

Current Status in Korea

for Pedestrian Safety Rule-making Researches

2004. 2.

Ministry of Construction and Transportation

Republic of Korea





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II. Research Activities for Pedestrian

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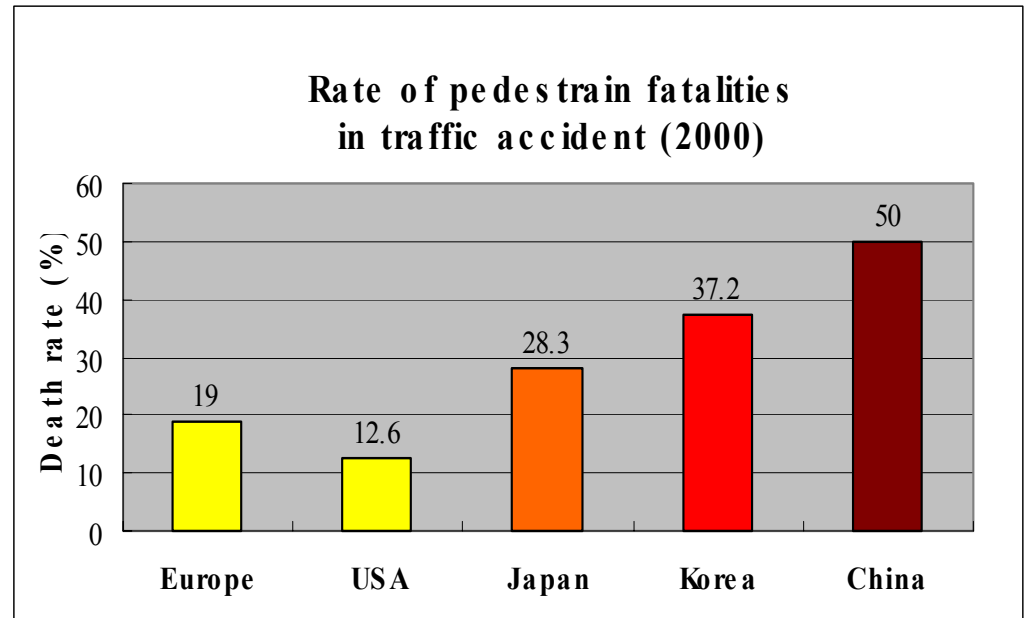


I. Accident Assessment

1. Backgrounds

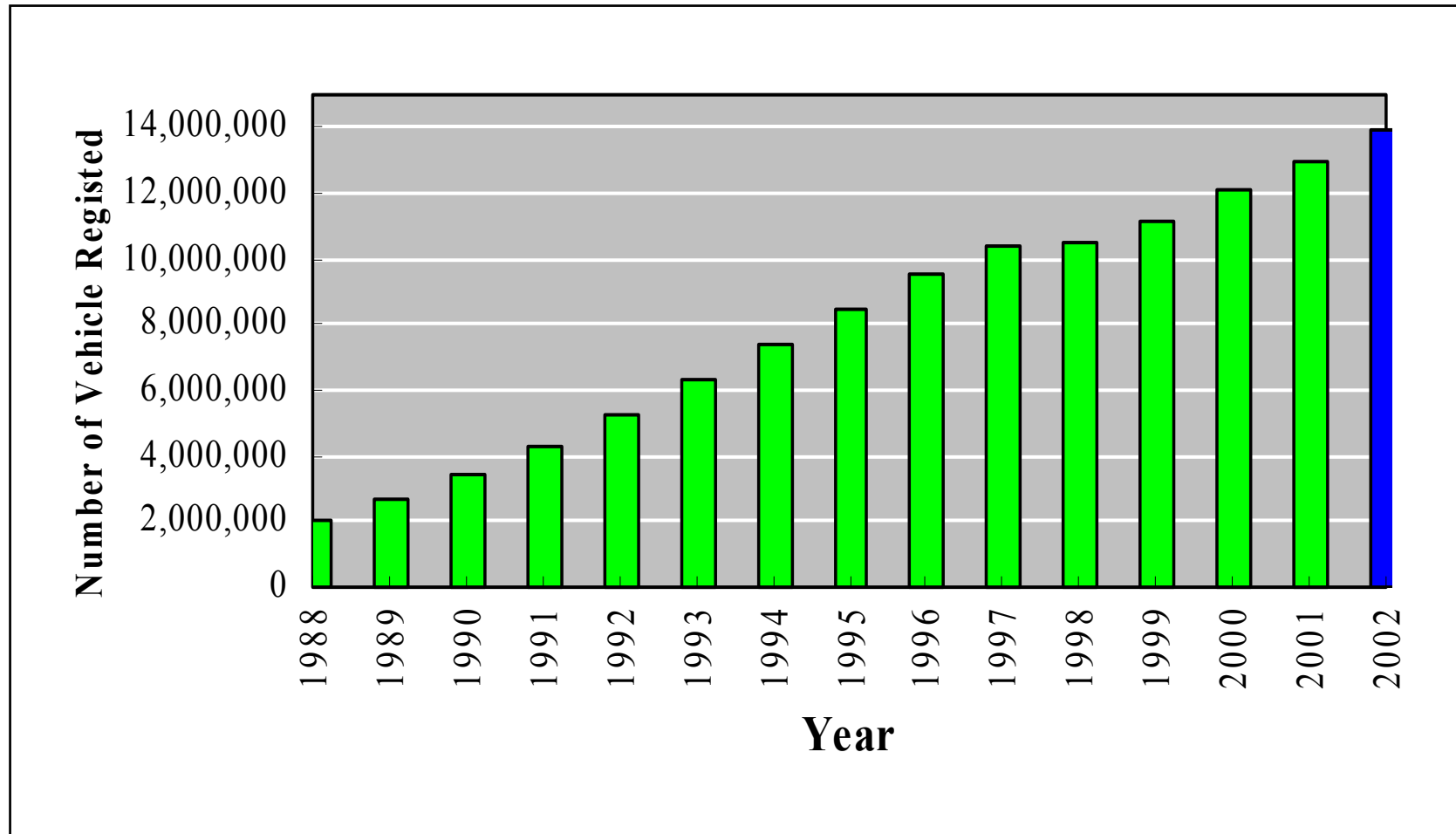
- **Korea Pedestrian Fatality**

- 37.2%(2000): 3,890(10,236)
- 43.5%(2002): 3,086(7,090)

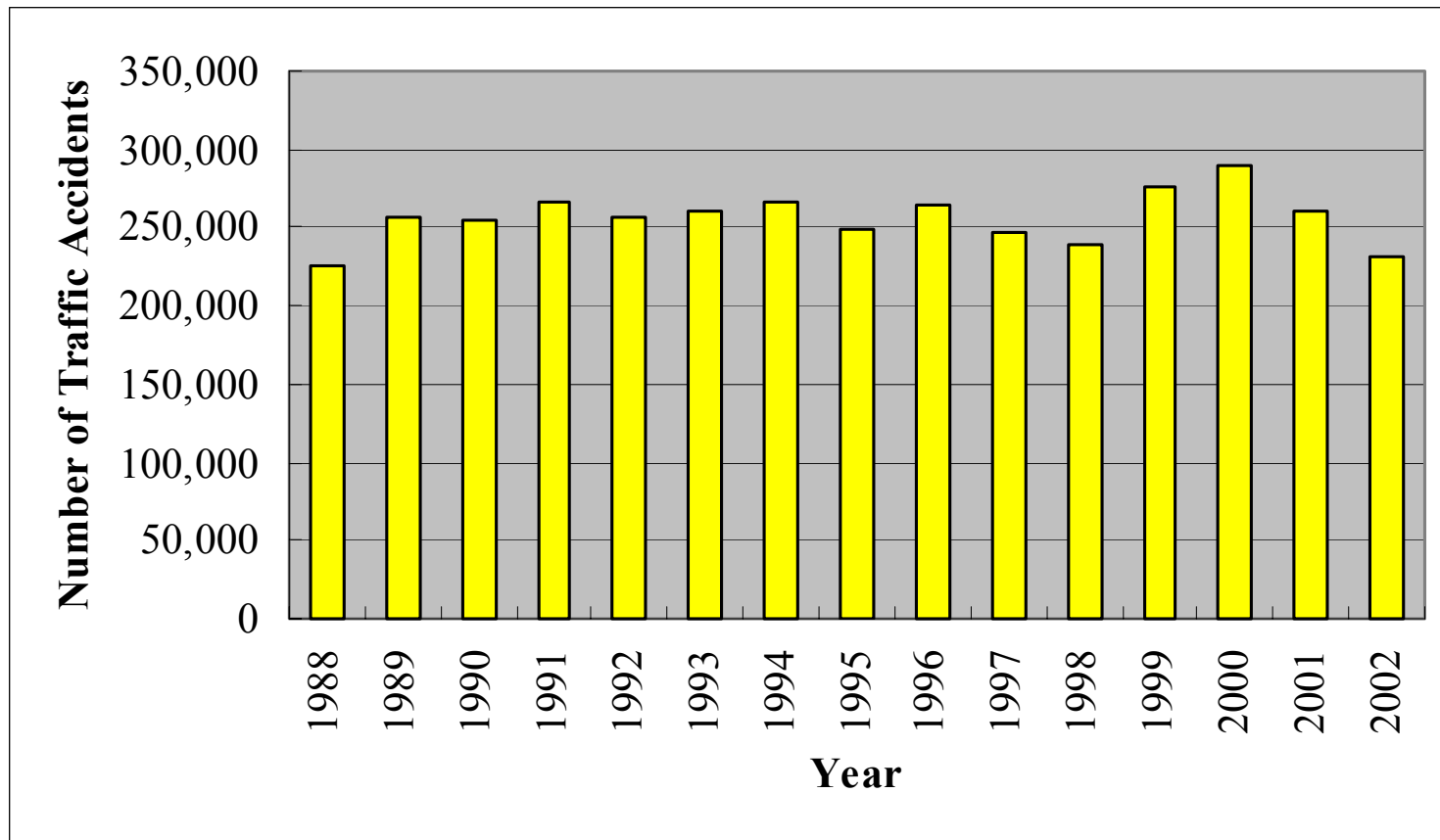


- **Need Pedestrian Regulation for Domestic Environment**
- **Consider Current Technology and Maker's Preparations**
- **Must be Harmonized with Europe/IHRA**

