Autonomous Vehicle Policy of Korea


Yong Seog Kim
Director General of the Motor Vehicle Management Bureau

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1. Motor Vehicle Management Bureau

Motor Vehicle Management Bureau

[Overall Control]
- System & Policy
- Regulation & Safety Standard
- Vehicle Certification
- License Plate, Maintenance
- Registration, Collateral, Car scrapping
- Vehicle Inspection
- Recall, KNCAP
- Vehicle R&D, Global Negotiation

Designated Agency: KATRI
Test & Evaluation, R&D, Defect Investigation, etc.

1. Motor Vehicle Management Bureau

● Organization of Motor Vehicle Management Bureau

Director General

Motor Vehicle Policy Division
- Budget Planning & Management
- Policy & Regulation - Regulatory Reform
- Certification & Tuning
- Recall & International Affairs
- FTA and International Affairs

Advanced Motor Vehicle Division
- AV Policy Improvement
- Support AV Commercialization
- Safety Standards
- Responding to WP29/APEC
- Promotion of Micro cars, Personal Mobility

Motor Vehicle Management & Insurance Division
- Oversight over Automobile Sale, Repair, Auction, and Scrapping
- Inspection & Testing
- Management of Registration
- Promotion of Insurance
- Support Care & Rehabilitation for the Accident Victims

Transport Safety & Welfare Division
- National Traffic Safety Master Plan
- Regulation and Management of Korea Transport Safety Authority
- System for the Traffic Accident Data Management
- Transport Welfare Policy
1. Motor Vehicle Management Bureau

**KATRI (Korea Automobile Testing & Research Institute)**

- **Mission**
  - Reduce casualties from traffic accidents
  - Protect rights & properties of customers
  - Support government in implementing policies
  - Support domestic auto industries with expertise

### 1980's
- May 15, 1987 Established KATRI
- Sept. 28, 1987 Appointed as a Vehicle Safety Testing Institute (MOLIT)

### 1990's
- Jan. 1, 1994 Extended test items of the vehicle safety test(35 + 38 items)
- Nov. 6, 1996 Completed construction of 7 Indoor Testing Institute Facilities
- Jan. 1, 1998 Enlisted with Vehicle Type Approval Work (MOLIT)

### 2000's
- Dec. 23, 2002 Completed phase 1 of the construction of the Proving Ground
- Jan. 15, 2003 Appointed as a Performance Test Institute (MOLIT)

### 2010's
- May 27, 2013 Hosted the 22nd International Technical Conference on the Enhanced Safety of Vehicles (ETC)
- Nov. 30, 2013 Completed the construction of 4 advanced test tracks

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1. Motor Vehicle Management Bureau

**Major Role & Responsibilities of KATRI**

- Investigation of safety defects in vehicles & components
- New Car Assessment Program (KNCAP)
- Harmonization of vehicle safety standards and research with UNECE/WP29
- Technical reviews and safety inspection
- Type approval/registration & safety inspection of construction machinery
- Certification of road safety facilities
- Research & Development

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2. AV - Introduction

- AV Technology

- Technology Status

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<th>Survey Year</th>
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<th>U.S.</th>
<th>Japan</th>
<th>Europe</th>
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< Smart Car Technology Comparison by Nation(Unit: %, Year) >

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<th>Nation</th>
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<th>Safety Technology</th>
<th>Convenience Technology</th>
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<tr>
<td>China</td>
<td>68.9</td>
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< Smart Car Technology Comparison by Technology Type (2015, Unit : %) >

Source : 2015 Industrial Technology Survey (KEIT)
2. AV - Introduction

- AV Level (NHTSA Standards)

- No Automation
  - No Control, Only Warning to Drivers in Case of Emergency
  - Driver's Role: Complete Control & Monitoring

- Function-specific Automation
  - Control Either Steering or Brake
  - Driver's Role: Control & Monitoring

- Combined Functional Automation
  - Control Both Steering and Brake
  - Driver's Role: Occasional Control

- Limited Self-driving Automation
  - Automated Driving under Certain Conditions (On AV Roads)
  - Driver's Role: Monitoring

- Full Self-driving Automation
  - Automated Driving under All Conditions
  - Driver's Role: Destination Input

- Monitoring is Required for AV Level 1-2,
- Automated Driving is Allowed Under Certain Conditions for AV Level 3
- Commercialization: AV Level 2 (Available), AV Level 3 (by 2020)

2. AV - Introduction

- Major Urban Road Automated Driving (COEX, Seoul)
2. AV- Introduction

● Av Market: Status and Forecast

![Graphs showing AV market share](image1)

