



# Company Credential



January 2022

**THINK-*i***  
*better solutions in a better way*

# *I. Market Overview*



## Government

- Reinforcing legal regulation for 'Safe Driving'
  - Driver's misbehavior
  - Left child/baby behind on rear seat
- Reinforcing investment on AI and quaternary Industry

## Technology

- Development of autonomous vehicle
- Development of sensors for safe driving with IoT technology & big data analysis technology

## Market Needs

- Needs for saving cost from traffic accident with risk management in freight forwarding Industry
- Needs for remote management of driver and fleet corresponding to Covid-19 era

AI Driving Assistance System Market Growth for protect drivers from accidental risk

# *New mandatory safety features from 2022 in EU*

- For cars, vans, trucks and buses: warning of driver drowsiness and distraction (e.g. smartphone use while driving), intelligent speed assistance, reversing safety with camera or sensors, and data recorder in case of an accident ('black box')
- For cars and vans: lane-keeping assistance, advanced emergency braking, and crash-test improved safety belts
- For trucks and buses: specific requirements to improve the direct vision of bus and truck drivers and to remove blind spots, and systems at the front and side of the vehicle to detect and warn of vulnerable road users, especially when making turns



European  
Commission

(source : [https://ec.europa.eu/growth/sectors/automotive-industry/safety-automotive-sector\\_en](https://ec.europa.eu/growth/sectors/automotive-industry/safety-automotive-sector_en))

# Euro NCAP 2025 Roadmap

IN PURSUIT OF VISION ZERO



***Advanced technology for safety is the key issue in automotive market now!!***



The focus of the roadmap is on the use of advanced technology to deliver improved passenger car safety but also on how it might assist other road users.

For primary safety, driver monitoring (start date 2020) is proposed, to mitigate the very significant problems of driver distraction and impairment through alcohol, fatigue, etc.

(Source : Euro NCAP 2025 Roadmap)



# DMS Regulation in China and USA



- In order to keep up with these rapid developments, regulations mandating the installation of driver monitoring technology in vehicles are under way – in select provinces as well as on a national level.
- Back in 2018, Jiangsu was the first province to implement regulations requiring long distance trucks and vehicles transporting hazardous goods to use driver monitoring, and a national notice is anticipated in 2020. <sup>1)</sup>



- The US government sees the potential of driver monitoring systems for improving road safety.
- An important step towards decreasing these numbers was taken on July 1st, 2020, when the U.S. House of Representatives passed the Moving Forward Act – a 1.5 trillion-dollar infrastructure bill committed to making roads safer. One of the safety measures included in the bill is to make installation of technology that detects inattentive or intoxicated driving required in newly produced vehicles. <sup>1)</sup>

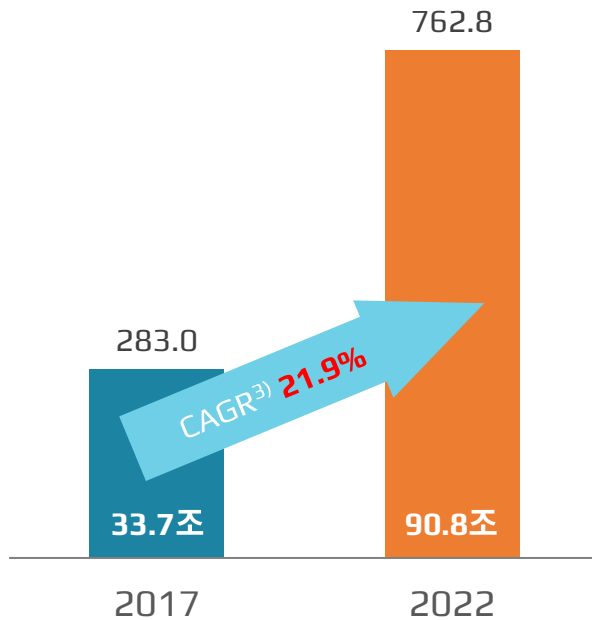
<sup>1)</sup> Source : <https://smarteys.se/blogs/driver-monitoring-dms-on-its-way-to-become-mandatory-in-vehicles-around-the-world/>

# ADAS Global & Domestic Market Size

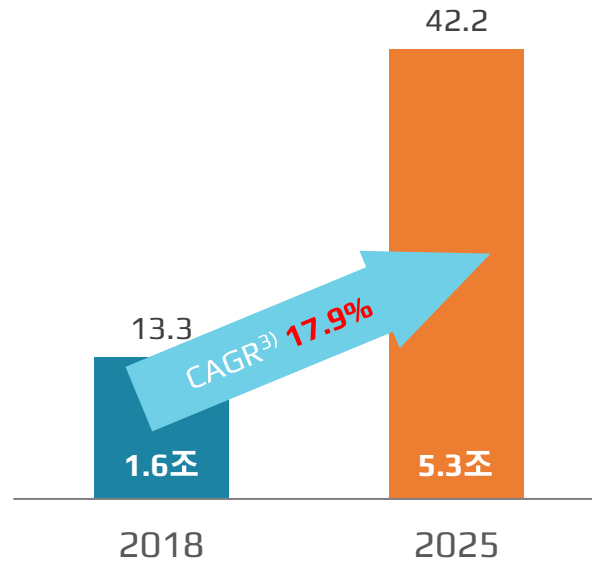
## ADAS Global & Domestic Market Size<sup>1)</sup>

(Billion USD)

### Global Market

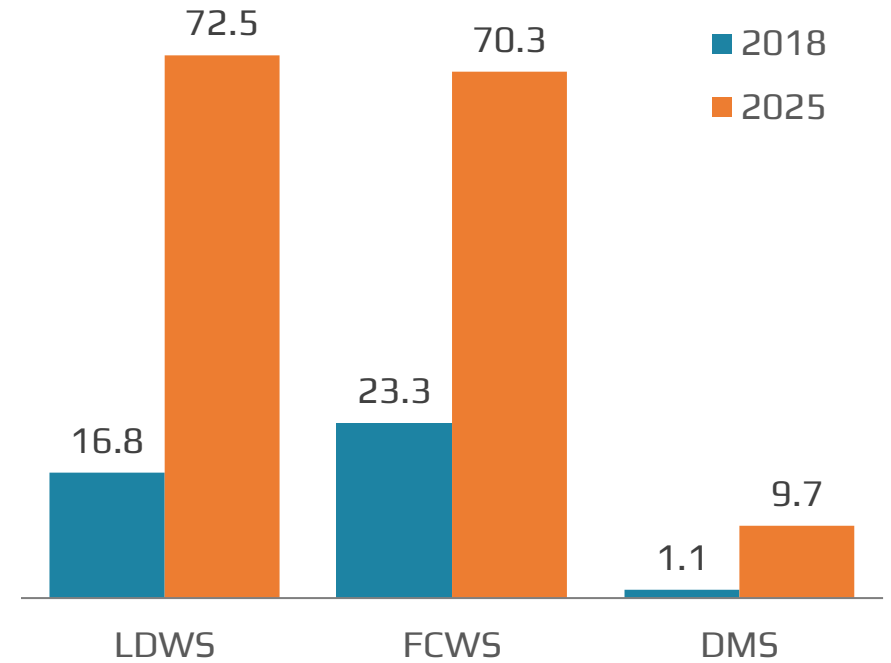


### Domestic Market



## Global ADAS Market Size by Systems<sup>2)</sup>

(Billion USD)