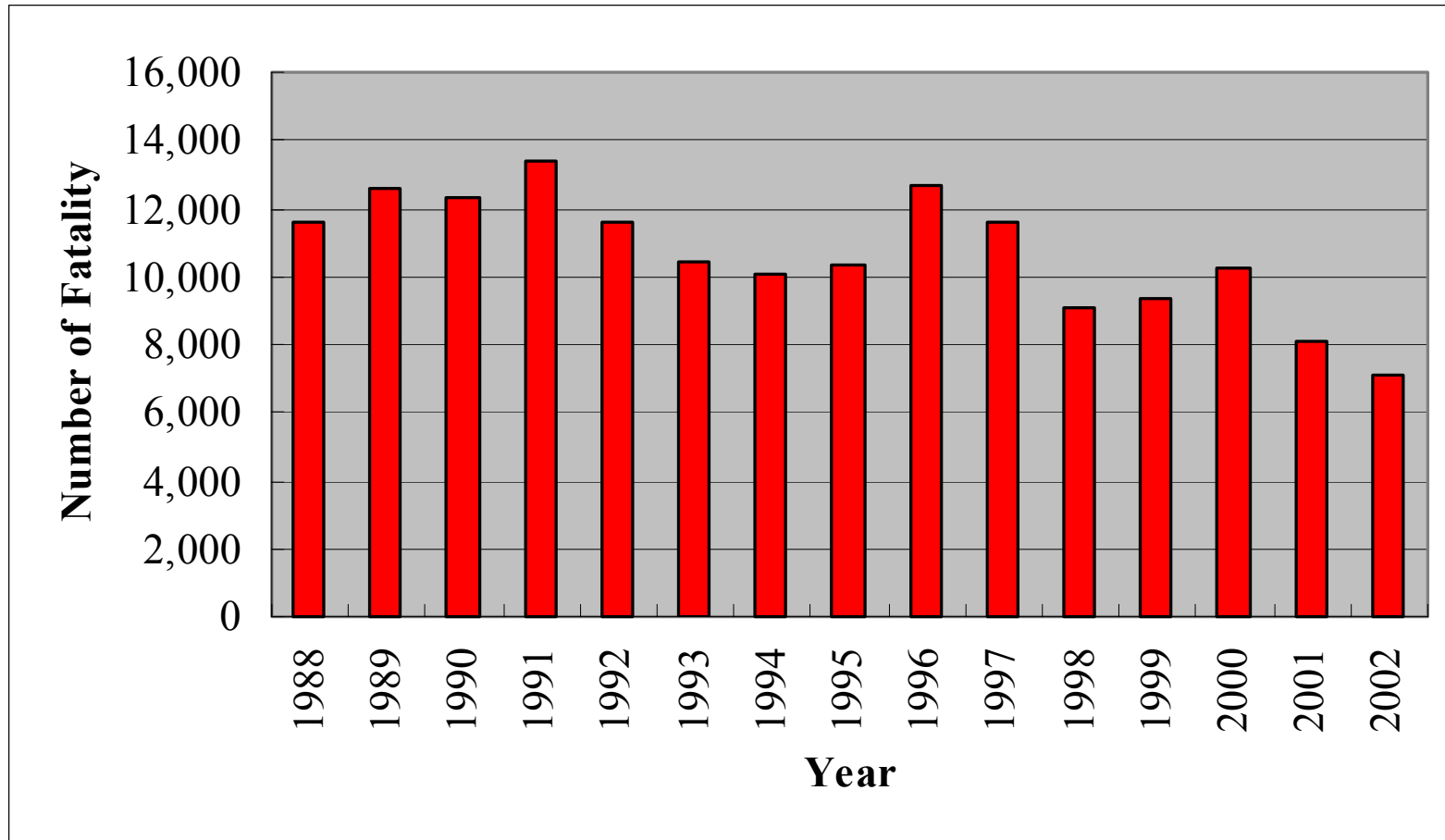
2. Trends of Vehicle Increments



3. Frequency of Traffic Accidents

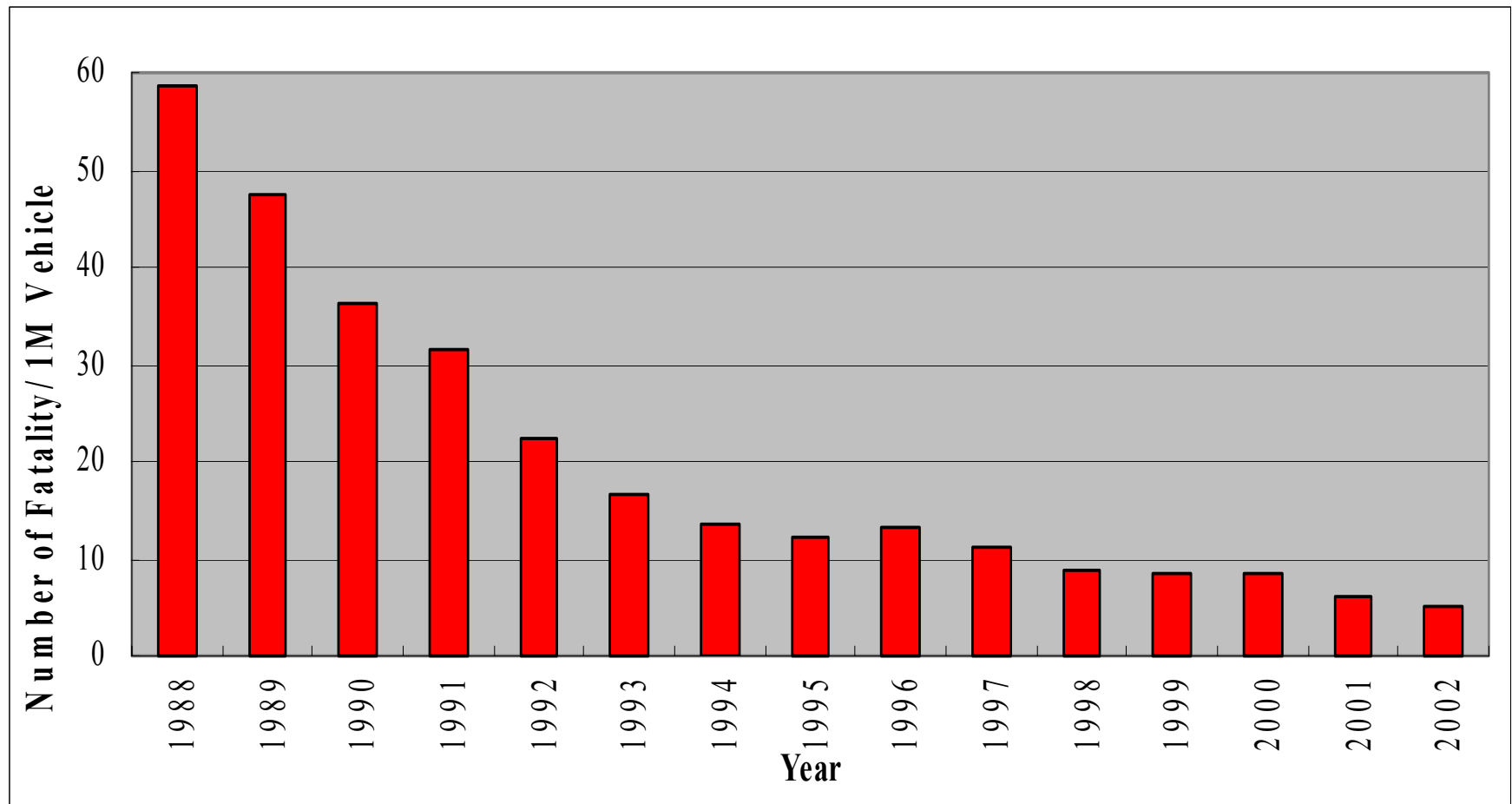


4. Trends of Traffic Accident Fatalities

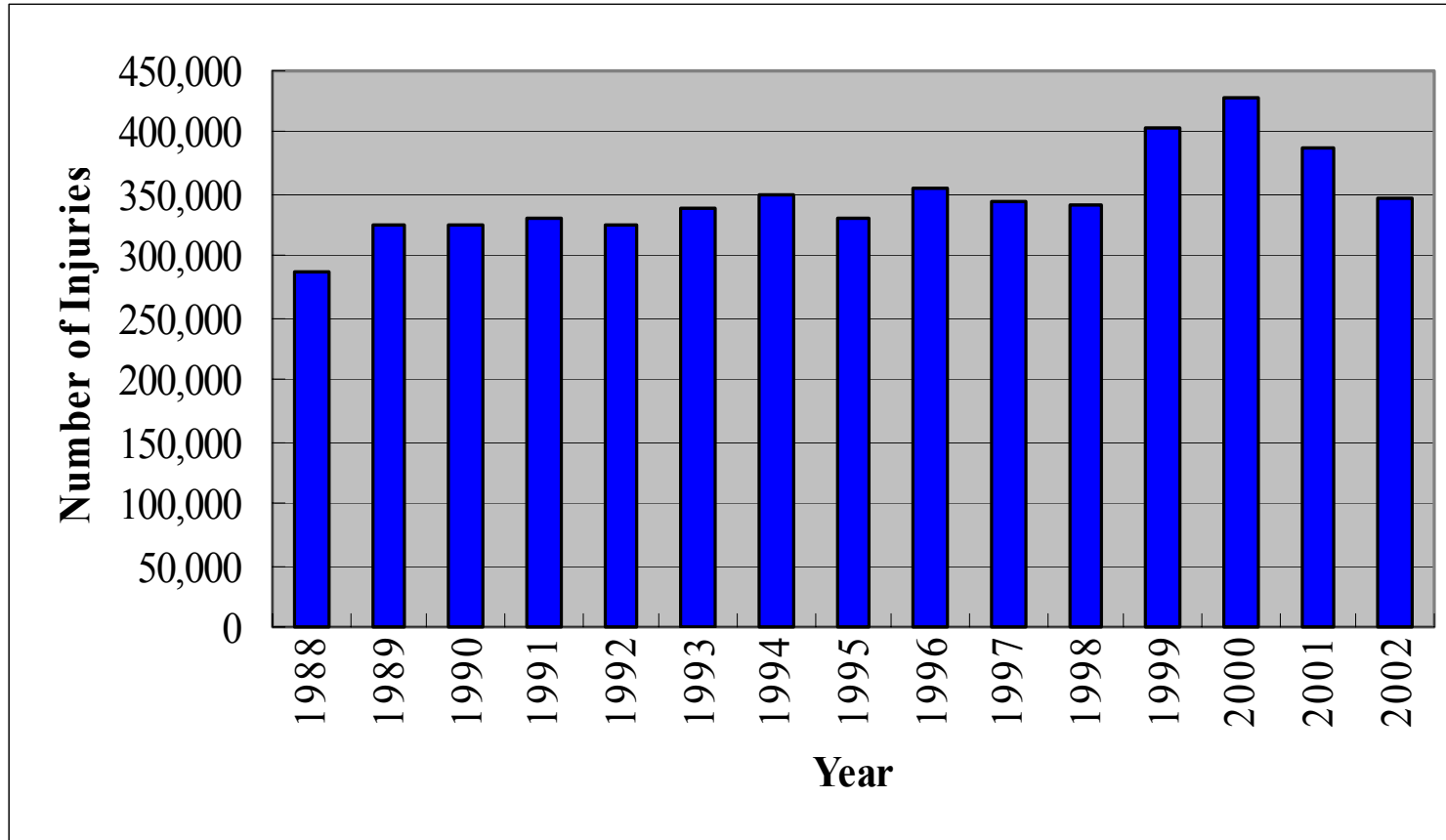


5. Trends of Traffic Accident Fatalities (Number of Fatalities / 1 Million Vehicles)

INF GR / PS / 70

