

# Honda Safety Concept

Toward the realizing intelligent mobility society that is close to people and evolve together

Japan Cabinet Office 5<sup>th</sup> Science and Technology Basic Plan

## Society 5.0

A human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space.

WHO 2<sup>nd</sup> Decade of Action for Road Safety

## SAFE SYSTEM APPROACH

Proactive and simultaneous improvement to roads, vehicles, speed-management, road user behavior and post-crash response so that the entire system is made safe.

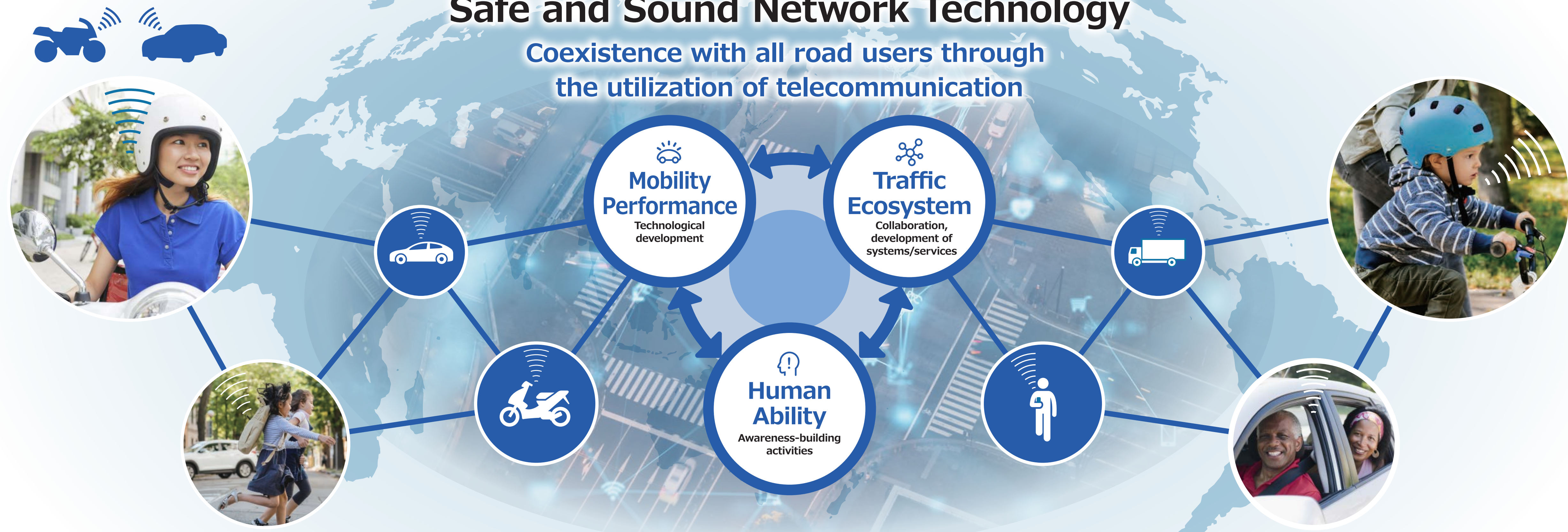
Honda safety philosophy

## Safety for Everyone

Honda wants to build a society without collisions where everyone sharing the road can safely.

## Safe and Sound Network Technology

Coexistence with all road users through the utilization of telecommunication



**HONDA**

# Honda Safety Concept

## ● Safety Target Concept

“Respect for human lives” “Proactive pursuit of safety”

## Collision-free Mobility Society

### Honda’s Safety Cause



Enable people to enjoy the real world while fully engaging their feelings and five senses

### Honda Approach to Safety

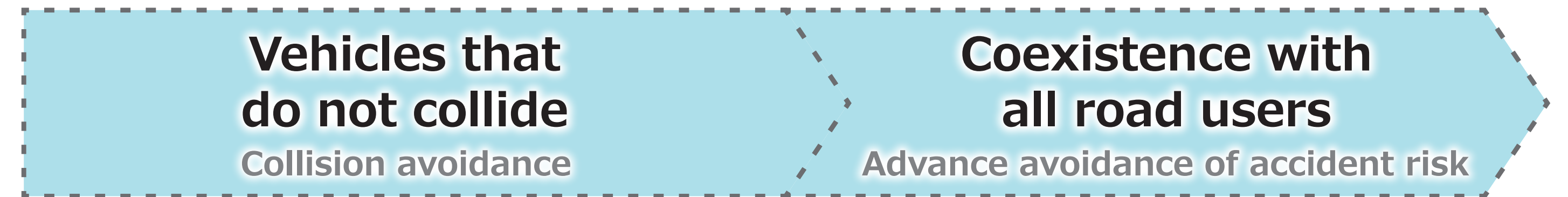


Safe coexistence: Provide everyone sharing the road with safety and peace of mind