1) Source : Marketsandmarkets, ADAS Market, 2018

2) Source : Marketsandmarkets, ADAS Market, 2018

3) CAGR : Compound Annual Growth Rate

## *II. Who is Think-I?*





# THINK-i

better solutions in a better way

- Start-up company established in May 2015
- CEO : SungKuk Choi
- Developing and Manufacturing AI Dashcam and Providing FMS service

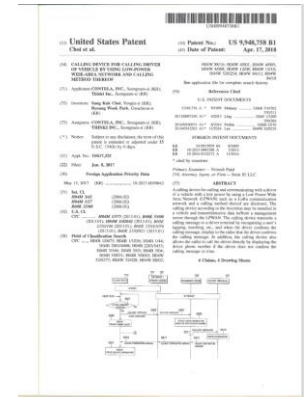
## Key Milestones

“ Think-I is your Next Gen solution provider for improving driver safety and preventing vehicle accidents with cutting edge IoT communication technology. Think-I puts higher priority on people, safety and convenience for the autonomous driving era with it's technology ”



## 12 Patents(2 oversea)/4 Applications

- Driving Recorder which can transfer video using LPWAN and the method
- Service modem which can be connected to Driving Recorder and supply various services by using LPWAN and the method of connection
- Service Modem which can alarm the accident in driving by using LPWAN and the method of supply
- Car Surveillance Method and System, and Service Terminal for the System
- Driving Recorder which can be quick Booting and The method of Image Recording
- Driving Recorder which have the automatic switch function of recording mode of day and night and the method of switch
- Camera device and service which can alarm drowsiness and distracted driving
- In-cabin safety sensor and it's service platform and the method of supply
- In-cabin safety sensor in vehicle and it's service platform and the method of supply(PCT)

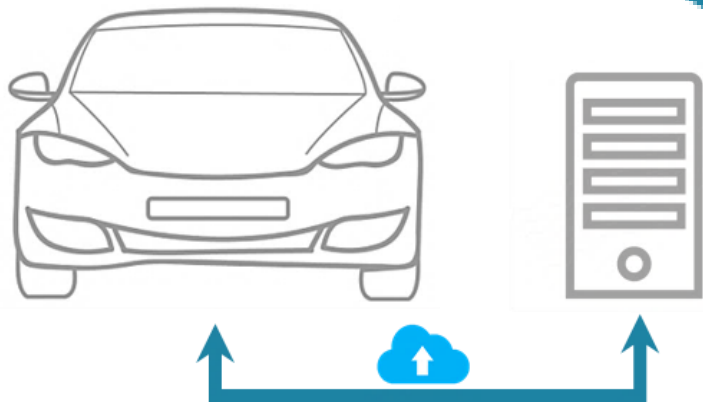


} patent application

# How to correspond reinforced government regulations in automotive industry

Think-I pays attention to improvement of safety on the road by applying advanced technology to our devices and solution.

We help you stay safe, save cost and drive comfortably .



Transmission of detected data via IoT technology

## HOW OUR BIZ WORKS?



### *III. Think-I AI Dashcam*



## External Environment Sensing



## Driver Monitoring



DMS- Drowsiness, Smoking, Using a phone, Distraction

Developing

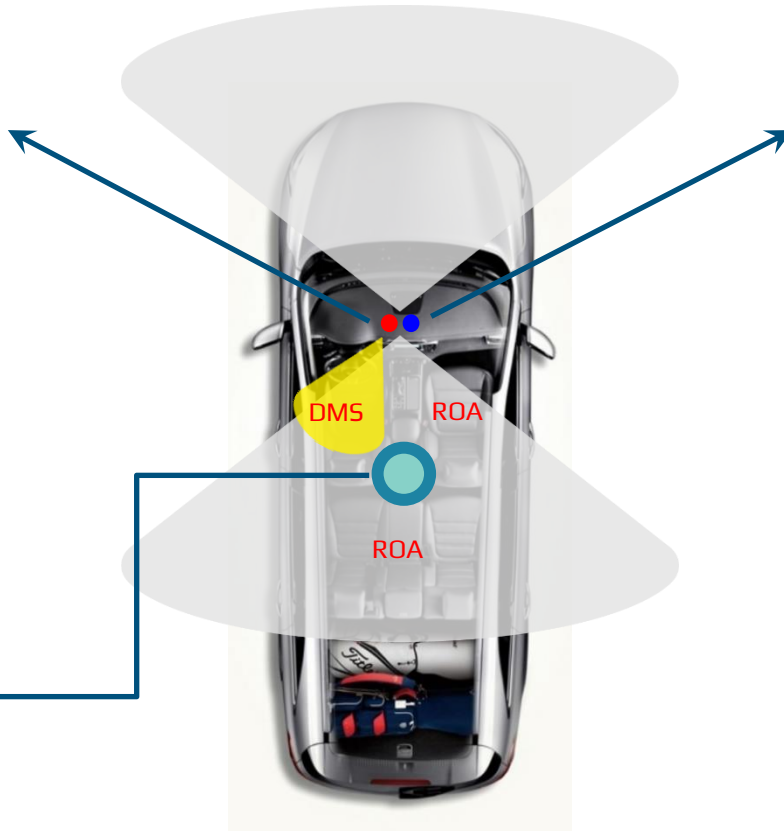


Infrared Thermal Sensor

## Rear Occupant Monitoring



ROA for (Baby/Child)



# Key Benefits of Think-I AI Dashcam



## Improve Driver Safety

Think-I AI Dashcam monitors driver to detect distractions and misbehaviors with real time coaching & alert to improve safety



## Protect from Car Accident

Think-I AI Dashcam protects drivers from fatal car accidents by alerting misbehaviors of the driver and risks in the environment



## Prevent Child Hot Car Death

Think-I AI Dashcam detects child in rear seat to prevent the child from being left behind in rear seats. This feature will be mandatory in EU from 2022 according to EURO NCAP2025



## Manage your fleet

Think-I AI Dashcam supports cutting-edge connected service to help administrators manage every vehicle on their fleets

 **samsara** : Industrial IoT Solution Provider based in USA

**15K+**

# of Customers

**50%**

Accident Rate

**60%**

Cost Saving

After using video-based safety program

# Key Features : Driver Monitoring System

- Think-I AI Dashcam continuously monitors the driver for various distractions - including drowsiness, smoking, not looking ahead and phone usage.
- If a driver is not paying attention to the road ahead and a dangerous situation is detected, Think-I AI dashcam provides real time coaching (audio prompt) to a driver by warning sound and warning message.