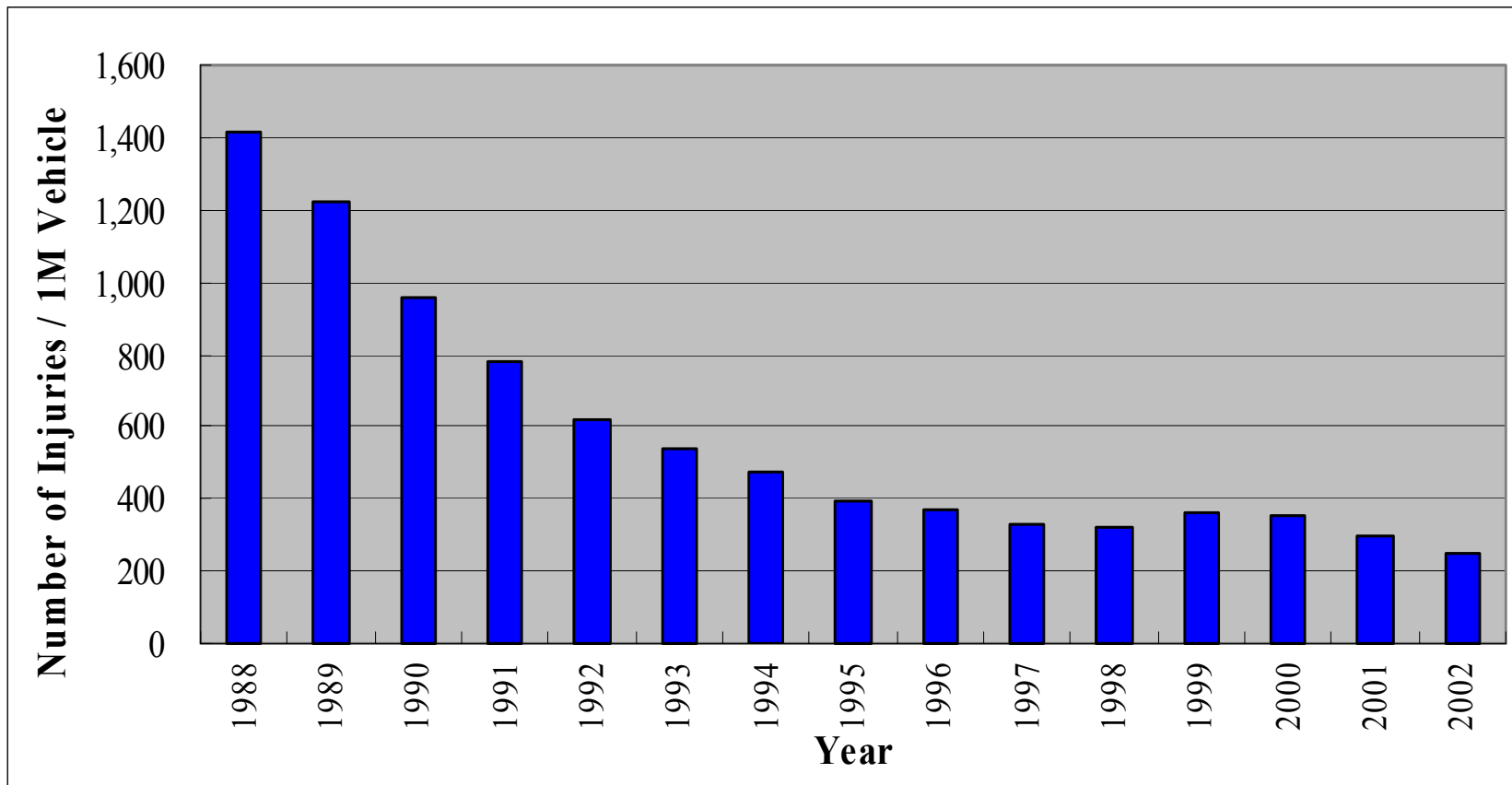


6. Trends of Traffic Accident Injuries

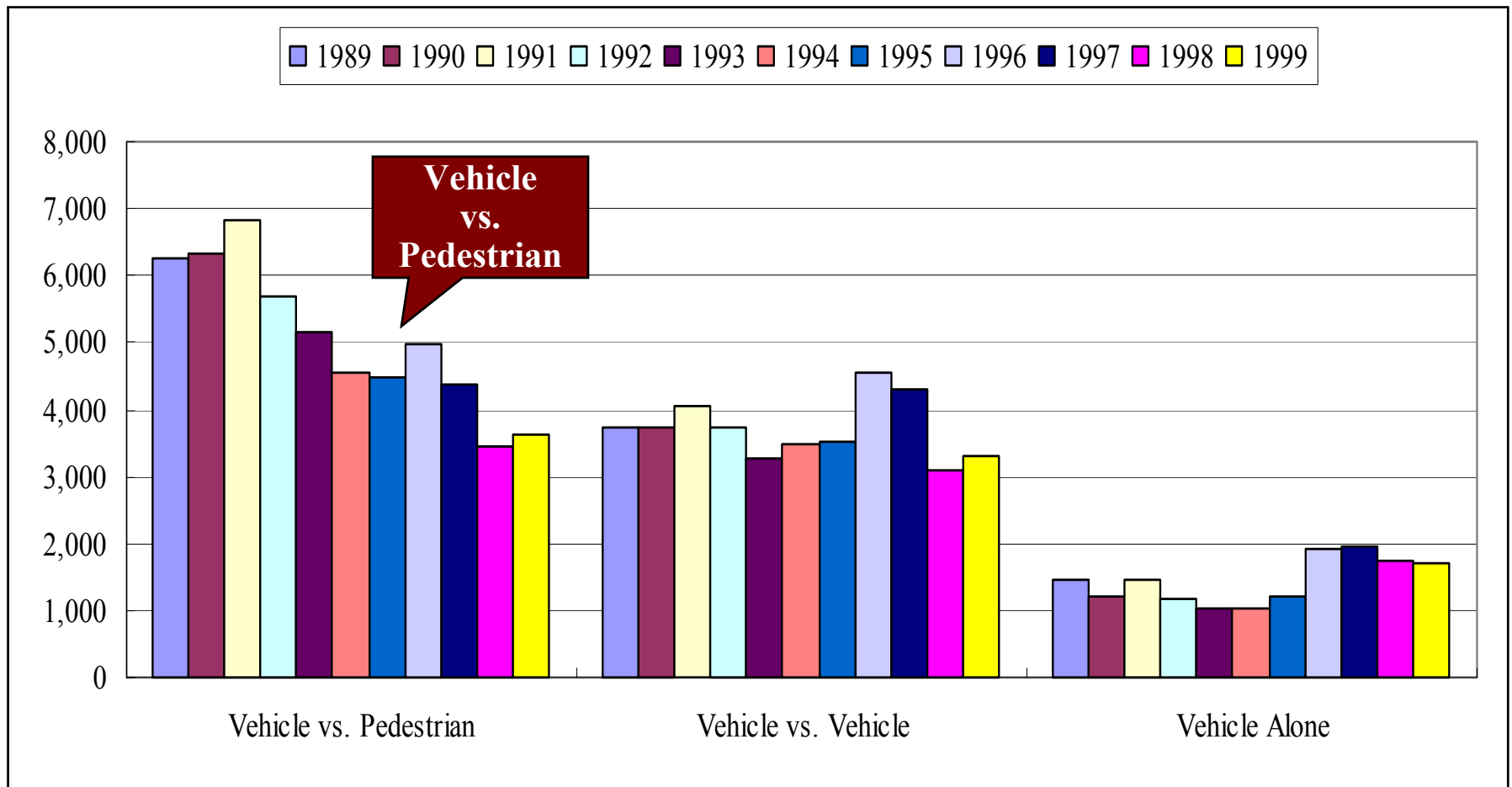


7. Trends of Traffic Accident Injuries (Number of Injuries / 1 Million Vehicles)

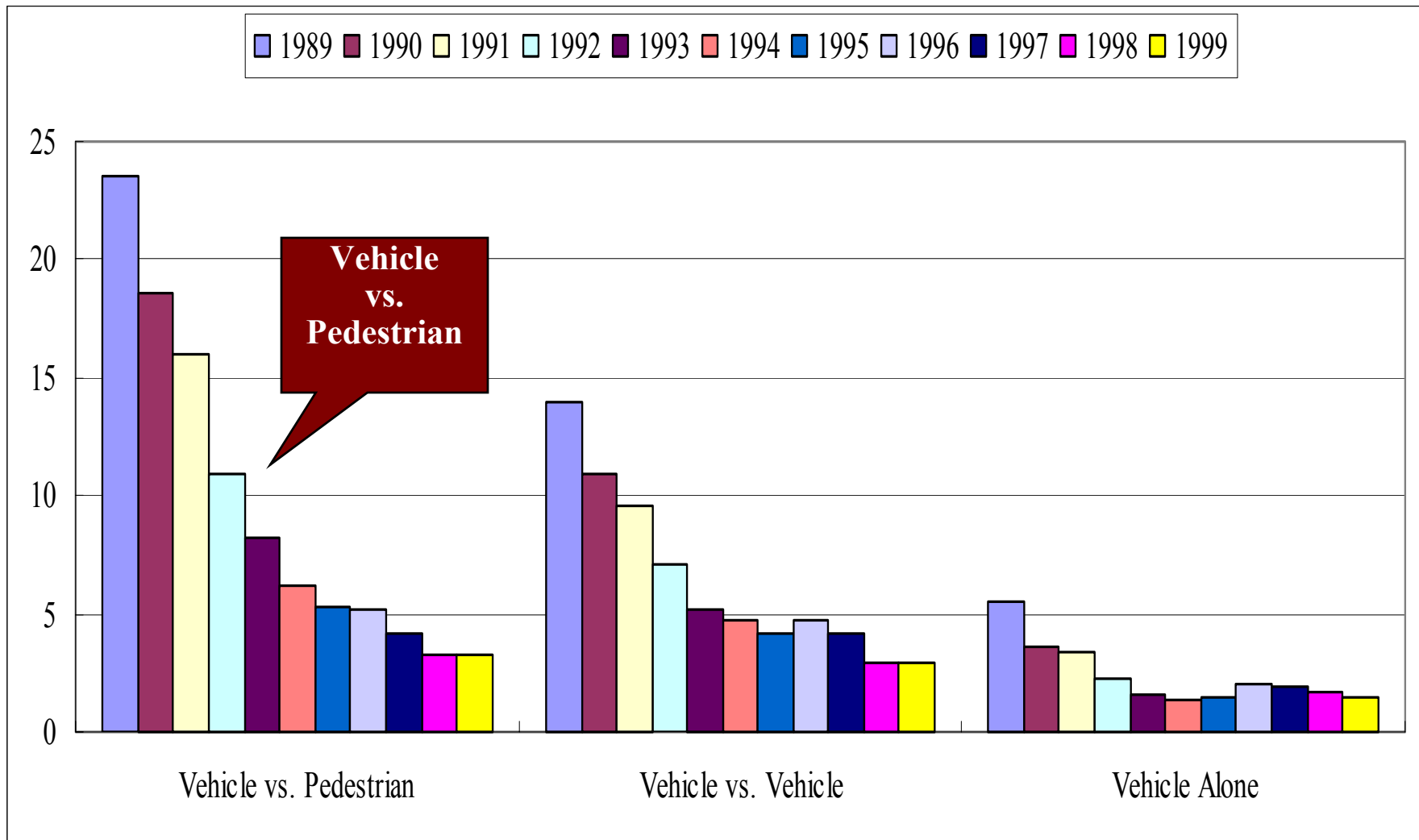
INF GR / PS / 70



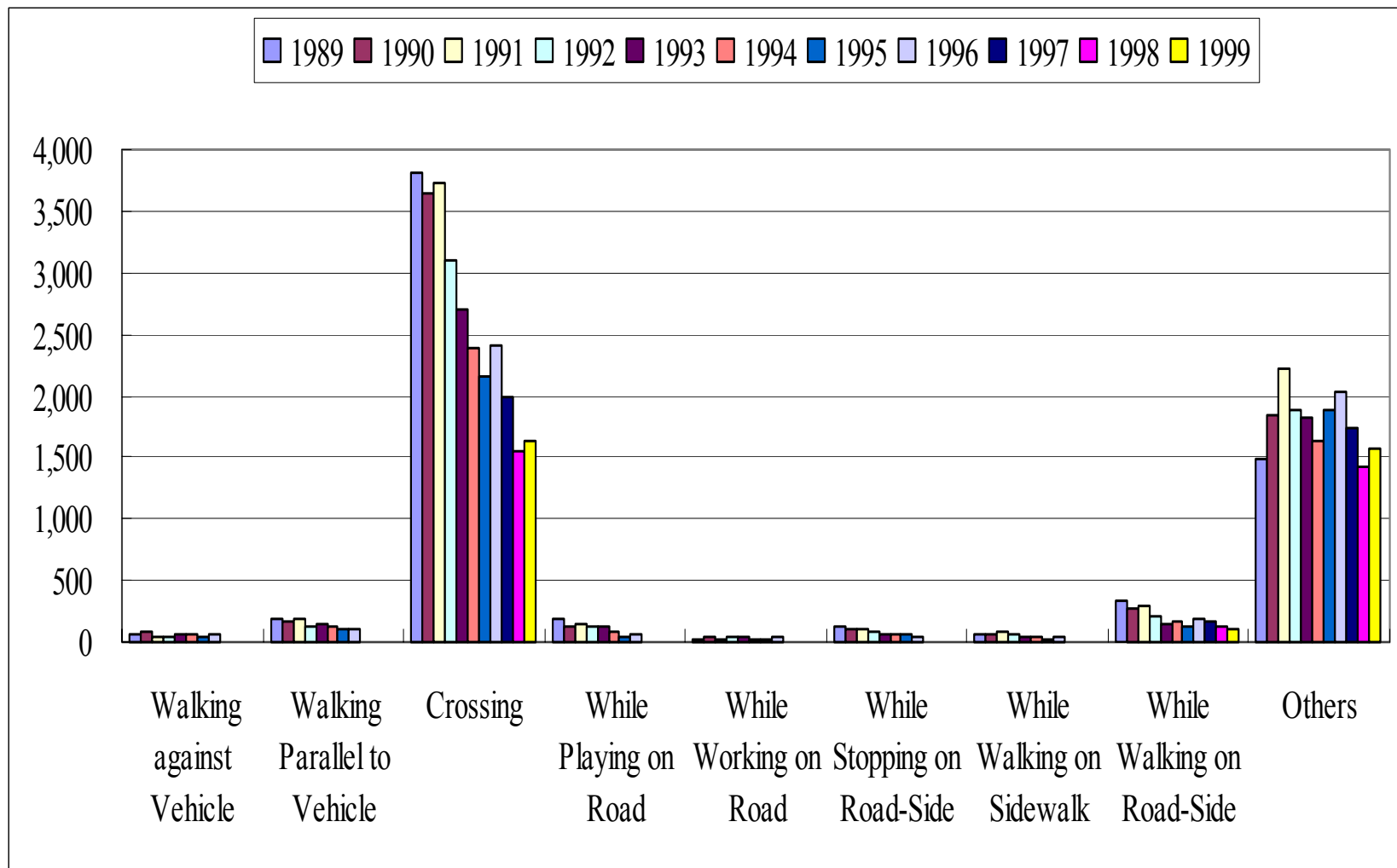
8. Trends of Accident Types - Fatalities