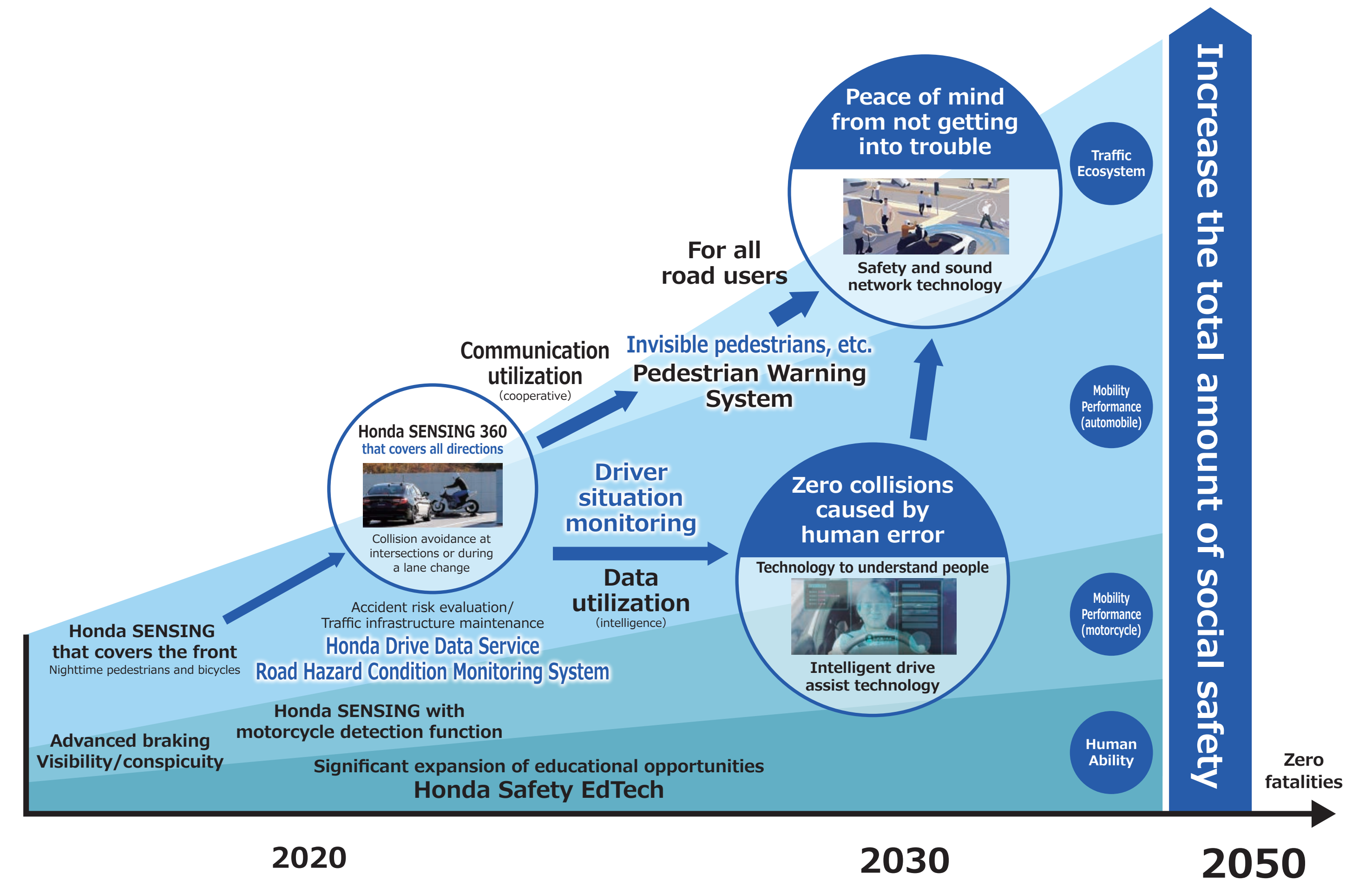
## ● Safety Technology Roadmap

Measures toward halve fatalities by 2030

Measures toward zero fatalities by 2050



**Strive for zero traffic collision fatalities involving Honda motorcycles and automobiles globally by 2050**



\* Honda vehicle involvement in fatalities among motorcycle riders, automobile occupants, pedestrians and bicycle riders (except for those who are intentionally and flagrantly violating rules and/or in a state of being legally incompetent)