**Drowsiness Warning**

**Smoking Warning**

**Using a phone Warning**

**Distraction Warning**



## DMS Working Video



<https://youtu.be/YVJccXS2410>

## Recognition with backlight



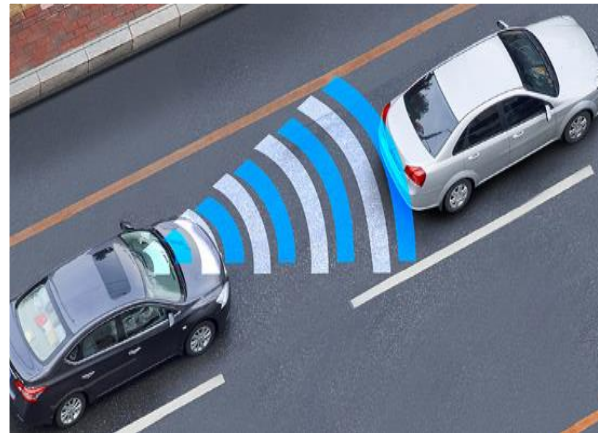
<https://youtu.be/Hd4T4USAotk>

# Key Features : Advanced Driver Assistant System

- Important ADAS(Advanced Driver Assistant System) features are applied on Think-I AI Dashcam to warn drivers of impending collisions.
- LDWS, FCWS and TWS are designed and applied for the safe driving and prevents going off the traffic lane, or collision with a vehicle in the front during driving and tailgating.



Lane Departure Warning System



Forward Collision Warning System



Tailgating Warning System

## LDWS



<https://youtu.be/7edtNJcQe-g>

## FCWS



<https://youtu.be/4YcaULEHjg4>

## Tailgating



[https://youtu.be/q4ycKp7MG\\_l](https://youtu.be/q4ycKp7MG_l)

## PCWS



<https://youtu.be/NW2SiiNjhBU>

# Think-I Product Line-up

	K370	K390
Appearance	 	 
Description	3ch AI Dashcam	Integrated 2ch AI Dashcam
Configuration	 LTE Cat.M1+GPS  Rear Camera  DMS Camera	 WiFi Dongle (LTE WiFi Router is needed)  LTE Dongle
Resolution	<ul style="list-style-type: none"> <li>- Front Camera : FHD</li> <li>- Rear Camera : FHD</li> <li>- DMS Camera : HD</li> </ul>	<ul style="list-style-type: none"> <li>- Front Camera : FHD</li> <li>- DMS Camera : HD</li> </ul>
DMS Function	Drowsiness/Smoking/Using a phone/Distraction	Drowsiness/Smoking/Using a phone/Distraction
ADAS	LDWS	LDWS/FCWS/Tailgating
ROA Function	None	On Developing
FMS Service	Optional (No Video Supporting)	Supporting
Vehicle Management	Optional (No Video Supporting)	Supporting

*If you need more information for our device, please contact us*

## Existing Dashcam(Blackbox)



- Providing simple vehicle management service only
- ➔ Those brands can not apply high-end in-cabin sensors with DMS deep-learning algorithm due to low CPU computing capacity



There are only two integrated products of "DMS" and "Dashcam"

Although Samsara's dashcam has high-end CPU, Samsara's dashcam only detects nodding without distinguishing various misbehavior such as smoking, mobile phone using and distracted driving.

It is because of low camera sensor's performance and heavy deep-learning algorithm.



## Existing DMS



- Only dashboard installation
- ➔ Installation process is not easy because height of dashboard is different by vehicle type and brand
- ➔ There are some problems to recognize driver's face which could be blocked by hands



# Competitor Analysis (1)

	Existing Dash Cams	Existing DMS	 samsara	 THINK-i <i>better solutions in a better way</i>
Installation Place	Windshield	Dashboard Only	Windshield	Windshield
Drowsy Driving	X	●	X	●
Video Recording	●	X	●	●
Distracted Driving	X	◐	◐	●
Smoking	X	X	X	●
Mobile Phone Use	X	X	◐	●
Blocking Camera	X	X	X	●
Pedestrian Alert	X	X	X	●

## Differentiation Drivers

1

Embedded AI Algorithm

➔ Light Computing

- Apply through implementation of 'high computing lightweight technology' with optimized AI algorithm (recognize pedestrian and driver face)

2

State-of-the-art DMS Sensors

➔ "Accuracy"