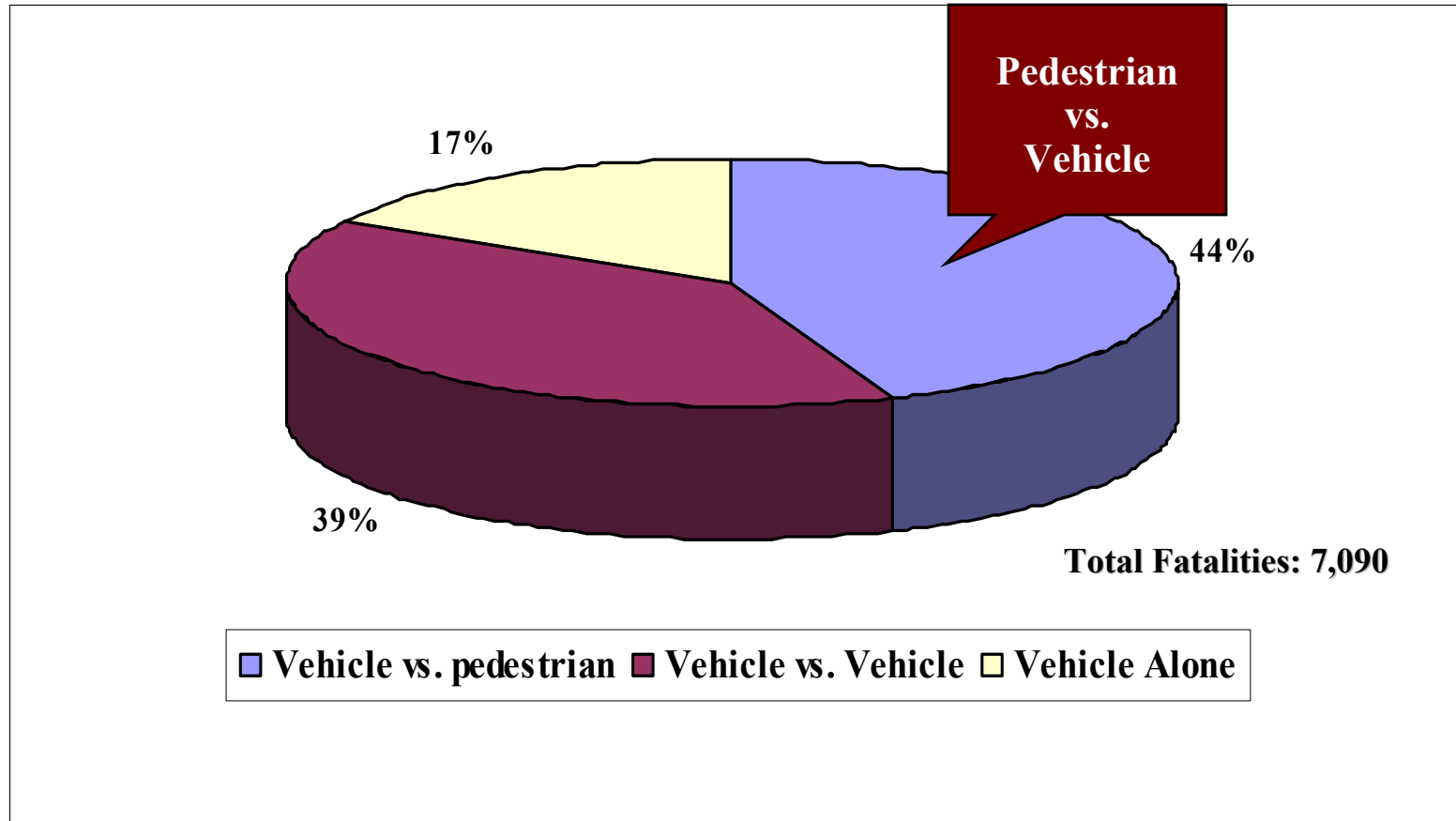
9. Trends of Accident Types (Number of Fatalities / 1 Millions Vehicles)



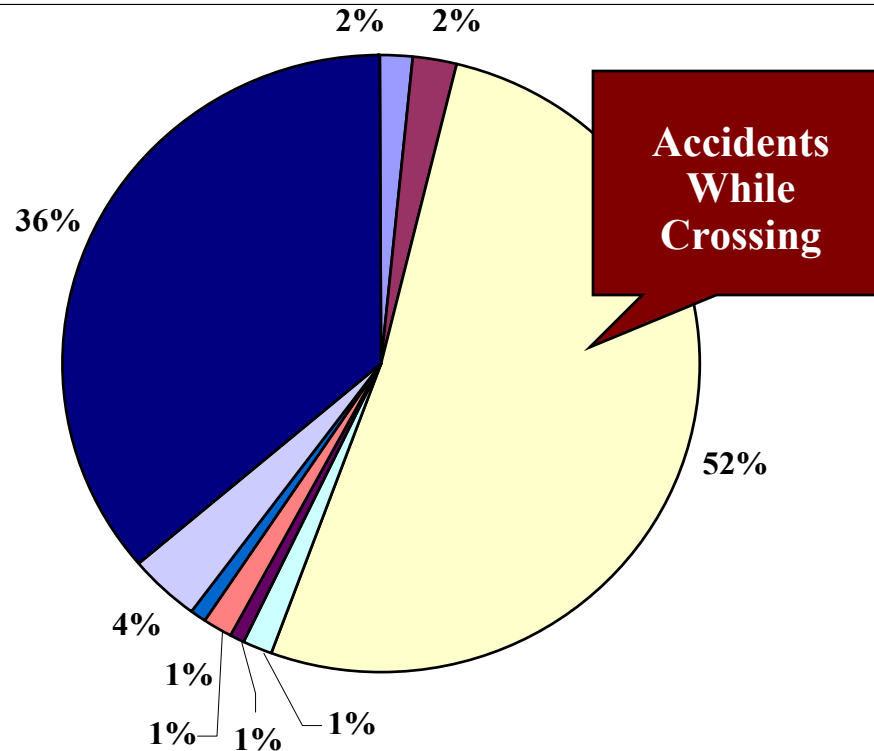
10. Trends of Pedestrian Accident Types - Fatalities



11. '02 Year Accident Types - Fatalities



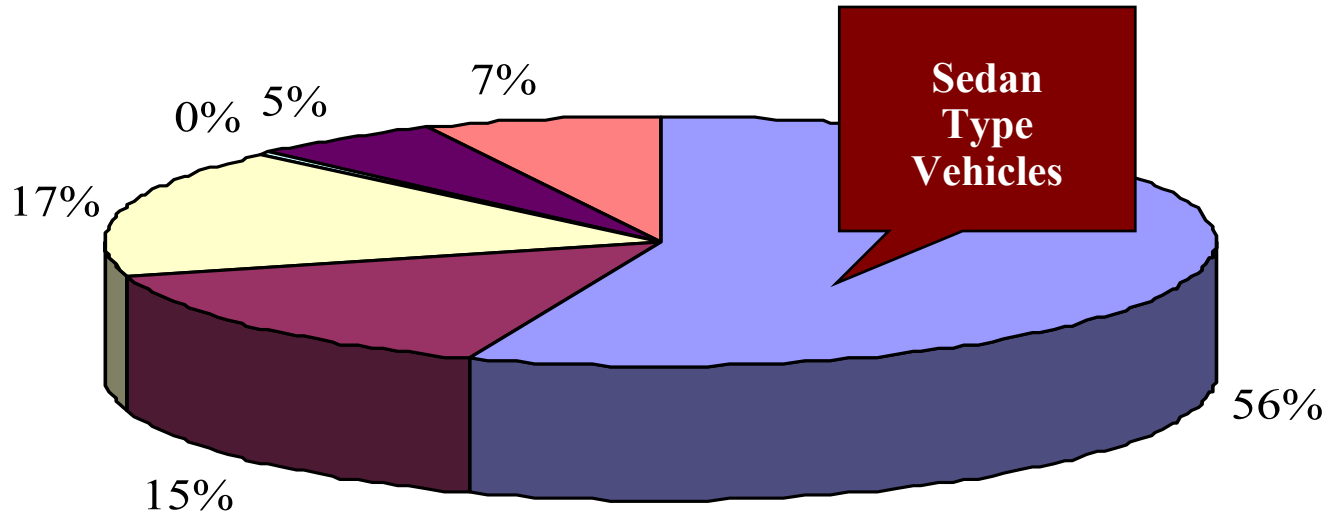
12. '02 Year Pedestrian Accident Types - Fatalities



- | | | |
|---------------------------|-----------------------------|-----------------------------|
| Walking against Vehicle | Walking Parallel to Vehicle | Crossing |
| While Playing on Road | While Working on Road | While Stopping on Road-Side |
| While Walking on Sidewalk | While Walking on Road-Side | Others |

13. '02 Pedestrian Accident by Vehicle Types - Injuries

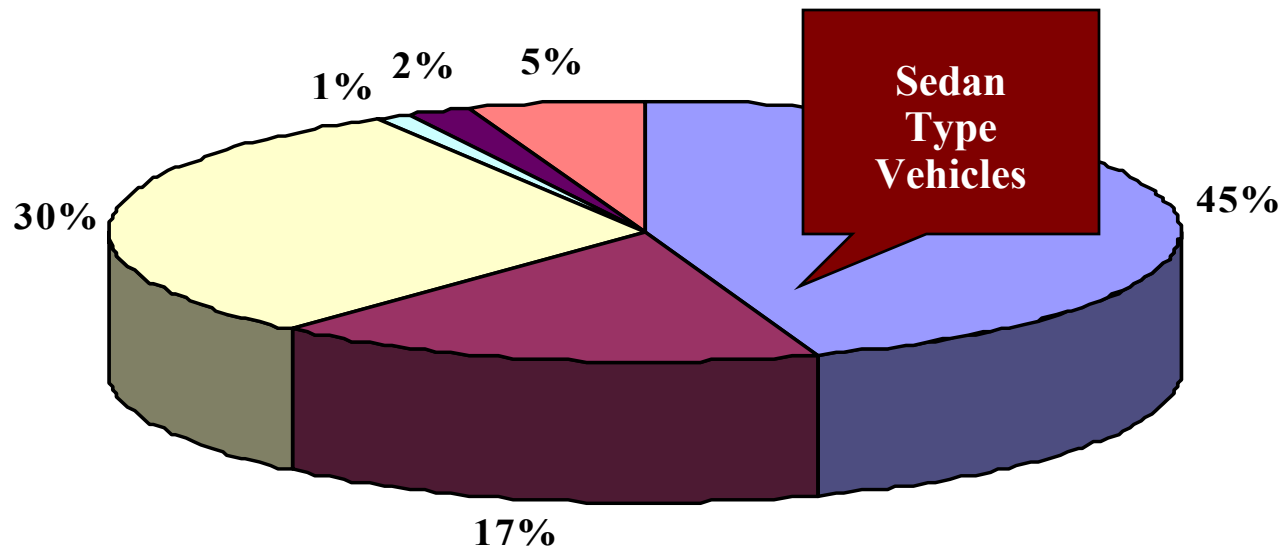
■ Sedan ■ Van/SUV ■ Heavy-truck ■ Special-vehicle ■ Motorcycle ■ ETC



Total Injuries : 59,236

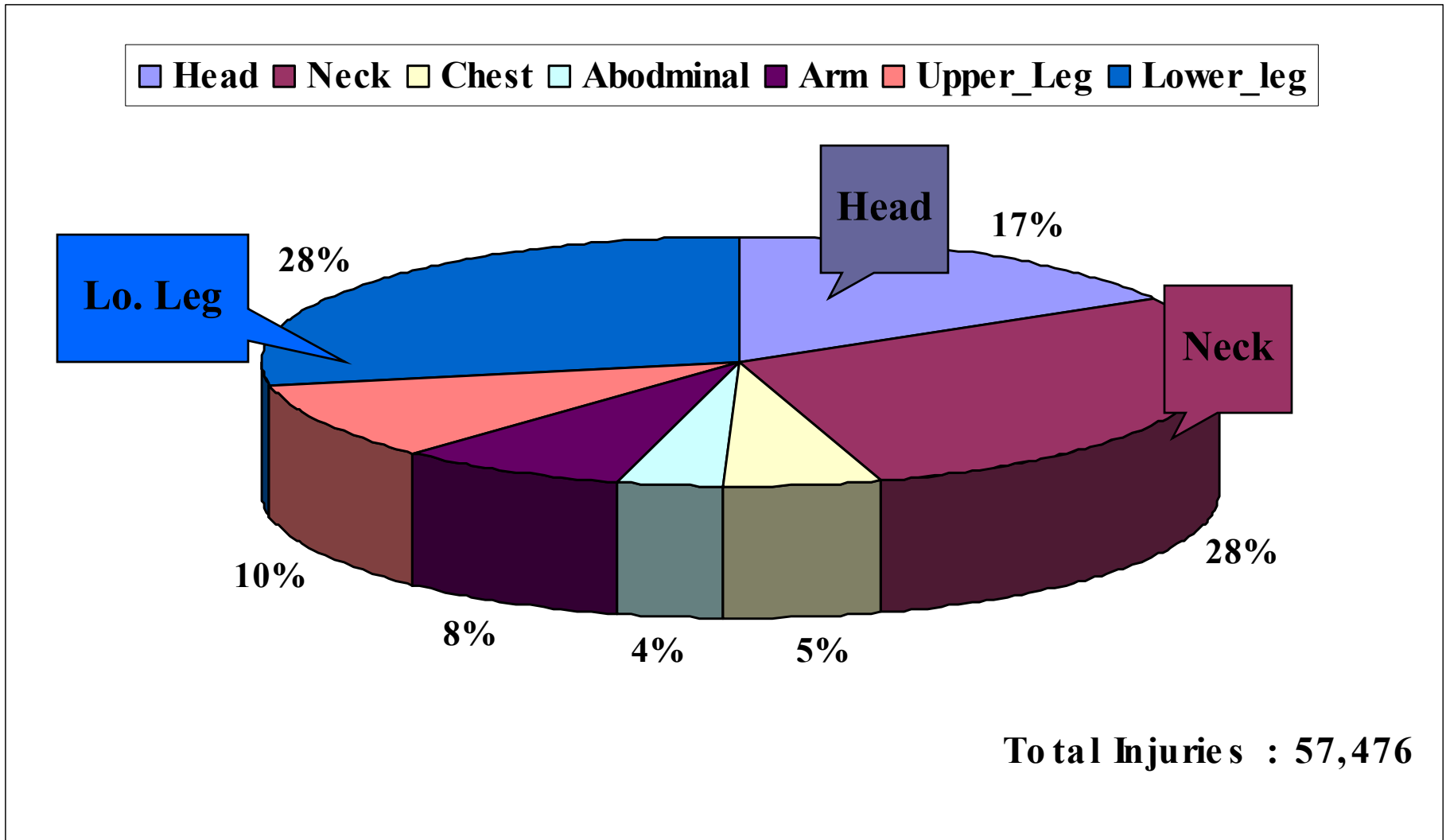
14. '02 Pedestrian Accident by Vehicle Types - Fatalities