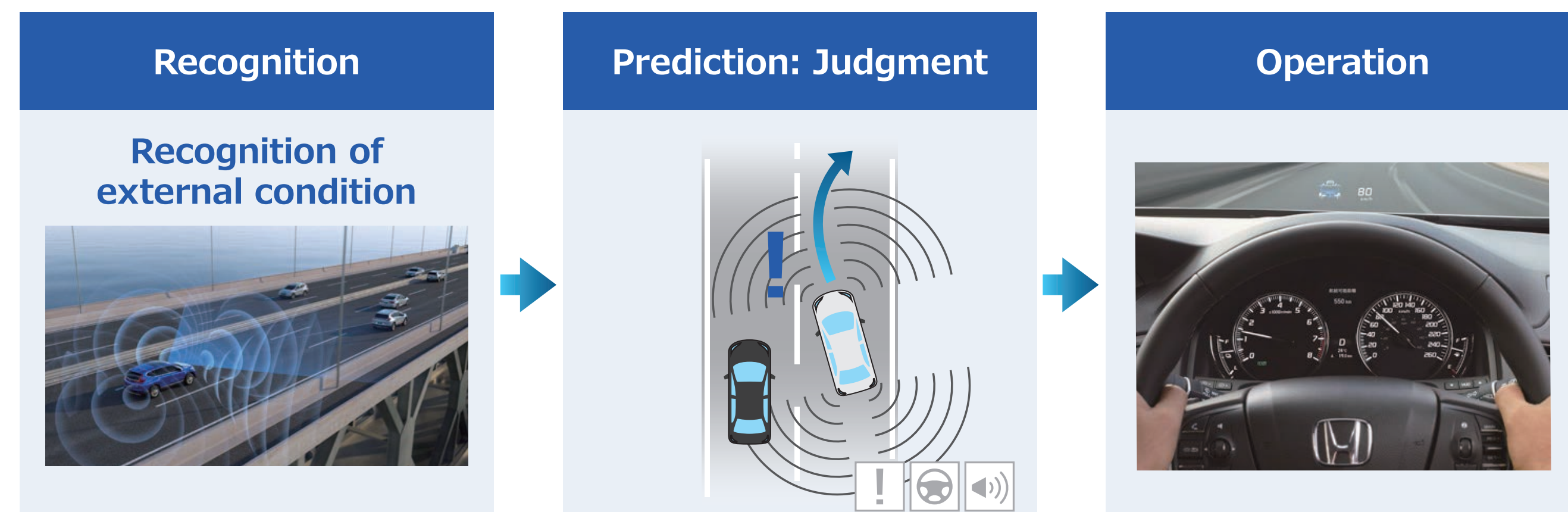
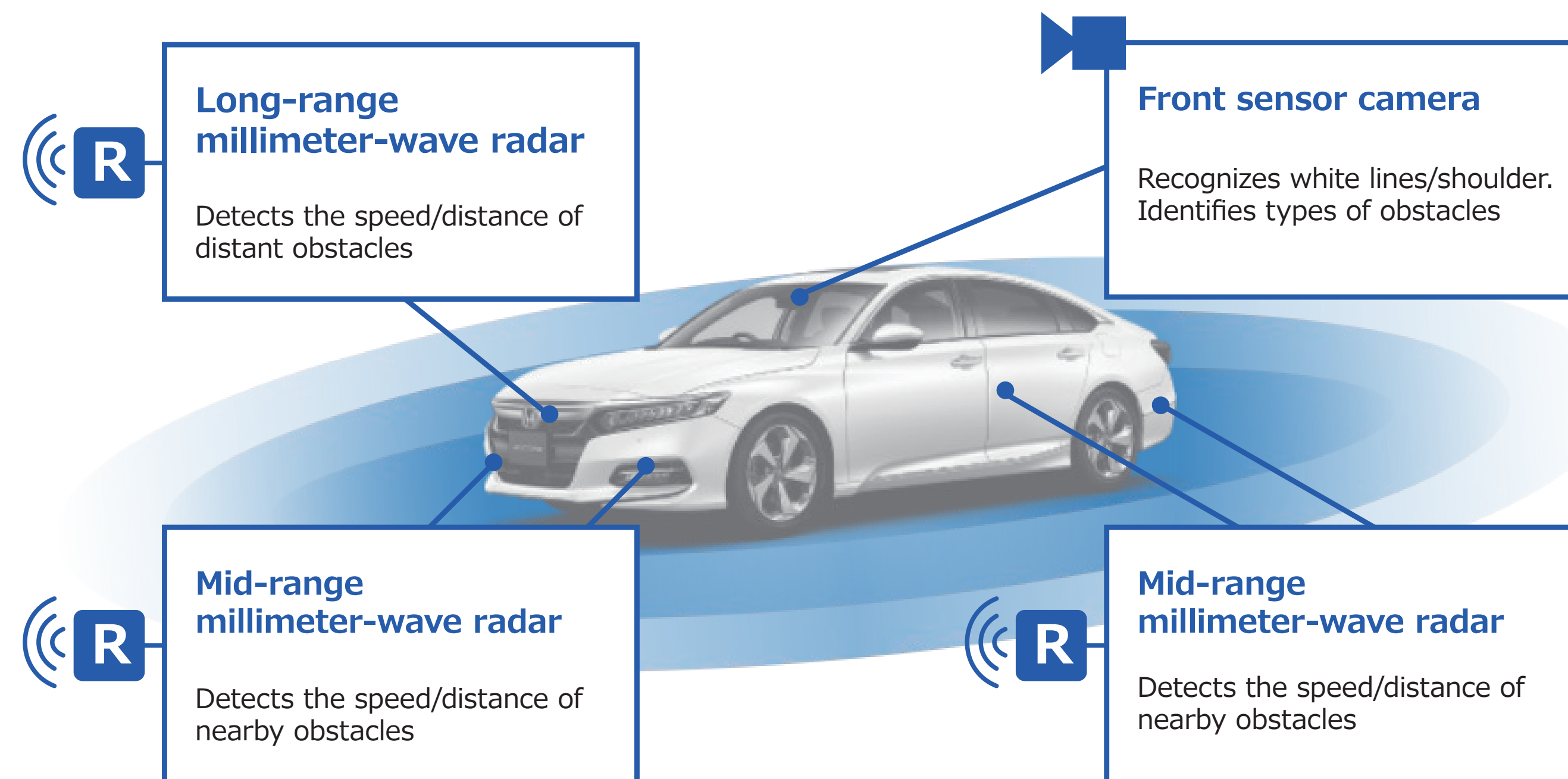
# Honda SENSING 360

