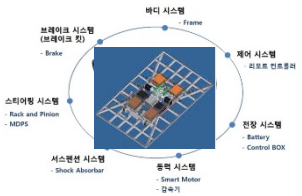



Production of high speed target vehicles

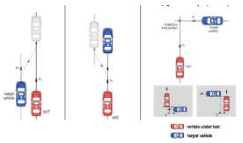



Active vehicle safety test

Stabilization of low speed target vehicles



Design of high speed target vehicles




Testing using real cars

Electronic Safety Assessment

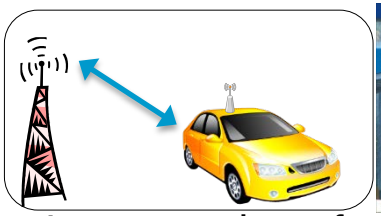
Goals

- Develop technologies to assess electronic safety for advanced safety vehicles
  - ➡ Develop technologies to assess safety from electromagnetic wave and V2X communication safety and analyze security and safety

Work scopes

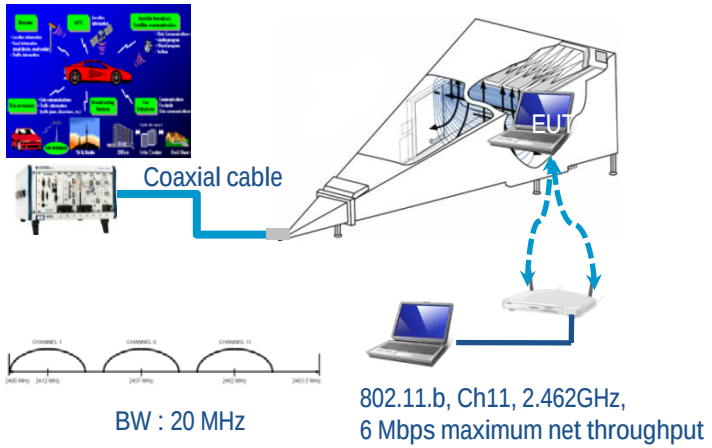
- Analysis of technologies to guard the security of communication between cars and technologies to ensure functional safety
- Electromagnetic environment, feature interpretation and simulation involving roadside devices
- Establishment of test beds based on communication operation plan and actual assessment

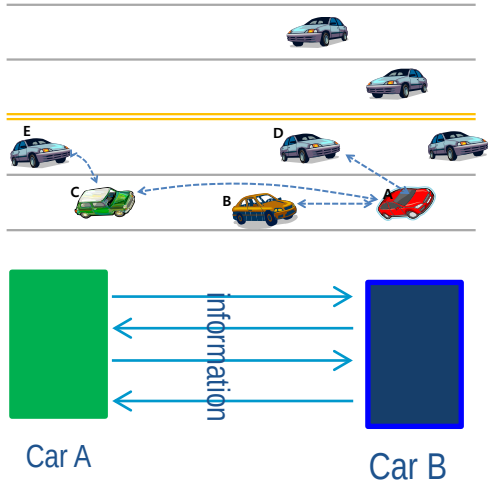
Interpretation of V2V communication environment



Interpretation of communication environment for V2I

Testing of resistance to various types of radio communication through the establishment of a test bed





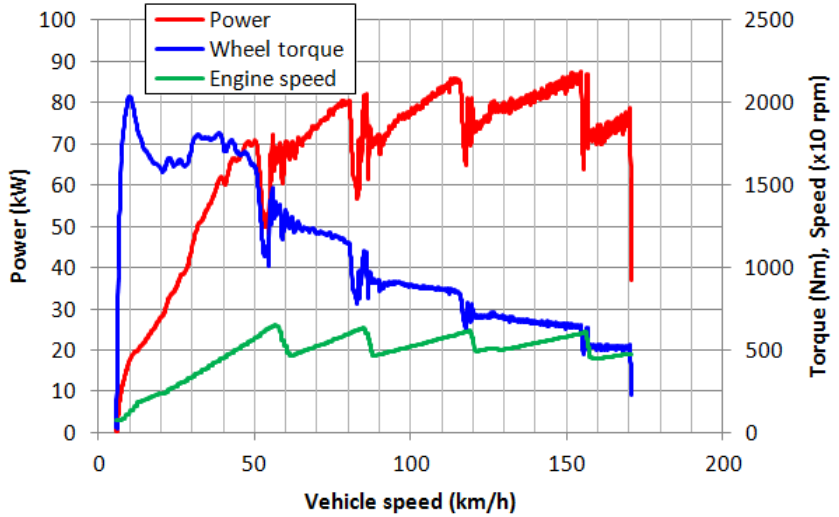
Power measurement

Goals

- Develop technologies to measure the power of advanced safety vehicles

  → Recommend draft classification of vehicles according to the method to assess the power of advanced safety cars and actual power

TS



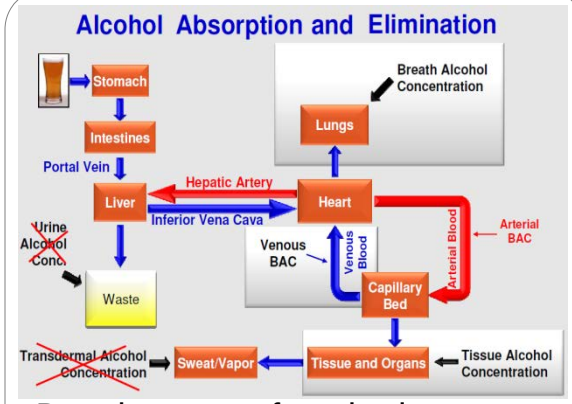
Alcohol Interlock

Goals

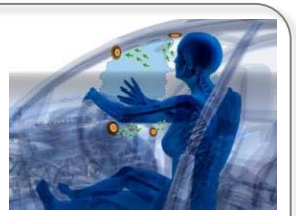
- Develop technologies to assess devices to prevent driving while intoxicated (DWI)
  - ➡ Interpret co-relation between BrAC and ABC and assessment devices for DWI and develop assessment technologies

Work scopes

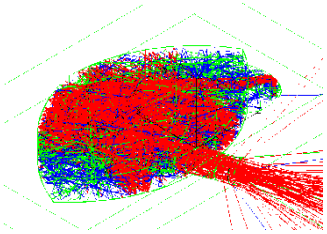
- Development of standards and method to assess DWI
- Development of a system to assess devices to prevent DWI
- Simulation of anti-DWI devices and development of DWI assessment algorithm



- Development of methods to interpret correlation between alcohol levels for blood and for respiratory system and to assess it
- Development of devices to prevent DWI



Development of Korean way of assessment and prototyping



Assessment system establishment and simulation-based interpretation of assessment devices

- Develop an algorithm to measure and assess DWI
- Develop a method to calculate the level of alcohol in blood considering changes in environment (CO_2, temperature, humidity)
- Development of anti-DWI devices

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Conclusions

Conclusions

- Road accidents are a leading cause of unnatural death and responsible for substantial productivity losses in all countries

- A successful accident reduction framework needs to address primary vehicle safety as well as infrastructural and behavioural aspects

- Primary vehicle safety
  - to prevent accidents (active safety)
  - to mitigate injuries to occupants and pedestrians during a crash (passive safety)

- For safer vehicles, R&D of vehicle technologies is essential

Technical Session #2
Standardization for
Charging Safety of EV

Thank you for your attention.

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