■ Sedan ■ Van/SUV ■ Heavy-truck ■ Special-vehicle ■ Motorcycle ■ ETC

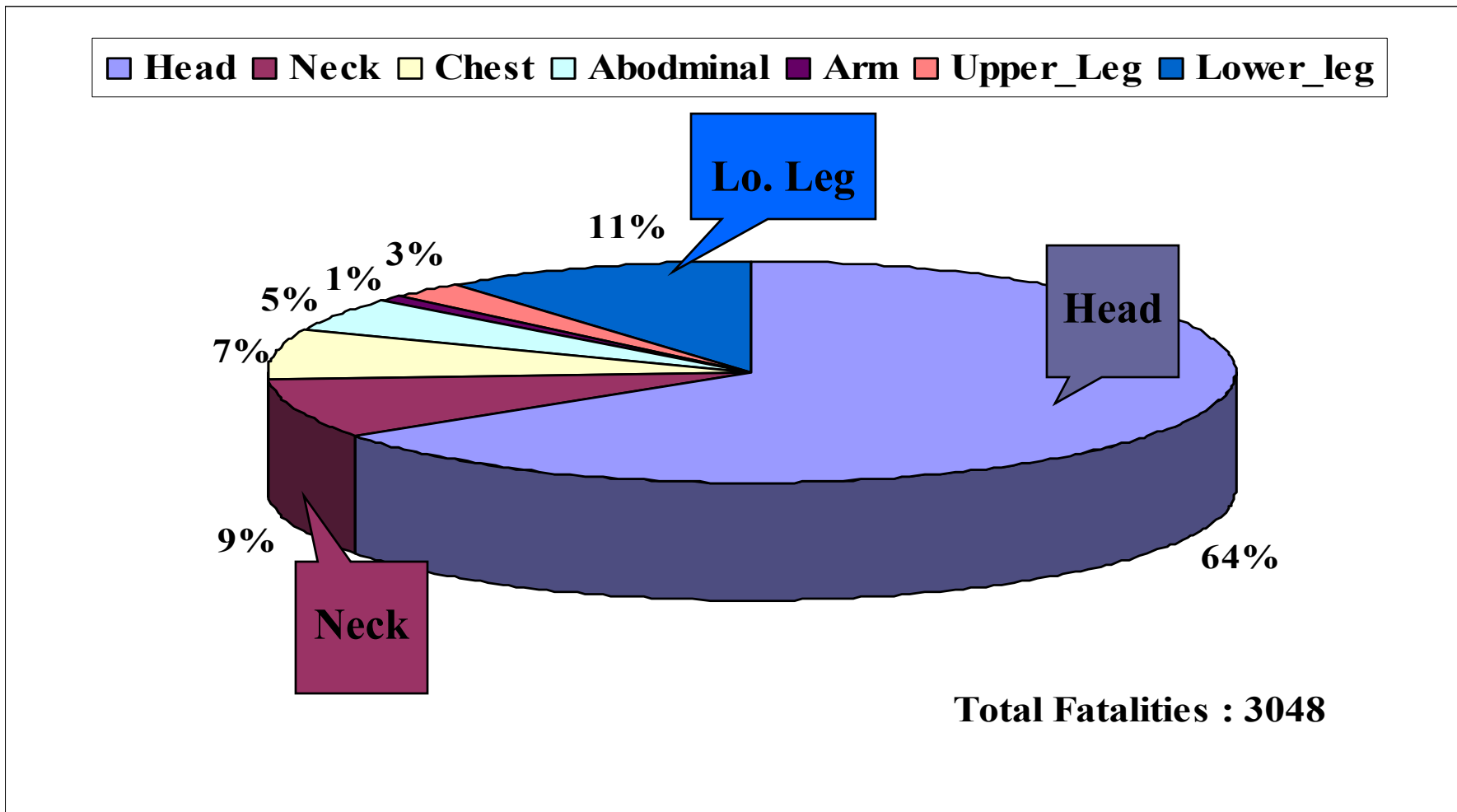


Total Fatalities : 3,086

15. '02 Pedestrian Injured Body - Injured



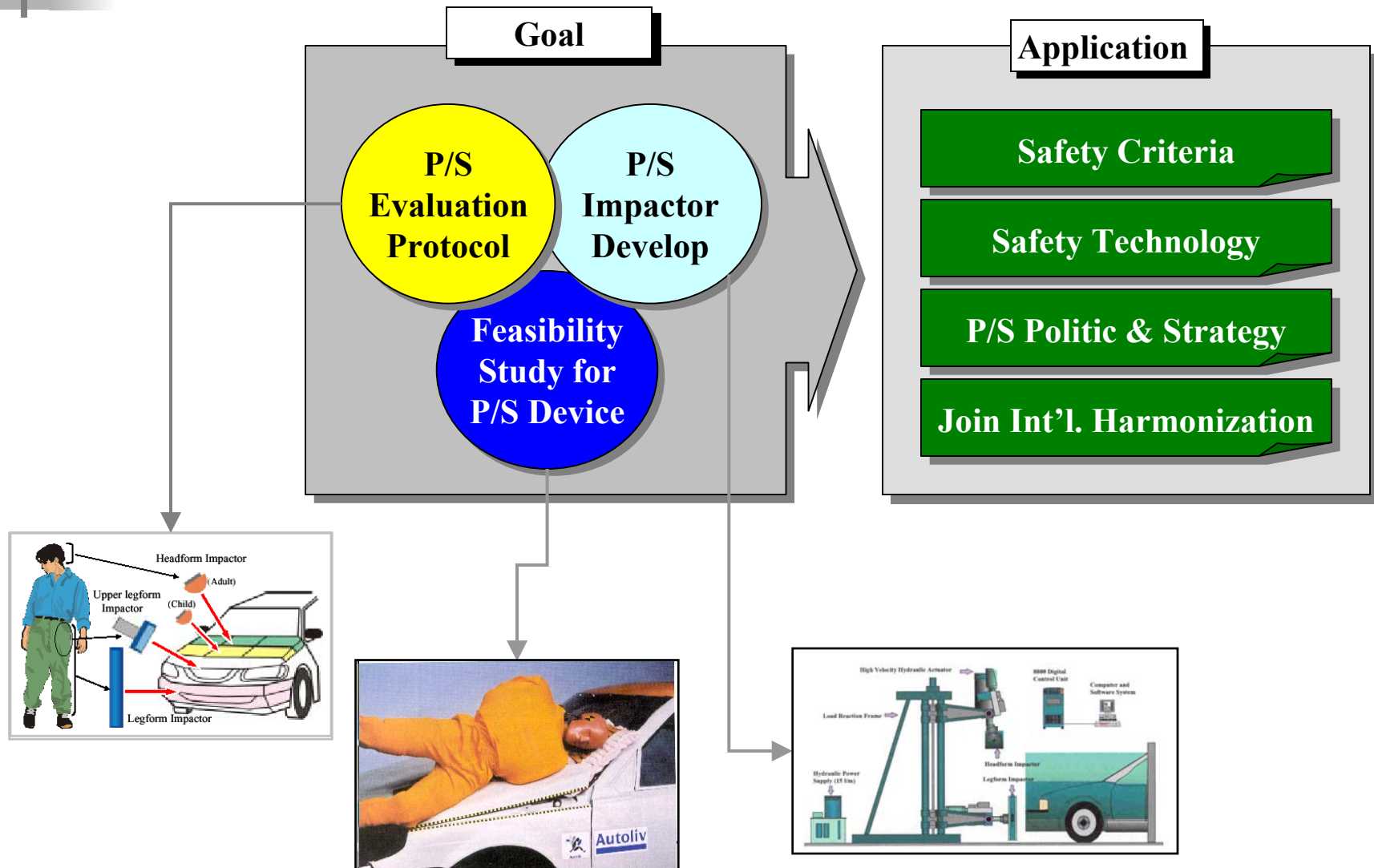
16. '02 Pedestrian Injured Body - Fatalities



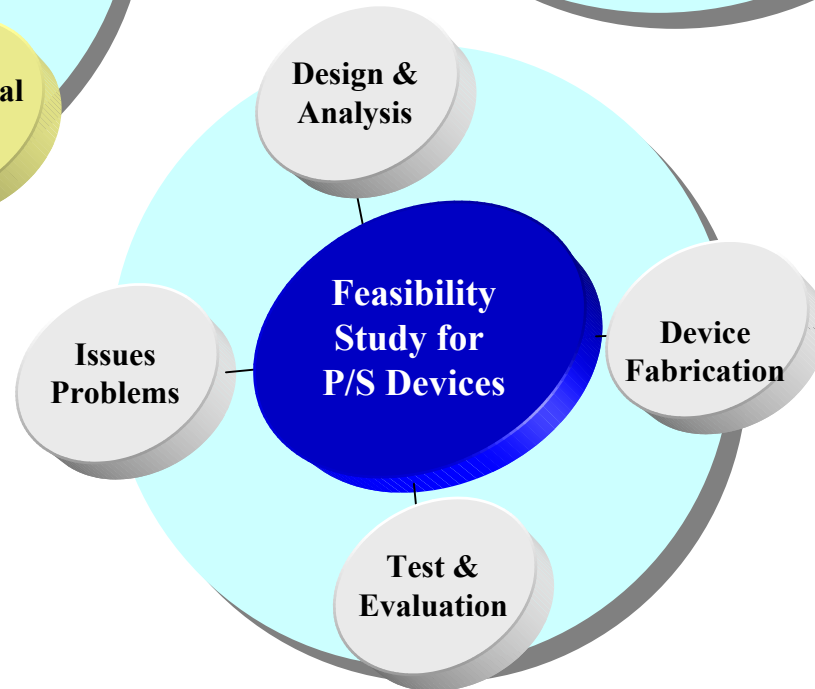
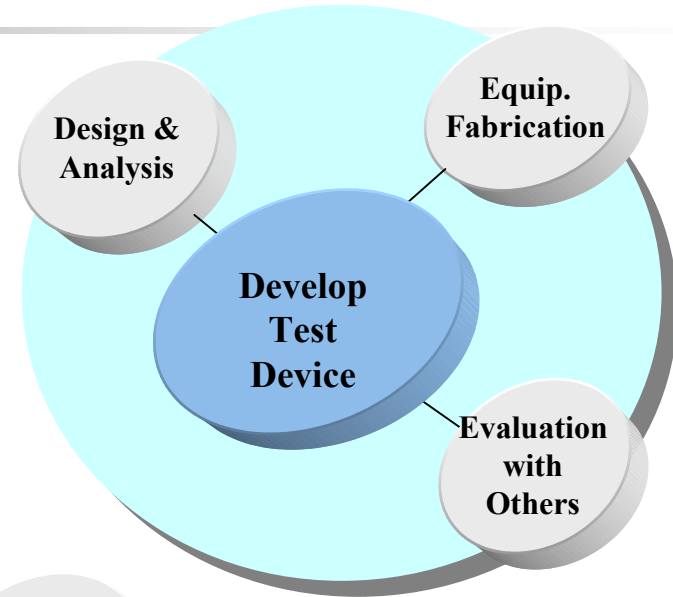
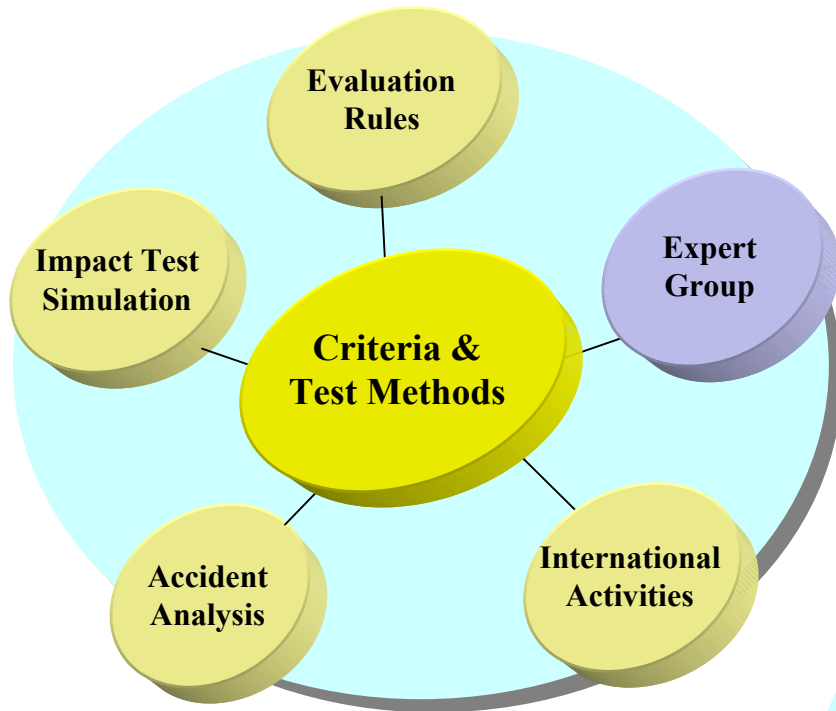