## Objective

To use multi-directional sensing to cover blind spots around the vehicle, which have been difficult to confirm visually in conventional driving, and to support the avoidance of collisions with other vehicles and pedestrians and the reduction of the driver's load due to driving.

## Technical Content

Supports safe driving by integrating the external world conditions obtained through each sensor used in Honda SENSING and performing recognition, prediction, and judgment.



## Technical Features

Evolution of accident avoidance support functions utilizing the knowledge and know-how cultivated in the research and development of automated driving Level 3 technology

- Based on accident analyses from each region, analyzes priority issues related to intersection/lane deviation/pedestrian/motorcycle/rear side accidents and creates countermeasure specifications.
- Expands the recognition range in all directions and improves predictive judgment capability.

## Honda SENSING on-board function+5 functions

<h3>Collision mitigation braking</h3> <p><b>Function expansion</b></p> <p>Intersection Head-on collision Pedestrian Vehicle side/opposing direction C/M</p> <p><b>Motorcycle/automobile crossing vehicle C/M</b></p> <p>C/M for pedestrian crossing when turning left/right</p>	<h3>Front cross traffic warning</h3> <p>Crossing vehicle alert when driving at low speed or starting</p>	<h3>Lane change collision mitigation</h3> <p>Assists steering operation to avoid collision</p>
	<h3>Cornering speed assist</h3> <p>Reads the curvature of the lane right before the curve and adjusts vehicle speed</p>	<h3>Active lane change assist</h3> <p>System assists with steering for lane changes</p>

# Technology to Understand People

## Objective

**Aim for zero human errors** that cause accidents.

Respond to the different needs of each person depending on the situation while focusing on peace of mind in daily driving.