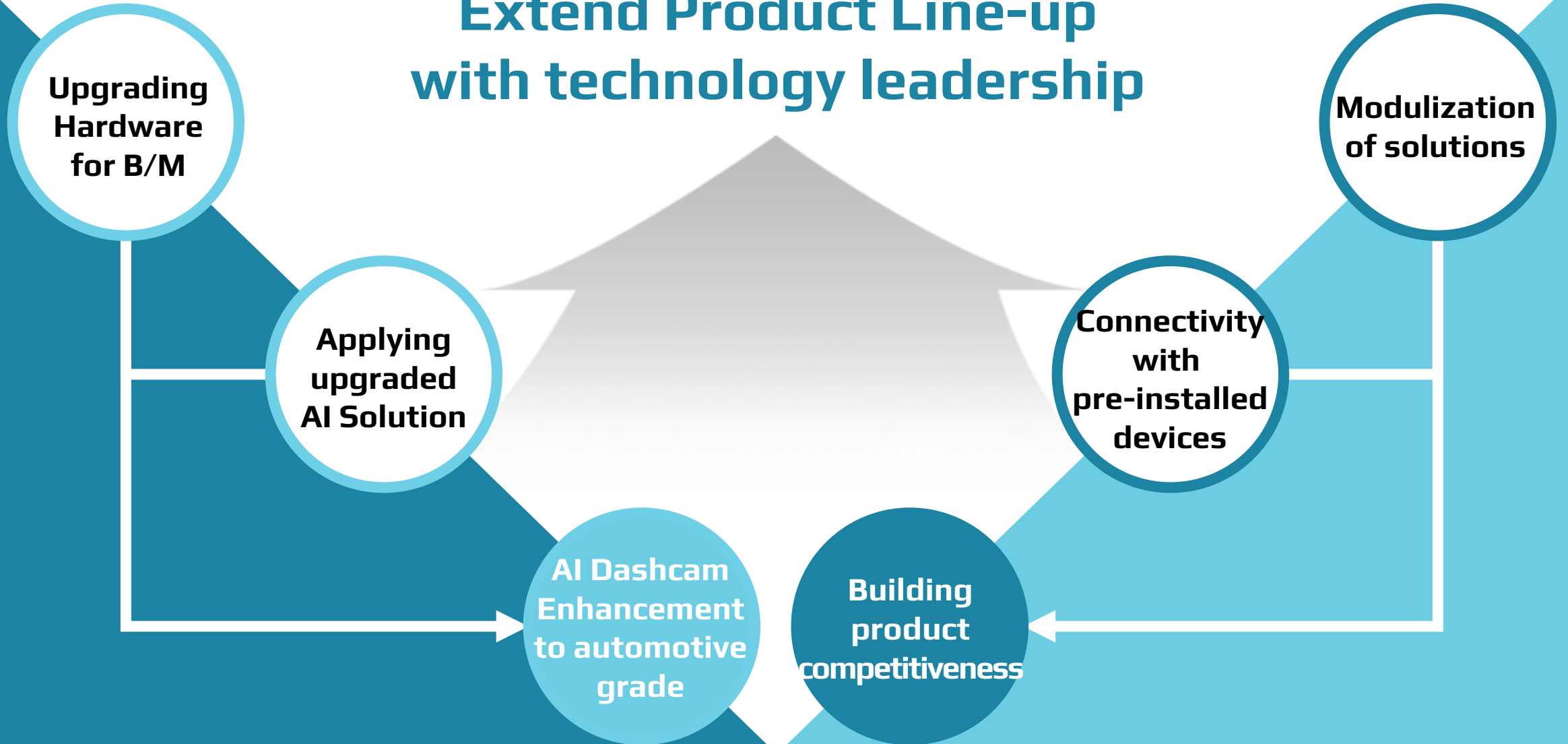
- Easy of installing regardless of vehicle type and installation space
- Minimizing false positive rate of face recognition in a specific circumstance such as backlight and sidelight
- Have patents related sensors

3

Cutting edge IoT technology with the patents

- Have cutting edge IoT technology based on commercialization experience
- Sustain technology leadership for 20 years in network protocol, development and certification area