II. Research Activities for Pedestrian in Korea

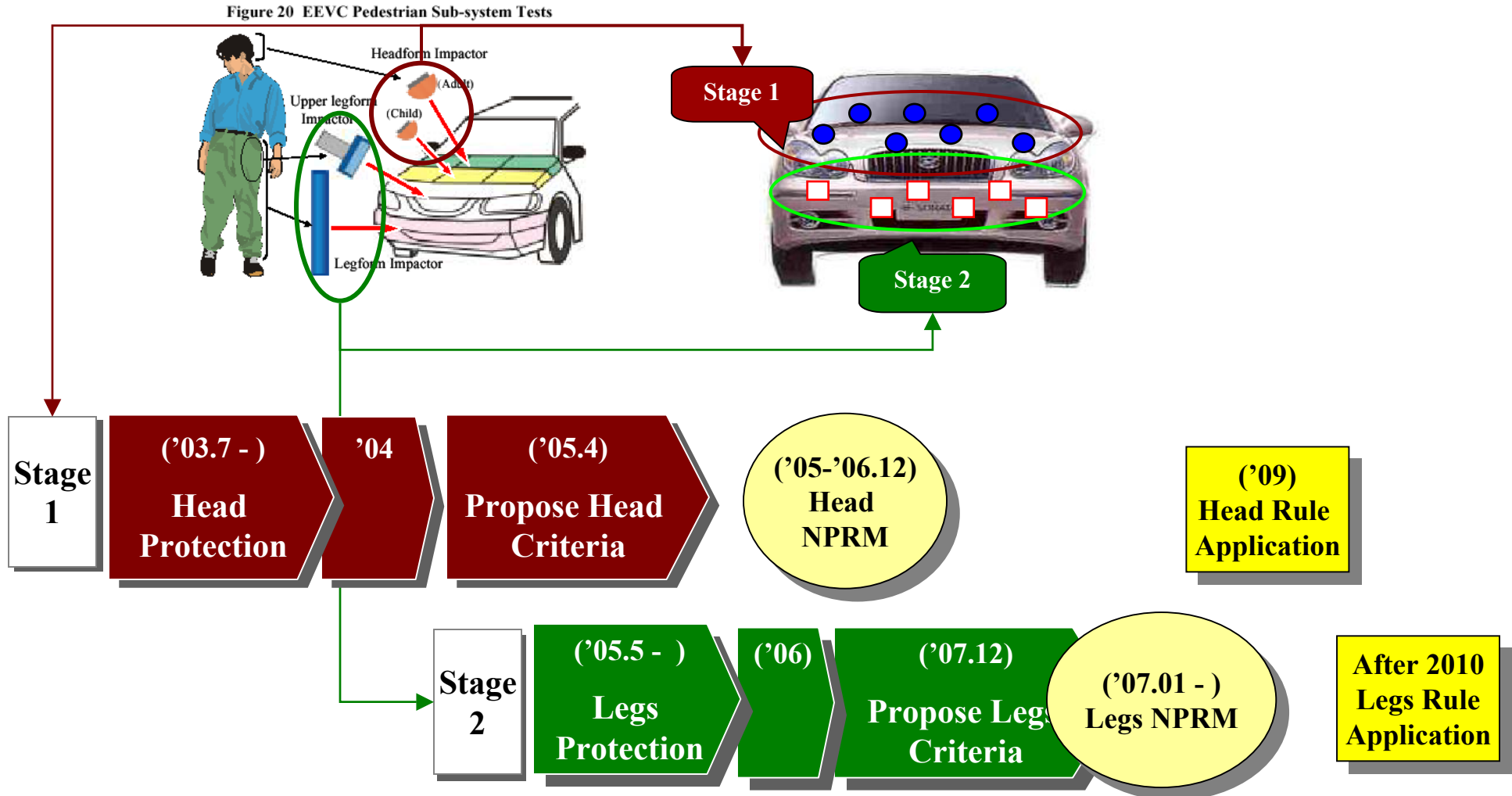
1. Objective of Research



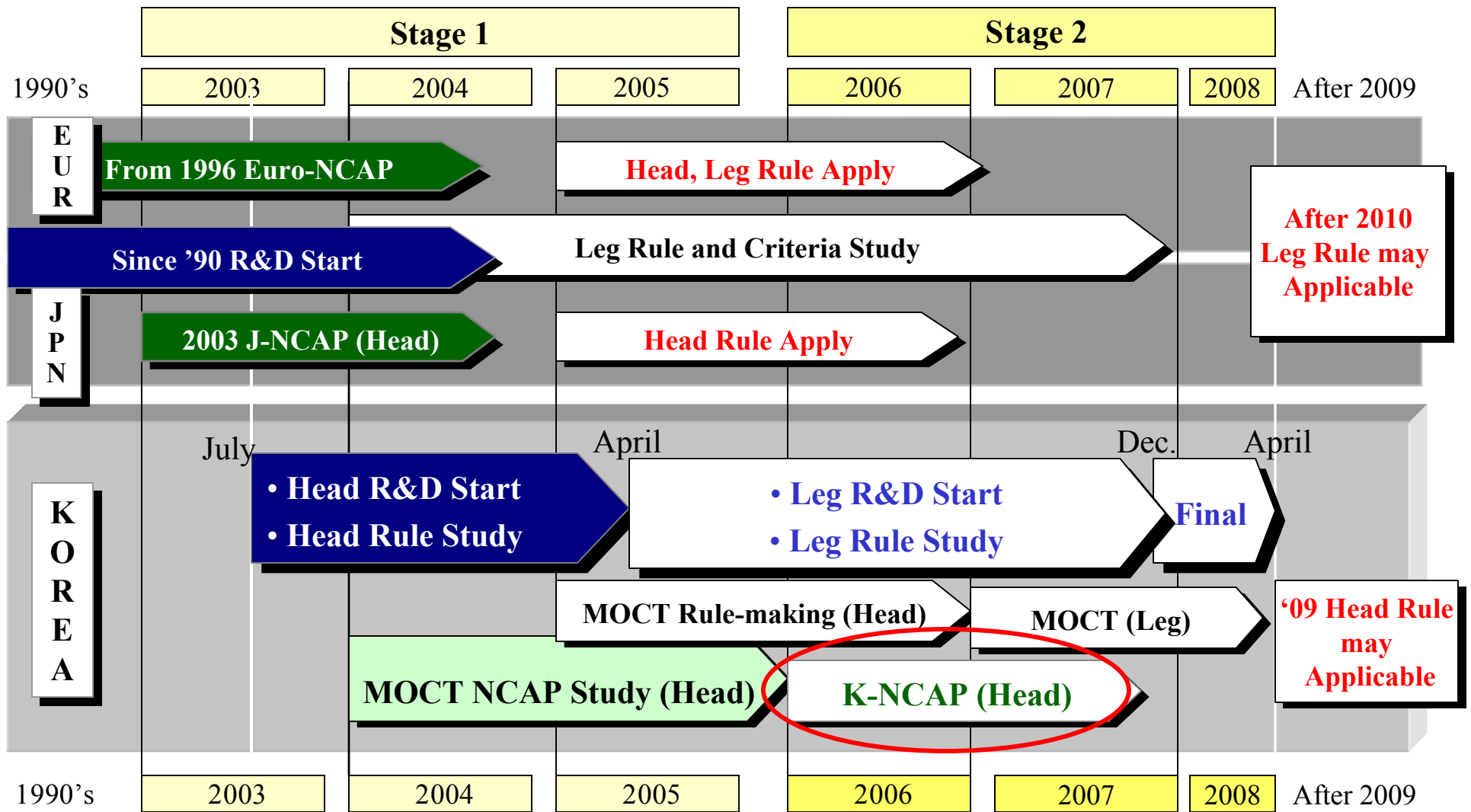
2. Research Scopes



3. Plan for P/S Rule-Making Activities

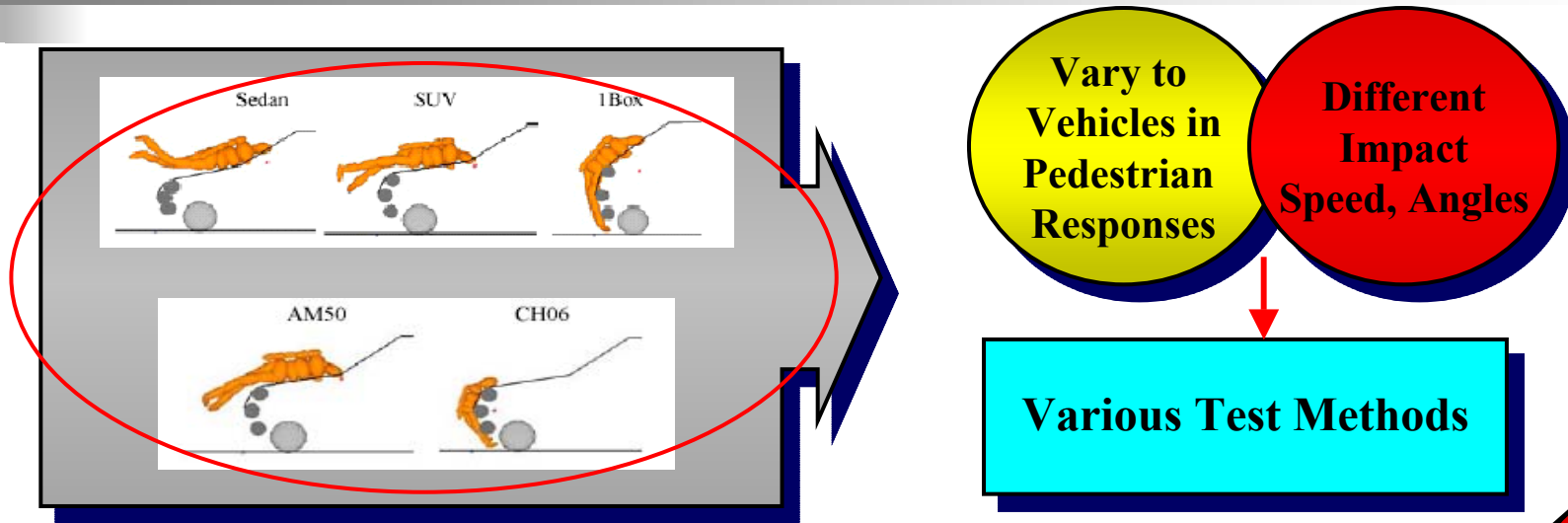


4. Expected Plans for Pedestrian Safety

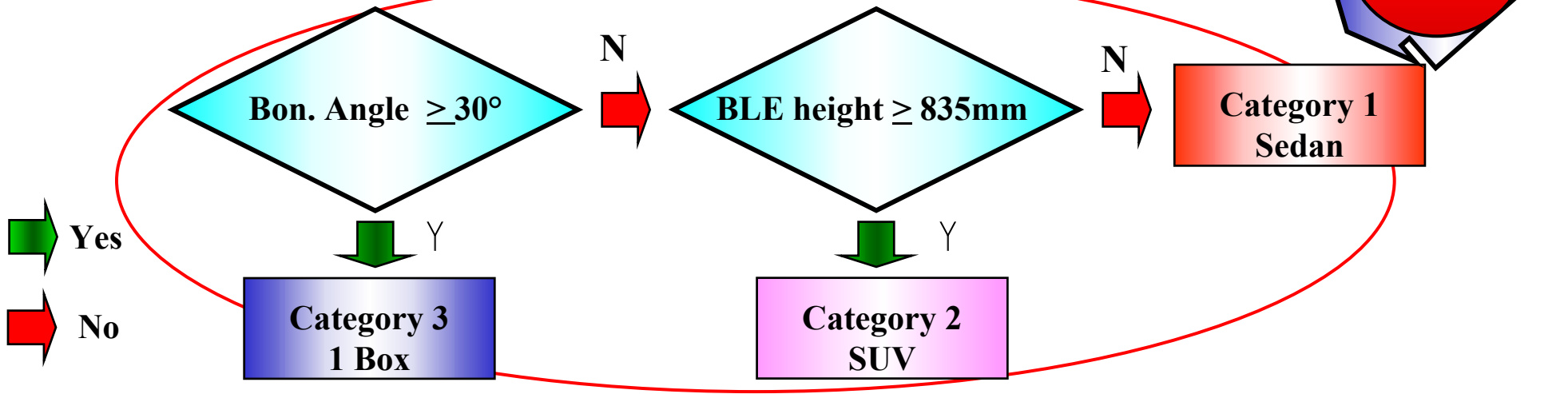


5. GTR Vehicle Classification

1)