Decreased functions/  
Changes in physical condition

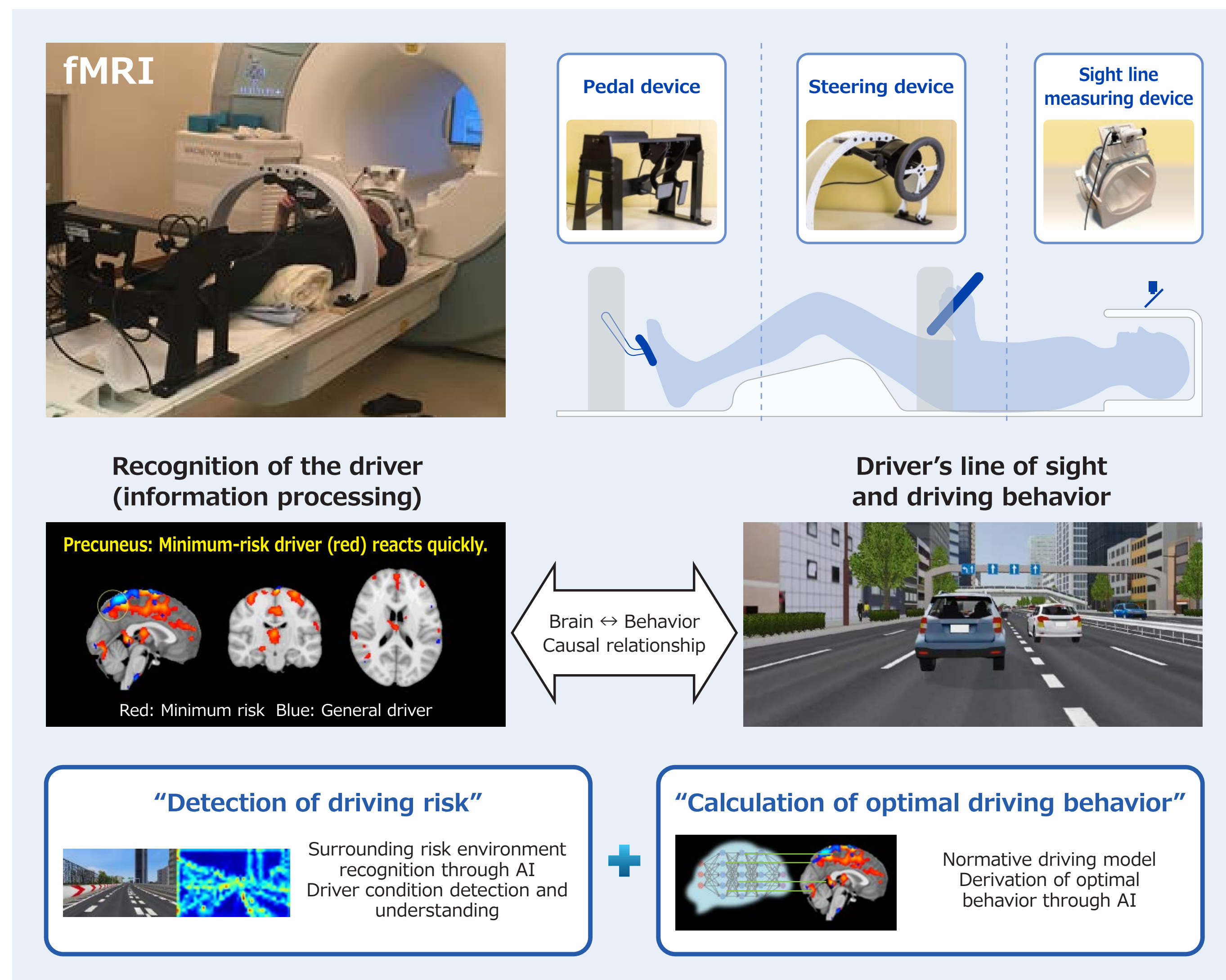


Self-control



Dashing out onto the street

## Technology Content

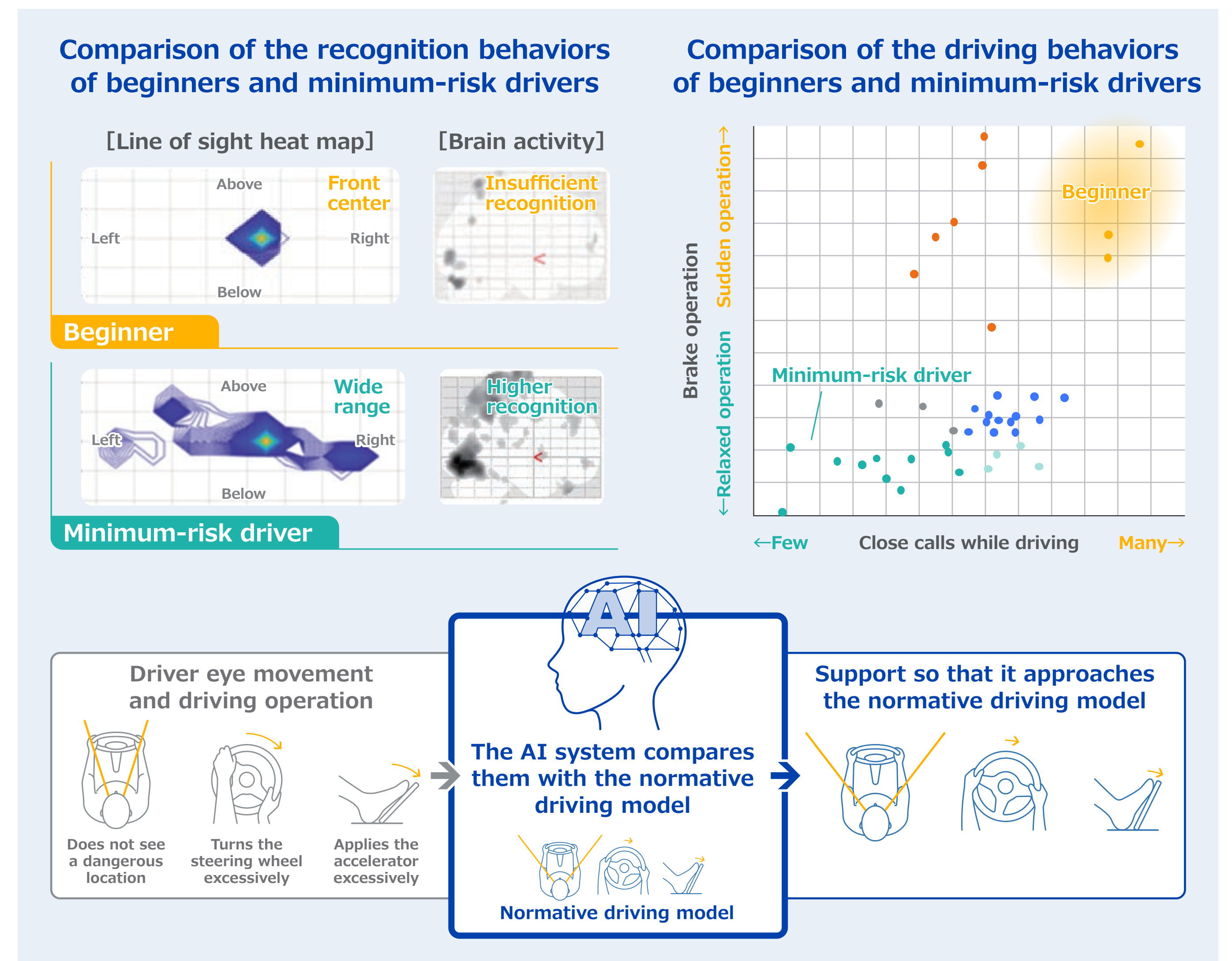


## Technical Features

Technology to understand people: Understanding human error

Reveals the true cause of the error through causal analysis of brain activity and risk behavior while driving.

Since the field of view is narrow for inexperienced drivers, provide support that results in driving with a wide field of view like that of a minimum-risk driver to aim at reducing human error and expanding driving capability that makes the driver feel like they've gotten better at driving.