## Extend Product Line-up with technology leadership

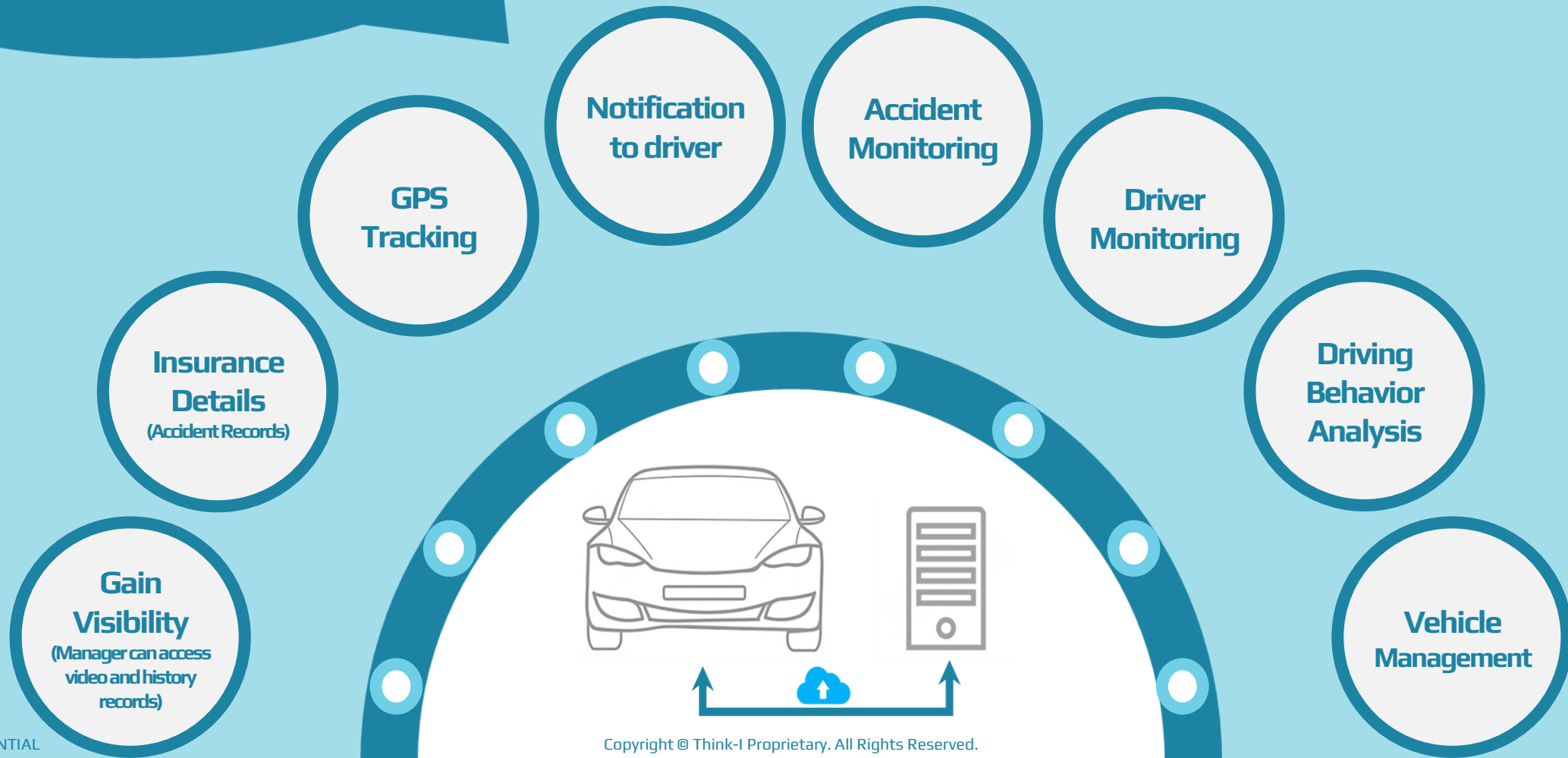




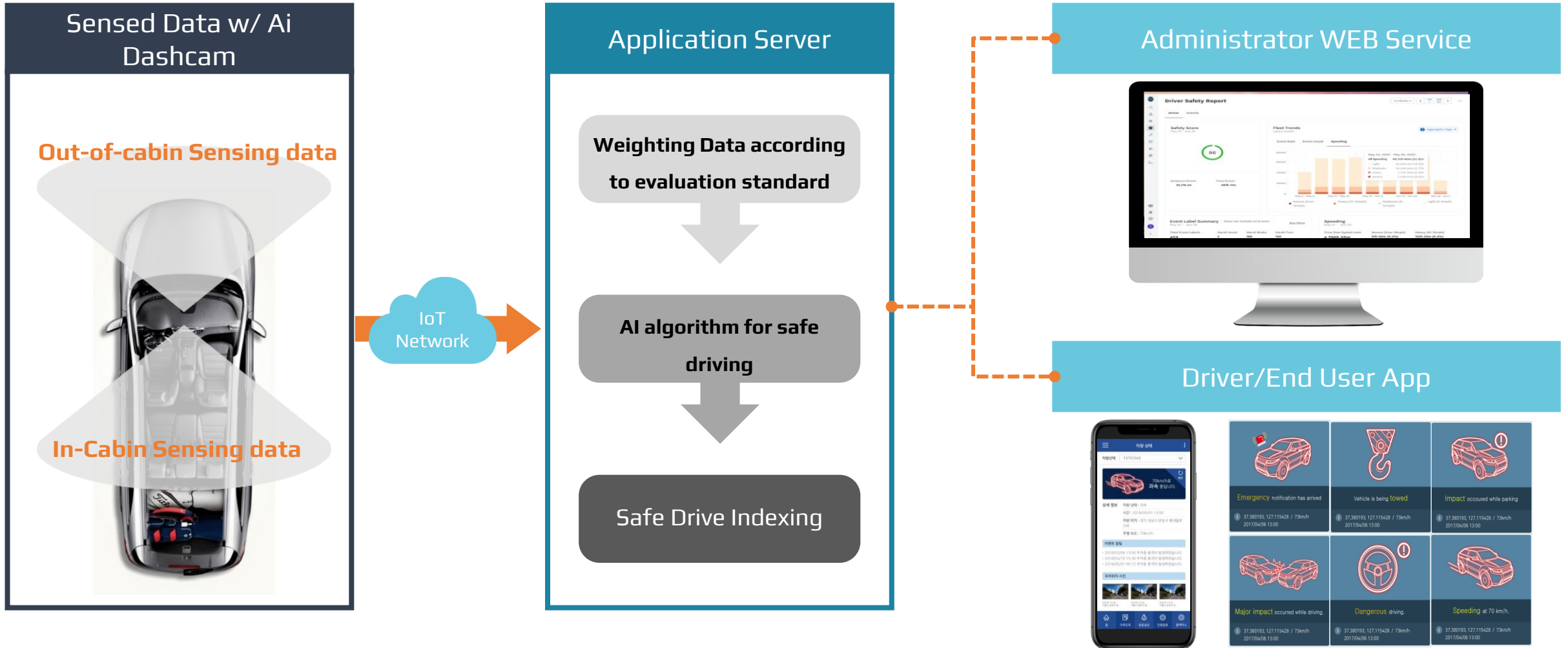
*IV. Think-I Connected Service for  
FMS & Vehicle Management*

# Key Benefits of FMS (Fleet Management Service)

Think-I dashcam supports cutting-edge connected service for helping administrator to manage every single vehicle in real time by giving visibility with video and history records. In addition, it helps drivers to improve driving safety with real time coaching, notifications



- Think-I FMS service supports Web service for administrator as well as app for driver



# FMS(Fleet Management Service) Dashboard

- With a WiFi Hotspot(Smart Phone tethering) or LTE WiFi Router in the vehicle, we can provide FMS (fleet management service) to fleet managers to increase safety, visibility and convenience in vehicle management

The dashboard is divided into four main sections:

- Device List with identified information:** A table with columns for Name, Critical Alarm, Last Activity, Label, and File size. It shows one device with ID 0203030401050041, last activity on 2021.10.15 at 15:45:45, and a file size of 1.1 MB.
- Route Map and Event Spot:** A map showing a green route with several green event spots along the path.
- Event List of a specific device by time series:** A table with columns for Timestamp, File, Event, Upload, and Lat. It lists several events such as Motion, Media Upload, Ign OFF, and Ign ON.
- Safety Driving Report with overall & safety items evaluation:** A report titled "New Demo mockup safety driving report" featuring a large circular gauge showing a score of 96. To the right, there are various safety metrics with gauges: Record Button (55), Driver Fatigue (34), Driver Distracted (45), Lane Departure (89), Tailgating (50), Shock Moving (77), Shock Park (89), Rear Lens Covered (67), DMS Callphone (42), Crash (48), and Forward Collision Warning (99).

# Vehicle Manager Service for SMEs

- Think-I provides FMS service currently which enable centralized vehicle management in real-time basis. but in some business area this service is not fully needed with several issues related to business characteristics
- For these customers, Think-I provides a customized program to manage vehicle manually and simply

## Main Targets

SMEs

Business Size

100 or  
Less

# of Vehicle

Decen-  
tralized

Management



WiFi Hotspot

Customer  
Example

- GSW is a taxi company running it's business in London, Paris and Berlin
- It has overall 50 taxies in each cities
- It dose not need centralized and real-time basis taxi management. It just wants to check some event video files when they want to check

**No data plan  
No data router  
/ WiFi dongle**

**No building  
and managing  
platform server**

**Low cost and high efficiency  
vehicle monument solution**

# Vehicle Manager Dashboard Example

- Think-I is developing a customized program for helping administrator to manage vehicles
- This is dedicated program for any customer who wants to manage vehicles manually with Think-I AI dashcam

The dashboard is divided into several sections:

- 2**: Header area containing user information, registration tools, dashboard selection, date range, and export options.
- 3**: A secondary header area with a calendar and a power button.
- 4**: A table listing vehicle devices with columns for Serial Number, Company Name, Vehicle Number, and Driver Name.
- 5**: A map showing the driving route of a selected vehicle, with various system alerts overlaid.
- 6**: A table of event files for the selected vehicle, including file name, date, time, event type, driver, and location.
- 7**: A driver performance report for a specific driver, showing a score of 96 and a list of metrics.