- AV Technology Introduction
- Level 4 AV Technology Introduction
- Av Market Share (Left) & Market Revenues (Right)

2. AV- Introduction

● AV Policy Status

**U.S.**
- AV Policy Introduction at the Federal and State Levels
- $3.9 Billion Investment Plan (2017-2026)

**U.K.**
- Set-up of AV Center and Smart Center
- Release of ‘A Code of Conduct’ for AV Test Driving
- £20 Million Investment in AV Technologies

**CANADA**
- AV Test Driving is Allowed on All Roads in Ontario State with Human Driver inside the Car (2016—)
2. AV - Introduction

Japan
- Release of ‘Public-Private ITS Initiatives/Roadmap’
- Public-Private Consultative Body led by MLITT & METI

Korea
- Designation of AV as the New Growth Sector by MOLIT (2016)
- Installation of Advanced Motor Technology Division within MOLIT (May, 2016)
- Set-up of AV Expert Forum

3. AV Commercialization Support Policy

Vision
AV for Safety Improvement & A New Growth Source

Goal

[Step1] Partial Commercialization of Level 3 AV Technology by 2020
[Step2] Leading the Trend toward Level 4 AV Technology by 2026

Institution
- Introduce AV Test Driving System
- Overhaul Existing Institution for Commercialization

Infrastructure
- Build Precise Map
- Improve GPS Accuracy
- Expand AV Road Infrastructure

Technology
- Expand AV Testing Area
- Strengthen Cyber Security Measures

Industry
- Train Experts
- Build Long-term R&D Strategy
- Hold Test Driving Event and Contest
3. AV Commercialization Support Policy

(1) Institution

AV Test Driving System
- AV Test Driving System Introduction (Feb, 2016)
- Revision of ‘Automobile Management Act’ to Allow AV Testing for Research
- Release of Requirements for AV Testers
- Grant of Temporary AV Testing License for Qualified Testers (by MOLIT)
- Easing of AV Testing Restrictions (Second Half of 2016)
  - Negative Approach in AV Testing Regulation, Expansion of Preliminary Testing Areas

Institution Overhaul for Commercialization
- Response to the Developments at UNECE/WP29
  - Compliance with International Standards upon Their Enactment
  - Active Involvement in the Standard-setting Process
- Set-up of Insurance Policy, Inspection & Recall Regimes for AV

(2) Infrastructure

Precise Mapping
- Building E-map Containing 11 Road Information (lanes, signs...)
  - Dec, 2015: Mapping for K-City & Testing Zone
  - 2016~: Mapping for the Remaining and New K-Cities and Testing Zones

GPS Accuracy Improvement
- Development of Core GNSS Technology
  - GPS Data with a tolerance of ± 1.0m (Oct, 2015)
  - Transfer Technologies for Error Correction Signal Transmission and Terminals to the Private Sector (2016 ~ 2018)
3. AV Commercialization Support Policy

(2) Infrastructure

- Pilot C-ITS Project between Daejeon and Seoul (Jul, 2016)
  - Build An Integrated Network of Traffic Management Centers for Road Infra Management (Dec, 2016)
  - Introduce the C-ITS to Designated Expressway & Prepare for Commercialization by 2020

V2V : Vehicle to Vehicle communication
V2I : Vehicle to Infrastructure communication

(3) Technology

- Testing Lane Expansion
  - 1st Phase: One Expressway & Five Highways
  - 2nd Phase: Gradual Expansion to City Roads (2016~)
- Support for Testing Zone
  - Designate Urban Areas as Testing Zones
  - Devolve Testing Authority to Cities
  - Support Precise Mapping and Infrastructure Building
- Designation of ‘K-City’
  - Allow Repeated AV Testing in Full-scale Road Environment
3. AV Commercialization Support Policy

(3) Technology

K-City

3. AV Commercialization Support Policy

(3) Technology

Security Guideline

- Draft Cyber Security Guideline(2016~)
- Revise Automobile Standards to Reflect the Guideline(Late 2018)

"...a self-driving car controlled by an attacker is the worst nightmare."