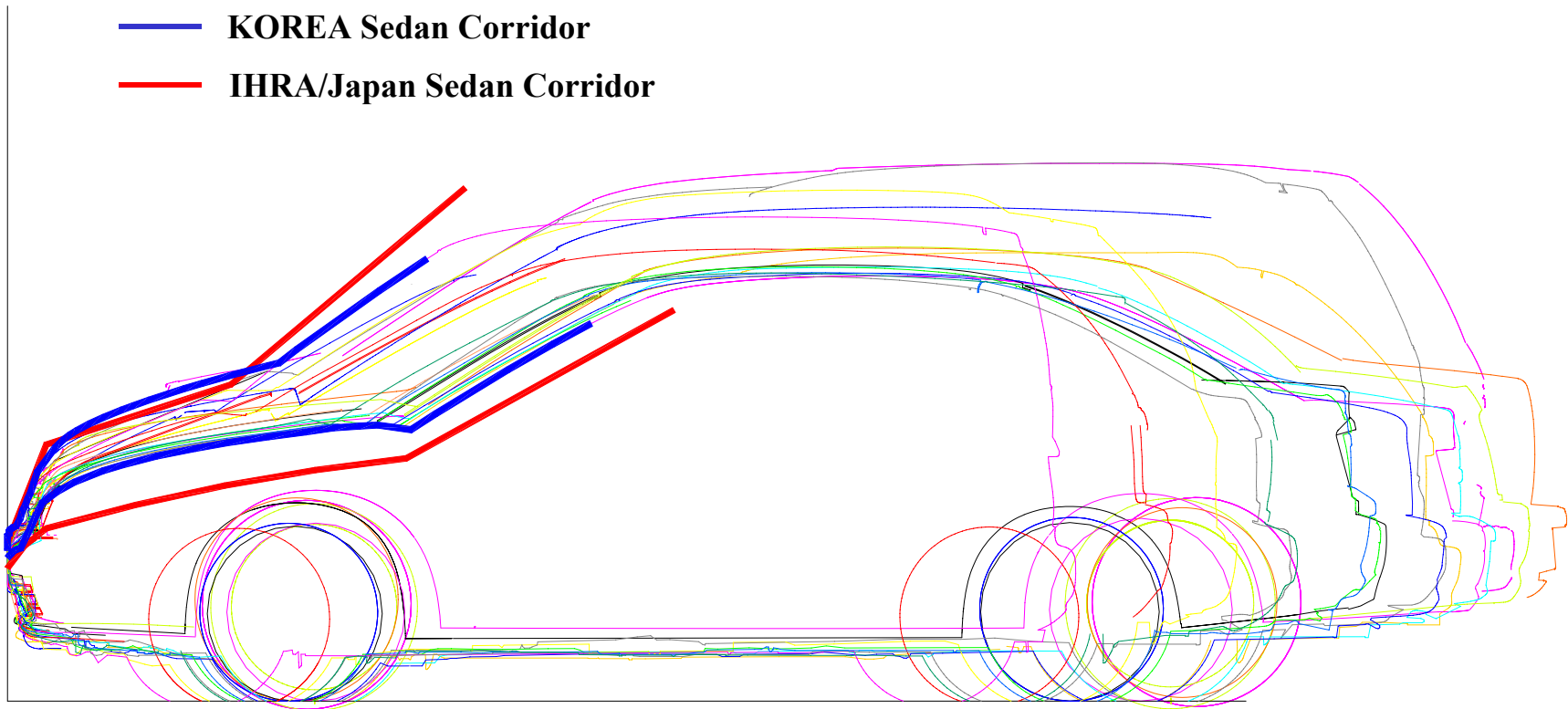


2) ■ Evaluate Domestic Vehicles in terms of GTR Classification



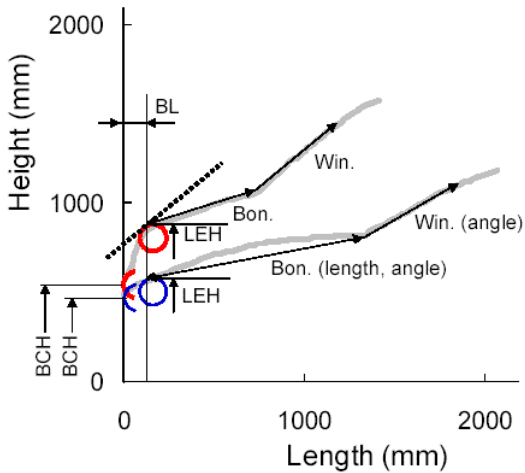
5-1. Vehicle Classification(Sedan)

Sedan Corridor



5-2. Vehicle Classification (Sedan)

Comparison of Sedan Corridor



— KOREA Sedan Corridor
— IHRA/Japan Sedan Corridor

IHRA/Japan Definition

Sedan: Bon. Angle < 30° & LEH < 835mm

Classification	Korea		IHRA/Japan	
	Lower	Upper	Lower	Upper
BL(mm)	122	175	127	127
BCH(mm)	431	479	435	516
LEH(mm)	656	849	565	839
Bon. Length(mm)	1099	895	1200	635
Bon. Angle(°)	13	19	11	18
Win. Angle(°)	29	32	29	40

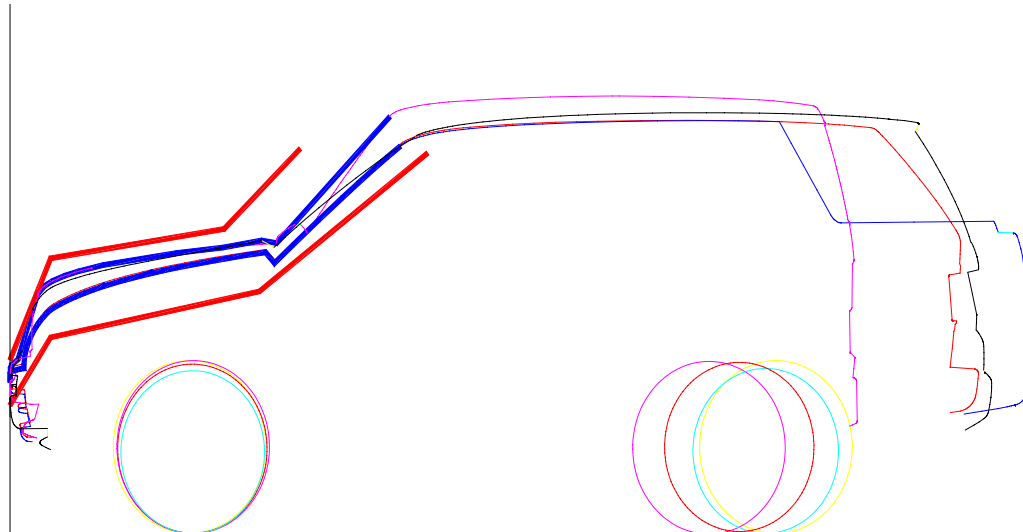
Angle	Sedan	SUV	1box
Child	65°	60°	25°
Adult	65°	90°	50°

5-3. Vehicle Classification (SUV)

Comparison of SUV Corridor

■ IHRA/Japan Definition

SUV: Bon. Angle < 30° & LEH > 835mm

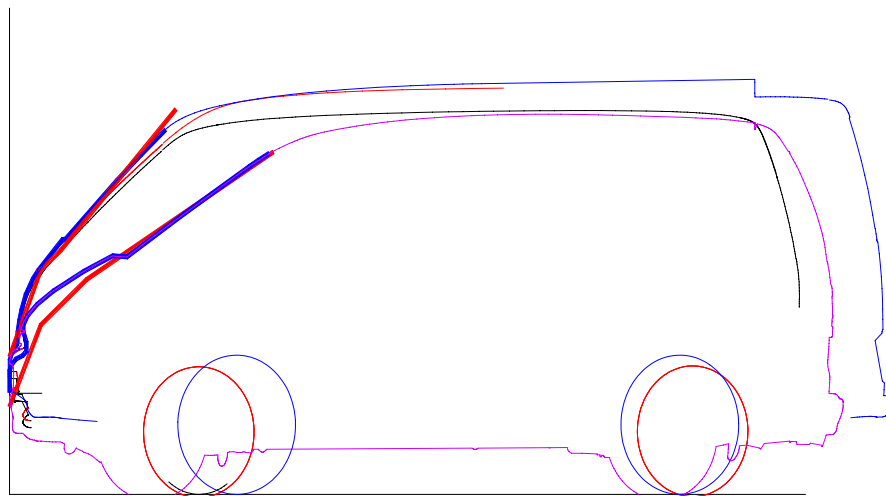


— KOREA SUV Corridor
 — IHRA/Japan SUV Corridor

Classification	Korea		IHRA/Japan	
	Lower	Upper	Lower	Upper
BL(mm)	182	165	195	195
BCH(mm)	640	647	544	736
LEH(mm)	939	1050	832	1168
Bon. Length(mm)	1077	1132	1023	844
Bon. Angle(°)	14	9	11	8.5
Win. Angle(°)	39	51	36	43

5-4. Vehicle Classification (1Box)

Comparison of 1 BOX Corridor



- KOREA 1 BOX Corridor
- IHRA/Japan 1 BOX Corridor

- IHRA/Japan Definition
1 Box: Bonnet Angle > 30°

Classification	Korea		IHRA/Japan	
	Lower	Upper	Lower	Upper
BL(mm)	166	189	188	188
BCH(mm)	521	601	448	704
LEH(mm)	970	989	864	1144
Bon. Length(mm)	521	129	361	157
Bon. Angle(°)	28	47	40	40
Win. Angle(°)	32	43	30	46

5-5. Counter-measure of Vehicle Class

for 1.5 Box Type Vehicle (Bonnet Angle <30)

Vehicle Class

1. Current Vehicle Class: 1.5 Box
2. IHRA Vehicle Class: SUV

Counter-measure Method

LS-Dyna Simulation:

FE Headform : ACEA Child / EEVC Adult

Child: Impact Angle: 60°(SUV), 25°(1 Box)

Adult: Impact Angle: 90°(SUV), 50°(1 Box)

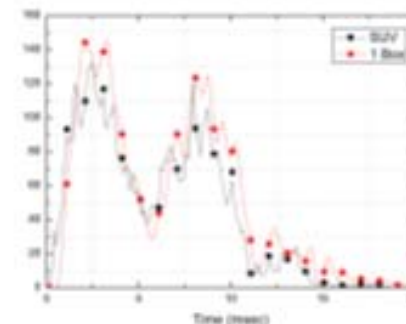
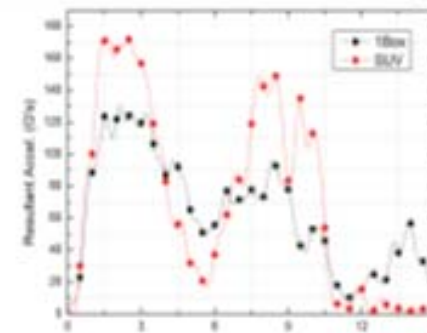
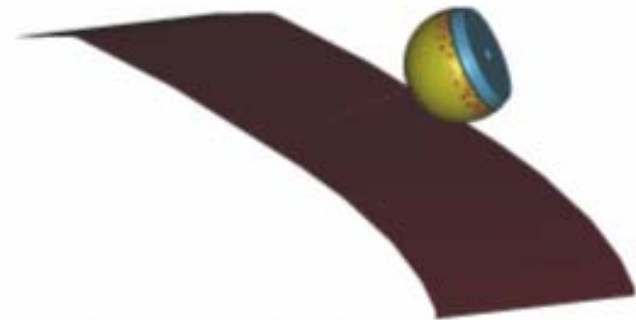
Impact Speed: 32km/h

HIC

Child: SUV(1082), 1 Box(487)

Adult: SUV(756.6), 1 Box(538.9)

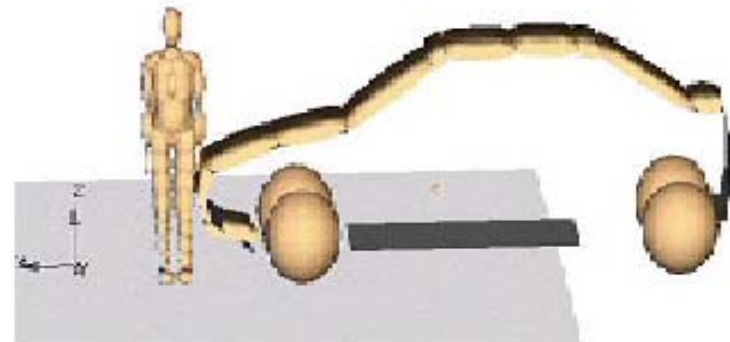
HIC is influenced significantly by impact angles