2 Registration

3 Tool Bar(Layout/Date/Export/Log out)

4 Device List

5 Driving Route Map

6 Event File List of the Selected Vehicle / SD Memory Card

7 Driver Performance Report

# Vehicle Manager Viewer Example

File Name

202120-115540-134

Front Camera Video



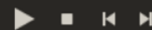
DMS Camera Video



Google Map



00:00:00



00:00:00





# Difference Between FMS and Vehicle Manager

	Fleet Management Service	Vehicle Manager
Target Customer	Medium or Large Enterprises	SMEs which runs less than 100 vehicles
Dashboard/Viewer Type	Web Base	Specified PC Program
Data Transition Method	MQTT/HTTP via LTE Network	MQTT/HTTP via WiFi Hotspot
Data Transition Type	Device to server in real-time	Device to administrator's PC manually
Management Type	Centralized management(i.e. FMS center)	Decentralized management (i.e. SF, NY branch)
Event management	Real-time basis	Manual basis when event is saved in the device
App/Web Push	App/Web Push is possible	No push

# Three Pillars to go to V2X

1

## AI Dashcam to detect all information on the road

- Think-I AI Dashcam detects every single risk elements on the road and supports data transmission from the device to platform server

2

## Cutting edge IoT Technology

- Think-I IoT technology supports oneM2M standards for V2X communication system with big data analysis algorithm on a real-time basis

3

## Ability to build platform server

- Think-I already has an experience to build FMS server in US. We know how to handle data distribution

# Simply connecting your vehicle to the world

Think-I IoT technology ensures every byte is streamed perfectly

**IOT**  
Internet of things



Technology  
Leadership



Secured Data  
Transmission

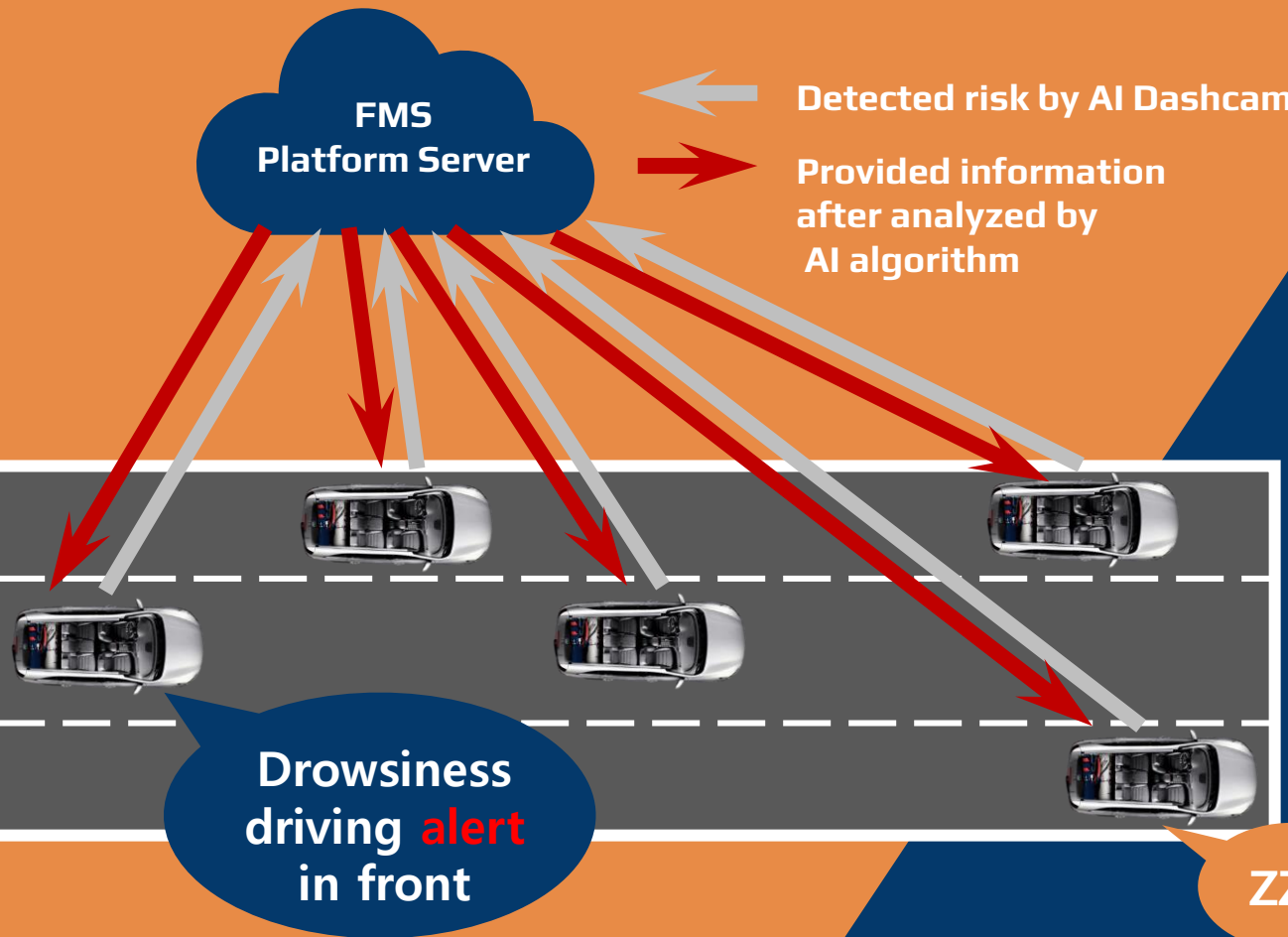


Expendability  
& Stability



Development  
Knowhow

# How to utilize FMS platform server to V2X



After installation of AI Dashcam and building FMS server, FMS platform server could be utilized for V2X service.

T-map provides very limited service to notice "accident" on the way only at the moment.

If Think-I build FMS platform server, we can provide aggregated and analyzed information to all vehicle on the road to improve safety.