Dieter Zetsche
3. AV Commercialization Support Policy

(4) Industry

**Expert Training**
- Undergraduate & Graduate Courses and Training Programs
  - Nurture AV Technicians and Industry Experts

**Long-term R&D Strategy**
- AV Master Plan for Technological Development (Jun, 2016)
- New R&D Projects to Develop ‘Core AV Safety Technologies’ (Jan, 2017~)

**Test Driving Event & Contest**
- Regular Test Driving Events, Expert Forums, and Contests
  - Raise the Public’s Interest and Promote Exchange of Expertise to Increase Public’s Acceptance of the Technology

4. Impact

**Traffic Safety**
- A Saving of $1.3 Trillion from Fewer Traffic Accidents (Morgan Stanley, 2013)
- A 50% Reduction in Expressway Traffic Fatalities by 2025

**Industry Convergence**
- Creation of High-Added Value for the Automobile Industry
- Job Creation from the IT-Automobile Convergence

**Better Living Standards**
- Time Saving of 50 Minute a Day or 12 Days a Year for Individuals (McKinsey, 2015)
5. Summary

- AV – A Car Capable of Planning and Controlling Driving
- AV Plan
  - Lv. 3: Partial Commercialization by 2020
  - Lv. 4: Securing World-class Technology by 2026
- AV Commercialization Support - Institution, Infrastructure, Technology, Industry
- Impact of AV – Traffic Fatality Reduction, Job Creation, Better Living Standards

THANK YOU!!
Who is liable?, Who is going to pay insurance bill?

Choong-Kee Lee
(Center for Roboethics & Robolaw, Hongik Univ.)

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1. Liability Regime for Automobile
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   (2) Product Liability (PL) Regime

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   (2) Product Liability(PL) Insurance
II. Liability Issues for Autonomous Vehicles (AVs)

1. Operator Liability : Strict Liability
   (1) Too harsh for Operator of AVs?
   (2) Option to make an exception for AV users

2. Product Liability (PL) : Software issue
   (1) Software malfunction, Product Defect or not ?
   (2) Option to cover software malfunction as Product Defect

III. Insurance Issues for AVs

1. Operator Liability Insurance : role & coverage, be diminished
2. Product Liability (PL) Insurance : increasing & compulsory

Liability Regime for Automobile

Current Liability Regimes for Automobile

(1) Operator Liability Regime : Strict Liability
(2) Product Liability (PL) Regime

Operator Liability Regime for Automobile Accident

1. Special Regime for Automobile Accidents v . Tort Law

2. Two Concepts in Special Regime :
   “Operator” : anyone who drives a car on his own behalf.
   => controls operation and enjoys benefits in respect of a car
   “Driver” : anyone who drives a car on behalf of others (= operators)
3. What is Special?
Operator is practically under **Strict Liability** whether negligent or not
In order to Protect Victims

Driver is under **Negligence Liability**

- **Auto Maker Liability Regime for Products**

1. PL (Product Liability) Regime
   : General Liability Regime for Products Defects

2. If there is a defect in a Automobile, the Maker will be liable for the defect.

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**Insurance Regime for Automobile**

- Where Automobile Accident, Who is Liable?

  90% : due to Operator Negligence
  9% : due to natural or environmental cause
  1% : due to car defects

- **Insurance Regime.**
developed to respond these patterns of Liability

While Operators are required to insure their highly likely liabilities, auto makers are not so required to cover their low possibilities.
Insurance Regime for Automobile

- **Current Insurance Regime** for Automobile Accident

1. Insurance for Operator Liability
2. Insurance for Car Defects: PL Insurance

- **Insurance Regime for Operator Liability**: Compulsory

Special Regime for Car Operators, due to high probability

: **Compulsory** Liability Insurance for Operators.

- **PL Insurance Regime for Car Maker**?

No Special Insurance Regime for Car Maker, due to low possibility

: **Optional** Liability insurance

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Liability Law Issues for AVs

- **Liability Law Issues for Autonomous Vehicles (AVs)**

Q1. Current Operator Liability Regime, Applicable to AV Owners?
Q2. Current Product Liability (PL) Regime, Applicable to AV Makers?

- **Operator Liability for AV Owners**

Due to “Autonomous” driving character,

  Operator’s role is becoming limited in AVs.

But,

Due to “control & benefit” enjoyed by AV owners,

  they still be perceived as “Operators”

→ Current “Strict Liability” regime still apply to AV owners.
Liability Law Issues for AV

Q: Strict Liability for AV owners, Desirable?

→ Too harsh for AV owners because they are not involved in driving.

One possible Option

: to make an exception to Strict Liability for AV users

Then, Who should be responsible in respect of AV victims?

As a Matter of Policy, AV Makers rather than AV Operator

But, it is still unclear car makers will be liable under current Product Liability Regime.

Liability Law Issues for AV

- PL (Product Liability) for AV Makers: Software issue

1. Current Structure of Product Liability
   Makers, liable for Defects in Product

   Product: produced or made movables

   Defects: Manufacturing defects
   Design defects
   Defects in explanation, and
   Lacking in safety reasonably expected
Liability Law Issues for AV

2. Applying Product Liability to AVs

(1) AVs, Product?
Yes, Because Avs are produced movables.