6. Pedestrian Kinematics Simulations

Purpose

- **Reconstructing Real Accidents**
- **Classify Pedestrian Walking Types**
- **Classify Head Speeds**
- **Classify WAD Contours**
- **Classify Head Rotation Angles**



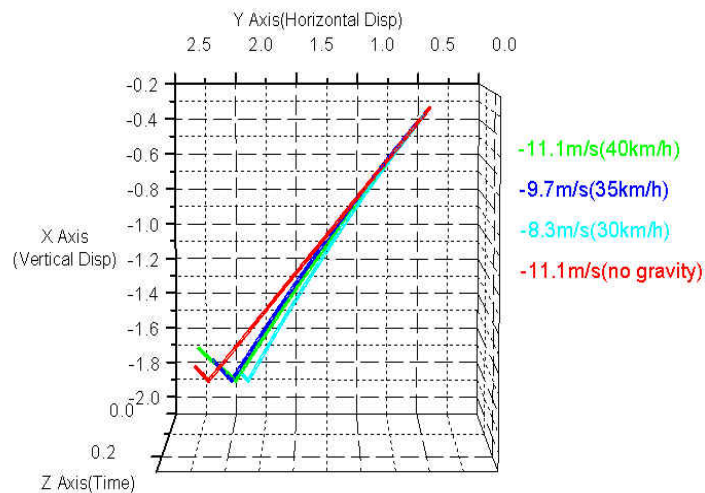
7. Injury Assessment in Test Methods

● Child Headform 2.5kg with 32/35/40km/h

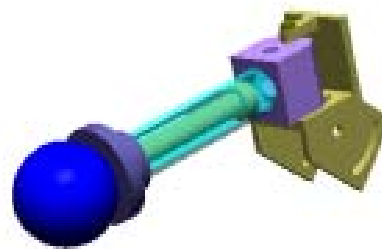


Purpose

- Injury Variations
- Test Tolerance Analysis
- Accuracy of Test Methods
- Targeting Point Clearance



-HEADFORM TRAJECTORY-

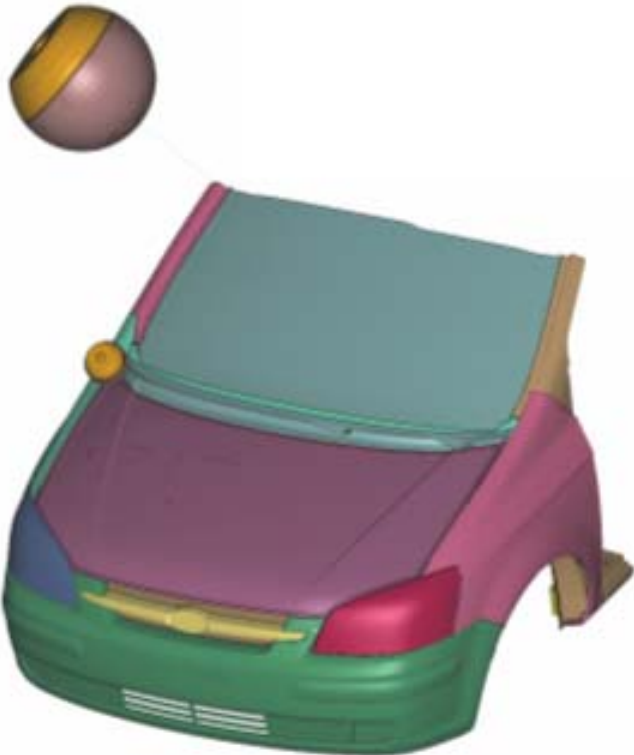


8. Injury Assessment by Simulations

- FE Child Headform 2.5kg/3.5kg & 32/35/40km/h

Purpose

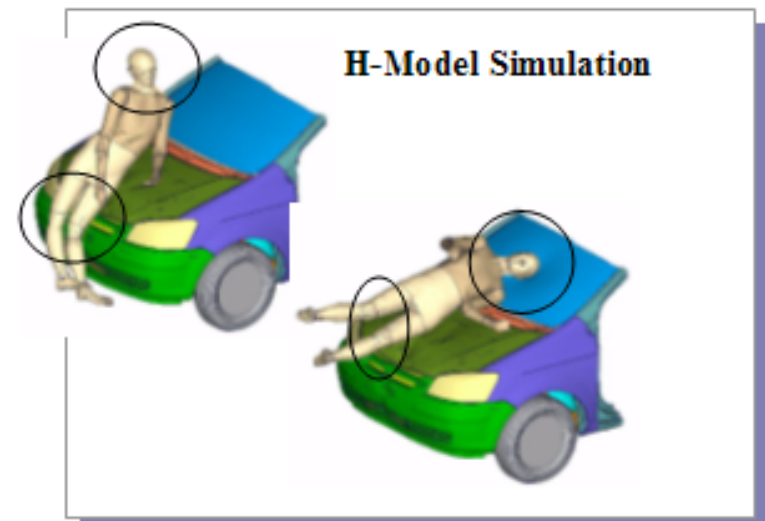
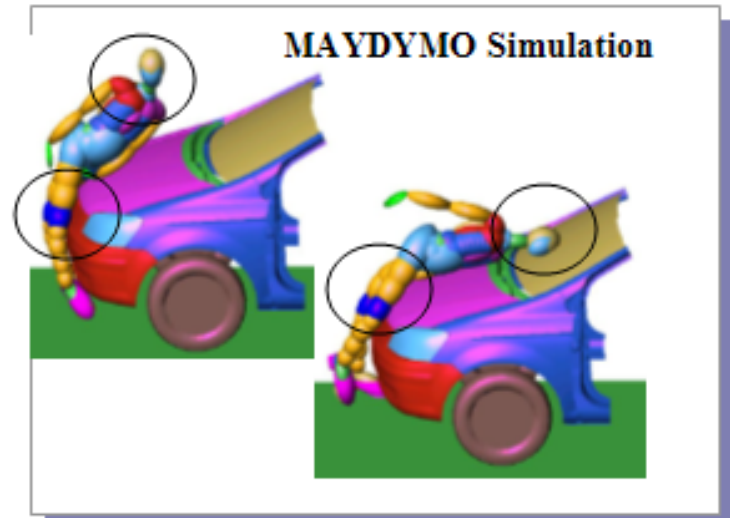
- Injury Variations
- Test Tolerance Analysis
- Effects of Angular Velocity
- Feasibility Study



9. Feasibility Study by H-Model

Purpose

- **MADYMO: Overall Pedestrian Responses**
- **H-Model Simulation: Detailed Injury Mechanism**
(Full Human Model)
 - Rotation & Flexion of Neck
 - Angular Rotation of Head
 - Head Impact Speed
 - WAD Contours



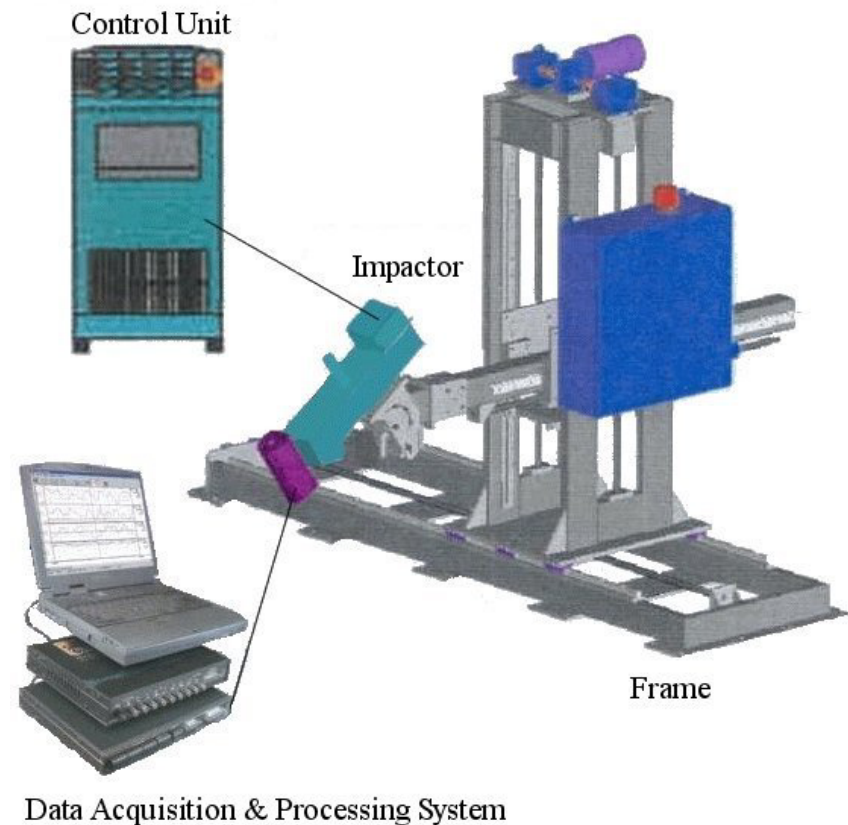
10. Development Test Equipment

● Components

- Control Units (H/W & S/W)
- Impact Mechanism
- Data Acq. & Processing
- Main Frame
- Headforms & Legforms

● Specifications

- Develop each Module
- Module Integrations





III. Harmonization Activities

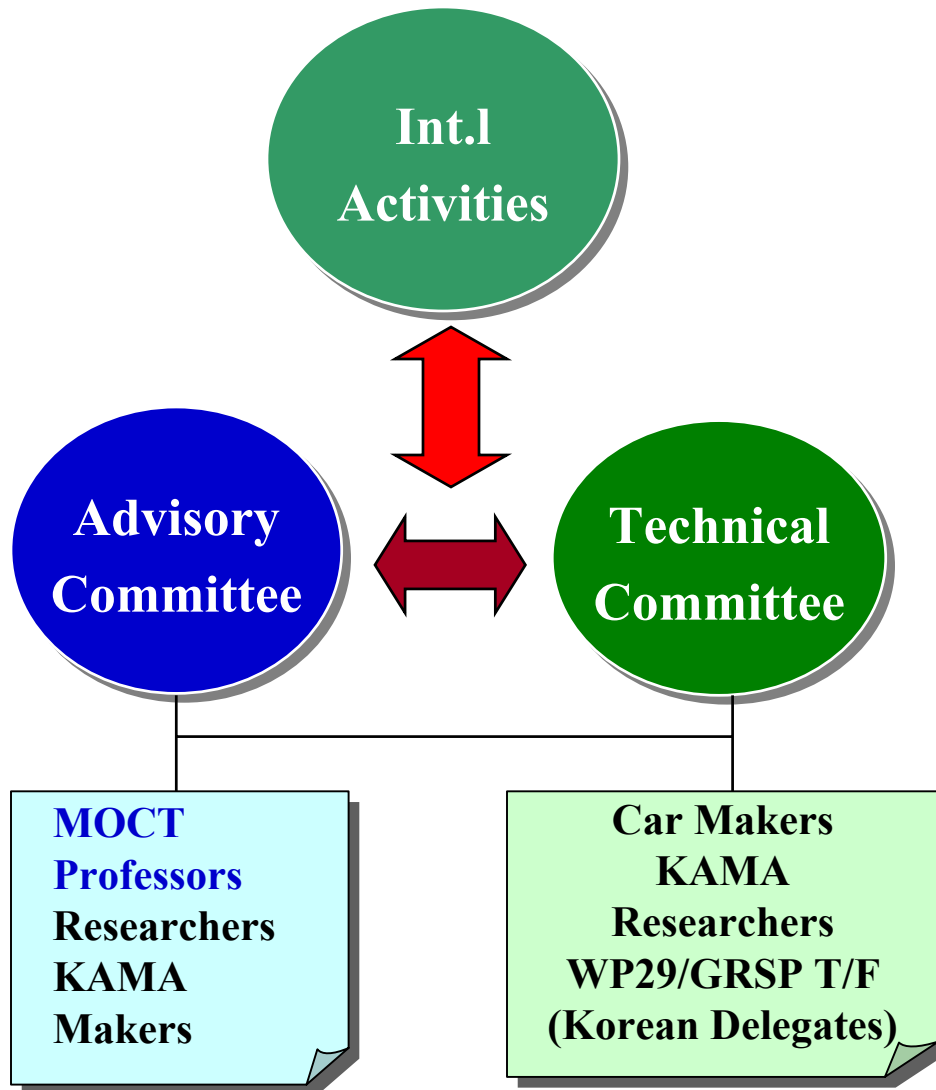


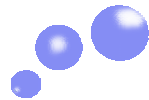
1. Cooperation & Participation

- **Expect to Share & Cooperate with GRSP/IHRA**
 - Strengthen MOCT(Korea) International Activities
 - Exchanges Government based Information
 - Participate Worldwide P/S Expert Regular Meetings
 - Statistical & Technical Information in Vehicle Safety Fields

- **Participations**
 - **UNECE/WP29** GRSP Meetings
 - **UNECE/WP29** GRSP - P/S Informal Group Meeting
 - Join in 1958 Agreements in the near future
 - Possibly Joining ESV/IHRA Member

2. Organization of Korean Expert Group for Pedestrian Research INF GR / PS / 70





Thank You !

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