*V. Business Development  
Status*



# Key Benefit of Think-I Solution



## Improving Safety

- Provide guide for safety driving and advanced assistant features
- Protecting drivers from vehicle accidental caused by distractive driving and risk from out of vehicle.
- Risk management solution for reducing vehicle accident dramatically



## Cost Saving

- Protect your asset by minimizing the loss caused by vehicle accident
  - Direct Cost : Reducing human/physical loss caused by accident
  - In-direct Cost : Reducing Insurance premium
- Reducing vehicle management cost by providing FMS solution

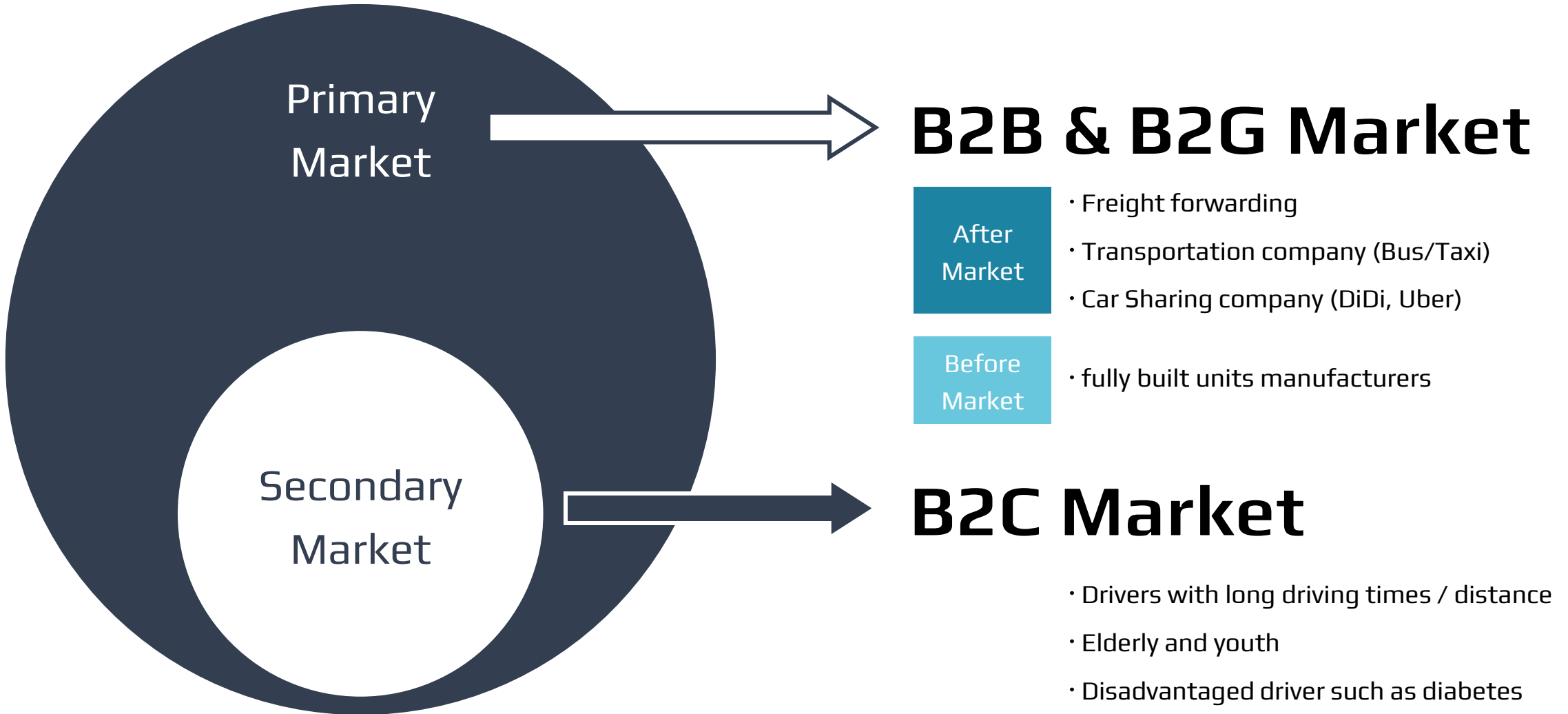


## Easy Management

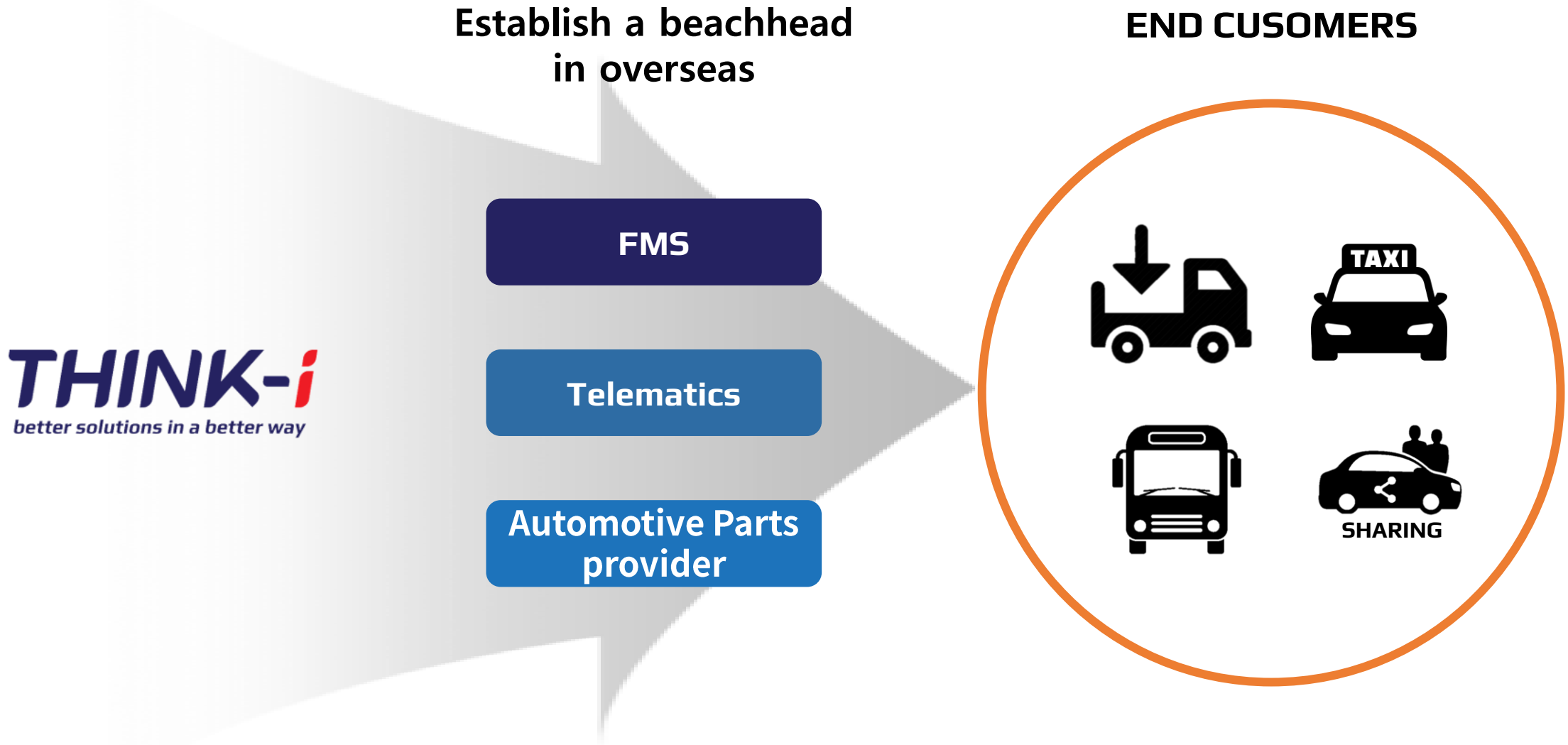
- Providing practical all-in-one solution for freight forwarding business
  - Providing adequate solution by client business size and characteristics (FMS/Vehicle Manager)
- Providing all-in-one solution suitable for needs on driver and fleet management in autonomous driving ear