(2) Issues: Software malfunction.
Q: Software, Product?
Embedded software, product or not? Maybe not

Korean Civil Code section 98 (Definition of Things)
Things are tangibles, electricity and natural phenomenon that can be administered.

Software: Intellectual property produced by humans

(3) Conclusion: not Liable
AV makers may not be liable for software malfunctioning.

Q: Exemption for AV Makers, Fair? Unfair
-> because AVs command driving, AV Makers should be responsible in respect of AV victims?

(4) One possible Option
  to stipulate software malfunction as Product Defect

  necessary to amend Product liability Act
Insurance Law Issues for AV

= Insurance Issues for AVs

Q1 : Operator Liability Insurance : role & coverage, be diminished
Q2 : PL (Product Liability) Insurance : role & coverage, increasing

- Liability Insurance for AV Owners

Due to “Autonomous” driving character, role of AV operator will be diminished.

-> Role of Liability Insurance for AV Owners, be diminished
-> Coverage, be narrowed

-> Ways to calculate Insurance premium will also be changed.

Insurance Law Issues for AV

- PL Insurance for AV Makers

Due to “Autonomous” driving character, role of AVs will be increasing.

-> Role of PL Insurance for AV Makers, be increasing

-> Coverage, should be compulsory & wide
### Suggestion

1. **Under current Liability Regime.**

   AV Owners: still likely to assume Strict Liability, which seems too harsh for AV Owners.

   AV Makers: likely to escape Liability relating to Software malfunctioning. Which seems unfair.

2. **Suggestion: Fair Allocation of Liabilities Bet. Parties**

   Liability law should be amended to shift liability from AV Owner to AV Makers.

   Insurance Law should also be amended to reflect such shifted burden.
Collaboration for Safe Automated Driving

Nils Lübbe, PhD
Autoliv Research, Sweden
May 17th 2016

Driven for Life.
Evolution of Driver Assistance

- Feet Off (2000)
- Eyes Off (2018)
- Mind Off (>2020)
Automated Driving Level “Eyes/Mind Off”

Safety opportunity and risk

Normal cars

- Situations that do not lead to accidents
  - Normal driving
  - Near-miss events
- Driver solves the situation

AD cars

- Risk

Situations that lead to accidents
- Driver not sufficient

Opportunity
Consequence of “Eyes/Mind Off” Automation

- More automation ⇒ understand the driver
- Integrated safety chain guides strategies
Lives Saved Earlier in the Integrated Safety Chain

- Biomechanics
- Human Factors
- Robotics
- Real life traffic analysis

Safe Driving → Deviation from safe driving → Emerging situation → Critical situation → Crash unavoidable

Active safety & Passive safety
Lives Saved Earlier in the Integrated Safety Chain

Safe Driving → Deviation from safe driving → Emerging situation → Critical situation → Crash unavoidable

Safe Driving

Deviation from safe driving

Emerging situation

Critical situation

Crash unavoidable
From Volvo Cars

Six ways that autonomous driving will improve your life

Reclaim your time  Save fuel  Safer journeys
Sit back and relax  Always find a parking  Lower insurance premiums
From Toyota

Safety

Efficiency

Freedom
Enablers for Highly Automated Driving: Balancing Safety and Mobility
Enablers for Highly Automated Driving: Balancing Safety and Mobility

Today's Human Drivers Expectation on HAD
Enablers for Highly Automated Driving: V2X

- Expectation on HAD
- Today’s Human Drivers
- Vehicle technology advances V2X

- Vehicle speed
- Safety
Enablers for Highly Automated Driving: Technology Advances

- System cost vs. Vehicle speed
- System cost vs. Safety
Enablers for Highly Automated Driving: Infrastructure

System cost?

Safety vs. vehicle speed

HAD highway
Enablers for Highly Automated Driving: More Infrastructure

Fences

I2V
- Positioning (Magnets…)
- Brake boost
- Status information (GLOSA…)

V2I
- Road conditions for safety warning
- Road conditions for maintenance
Validation: Circle of Life – Then and Now

REAL LIFE SAFETY

Start of Production

Accident Statistics

Real Life Validation

In-depth Studies

Test Methods

Biomechanics & Human Factors

Technology Innovation
Validation

- 1 laboratory test will not be enough
- But also 100 will not
- Can lead to certification

- Simulation of the unexpected?

- Driving 1 billion km
Every year, Autoliv’s products save over 30,000 lives.