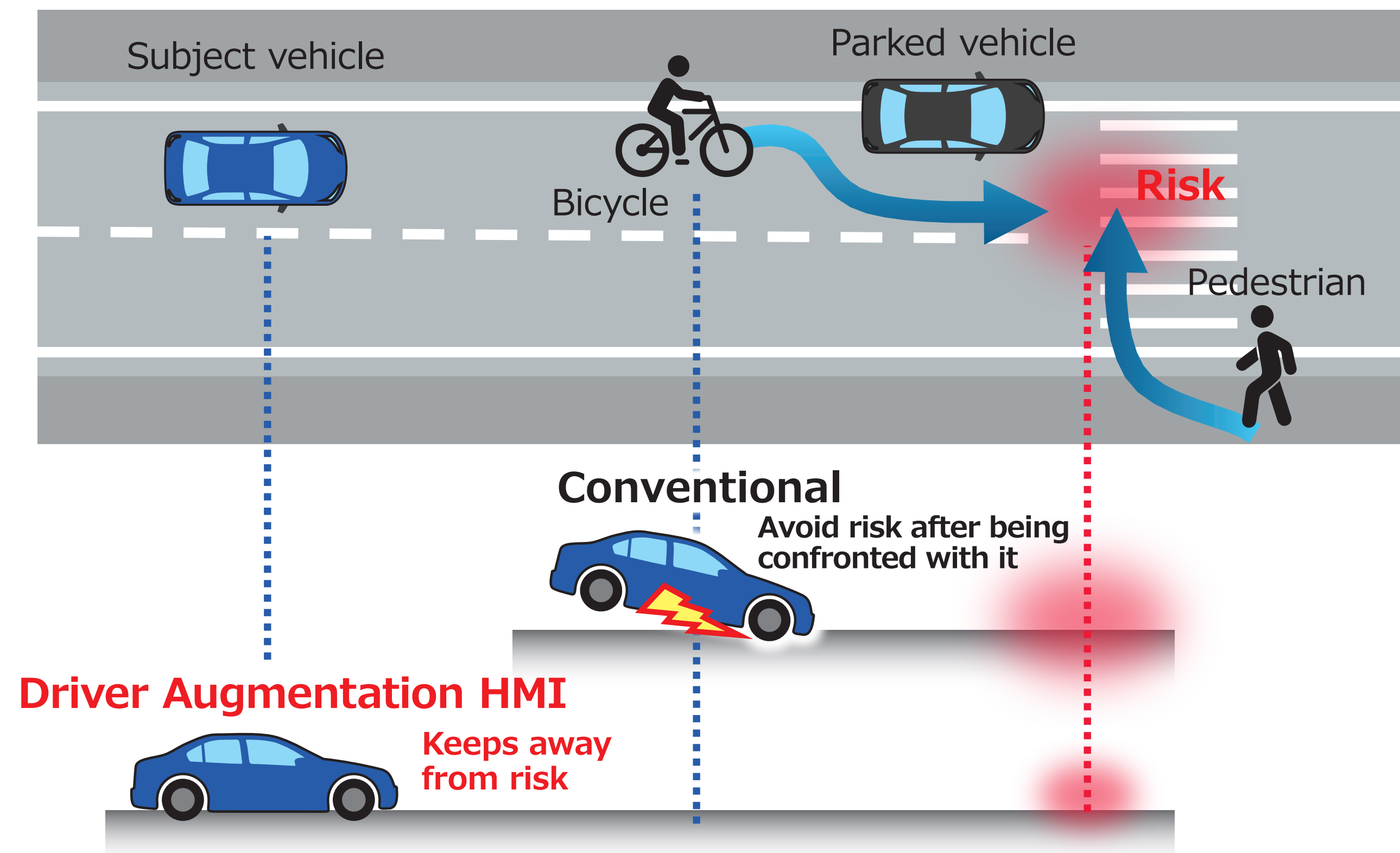


# Driver Augmentation HMI

## Objective

Provide peace of mind suited to each individual by providing appropriate drive assist according to the condition of each driver and the traffic scenario to suppress the occurrence of human error while driving.