**AND  
EXPENDABILITY  
TO OTHER  
INDUSTRIES**

**Drone,  
Electric Bike,  
Motorbike  
and so on.....**

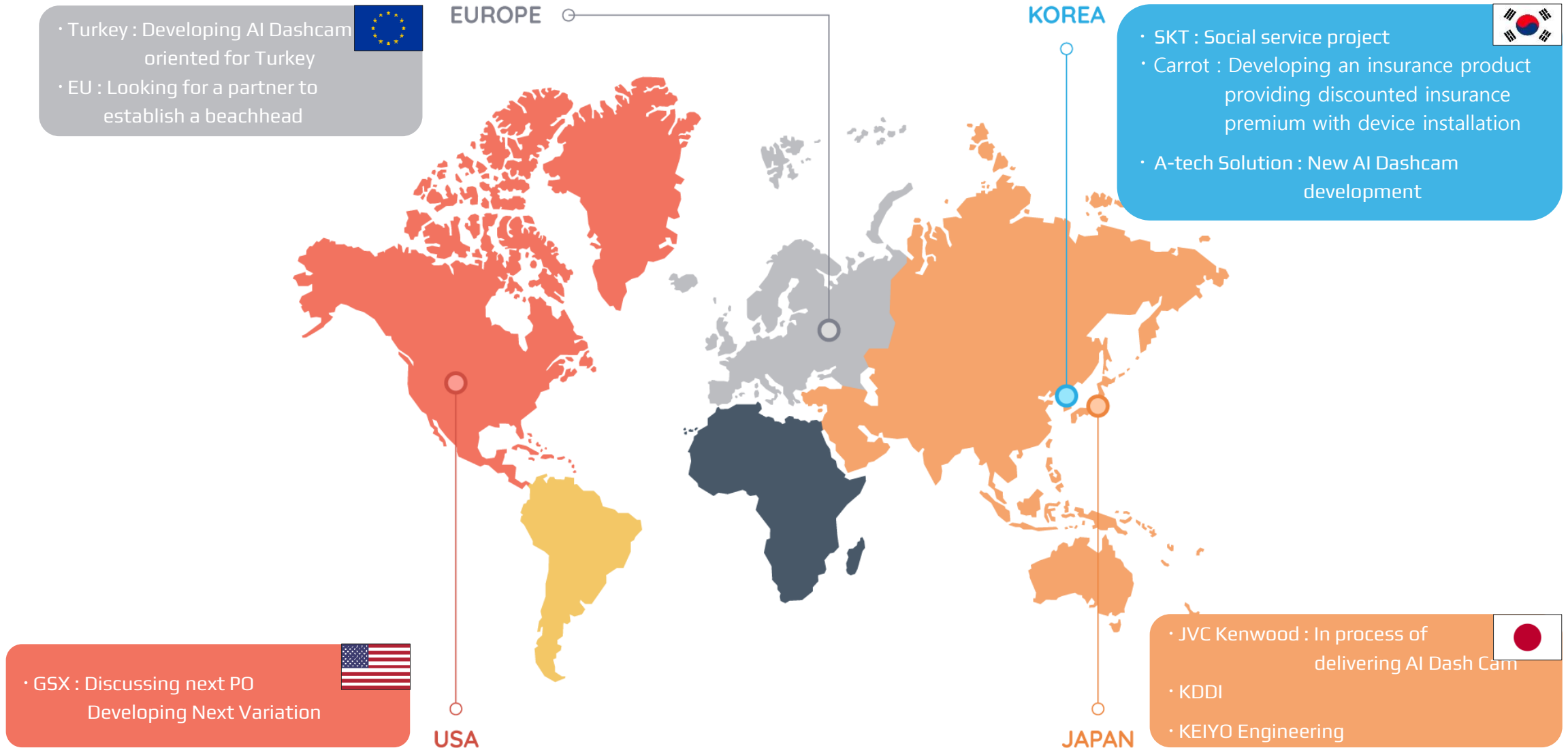


# The 1<sup>st</sup> step is with partners





# Business Development Status (1)



# Our Target in ADAS market

(Unit : Million USD)

Market	Market Size (2017)	Expected Size (2022)	Target M/S in next 5 years	Expected Revenue
Global	283,000 (33.7 trillion KRW)	762,800	0.005%	38.1
Domestic	13,300 (1.6 trillion KRW)	42,200	0.01%	4.2

- By 2026, we intend to secure as a sales target of 0.005% of the global market and 0.01% of domestic market. The total estimated revenue in next 5 years is about 42.3 million USD.

## Data Source

· Source : Marketsandmarkets, ADAS Market, 2018

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# Thank you!!



## Product Usage Video



<https://youtu.be/YVJccXS24IO>

You can find more video on Think-I Homepage  
<http://www.think-i.co.kr/product/>



[Drowning operation recognition with backlight]  
<https://youtu.be/Hd4T4USAotk>



[FCWS(Forward Collision Warning)]  
<https://youtu.be/o2QubUgySmE>



[FVSA(Front Vehicle Start Alarm)]  
<https://youtu.be/WGNwa-0816o>



[LDWS(Lane Departure Warning)]  
<https://youtu.be/F6MBpnAjl-l>



[PCWS(Pedestrian Collision Warning)]  
<https://youtu.be/7VwrLevbtj4>



[TLDS(Traffic Light Detection System)]  
<https://youtu.be/BOXNz6KETYw>