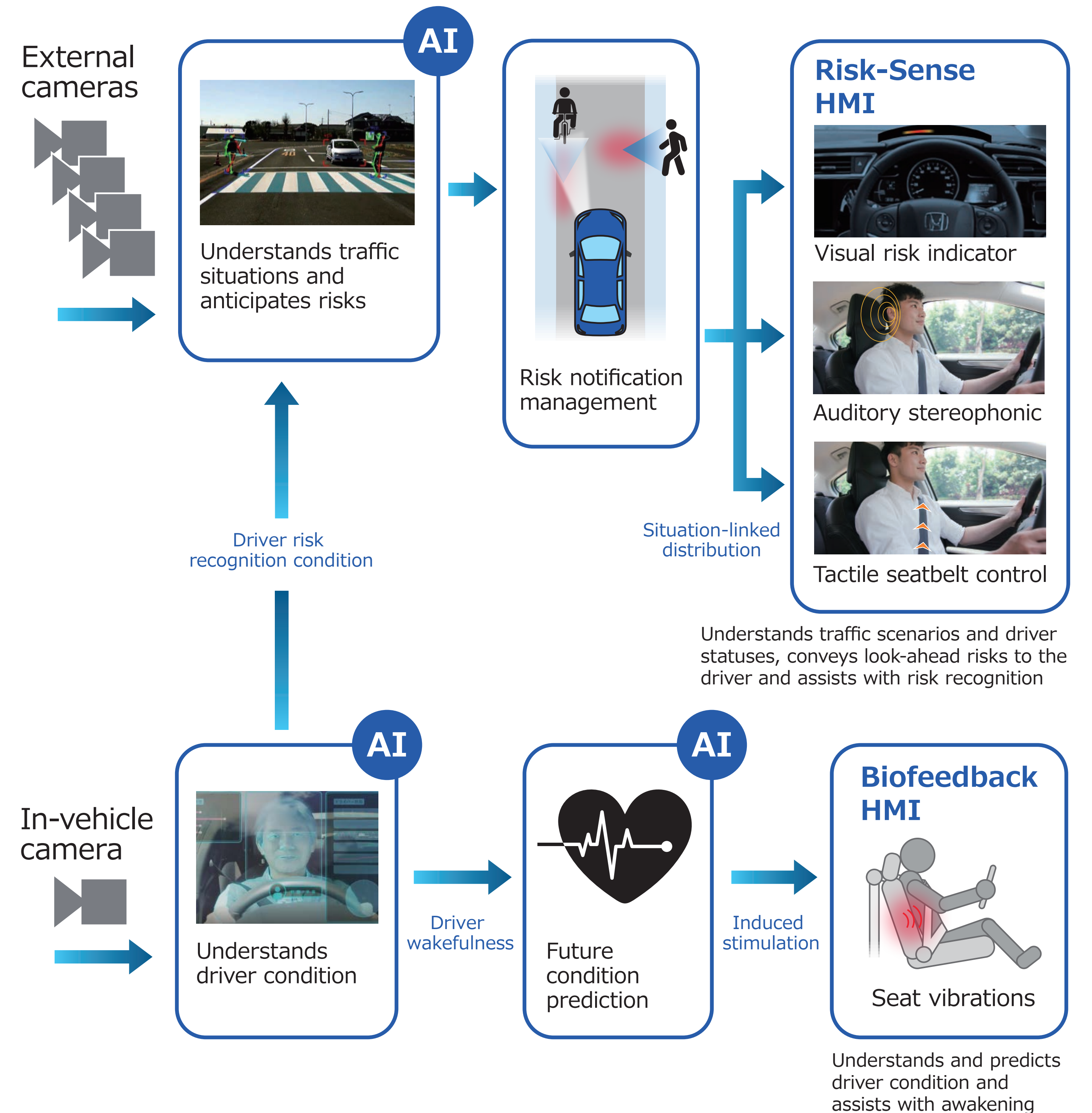
## Technology Content



<p><b>No driving operation errors</b> Operational assist</p> <p>AI reduces drifting/operation delays</p>	<p><b>No oversight prediction errors</b> Cognitive assist</p> <p>Conveys risks visually, tactilely, and auditorily</p>	<p><b>No careless driving errors</b> Wakefulness assist</p> <p>Reduces drowsiness and fatigue</p>
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## Technical Features

- AI that understands the driver's condition and traffic situations, and that conveys anticipated risks to the driver
- Risk-sense HMI that assists the driver with risk recognition
- Biofeedback HMI that brings out the good condition of the driver



# Mobile-device Based Pedestrian Warning System

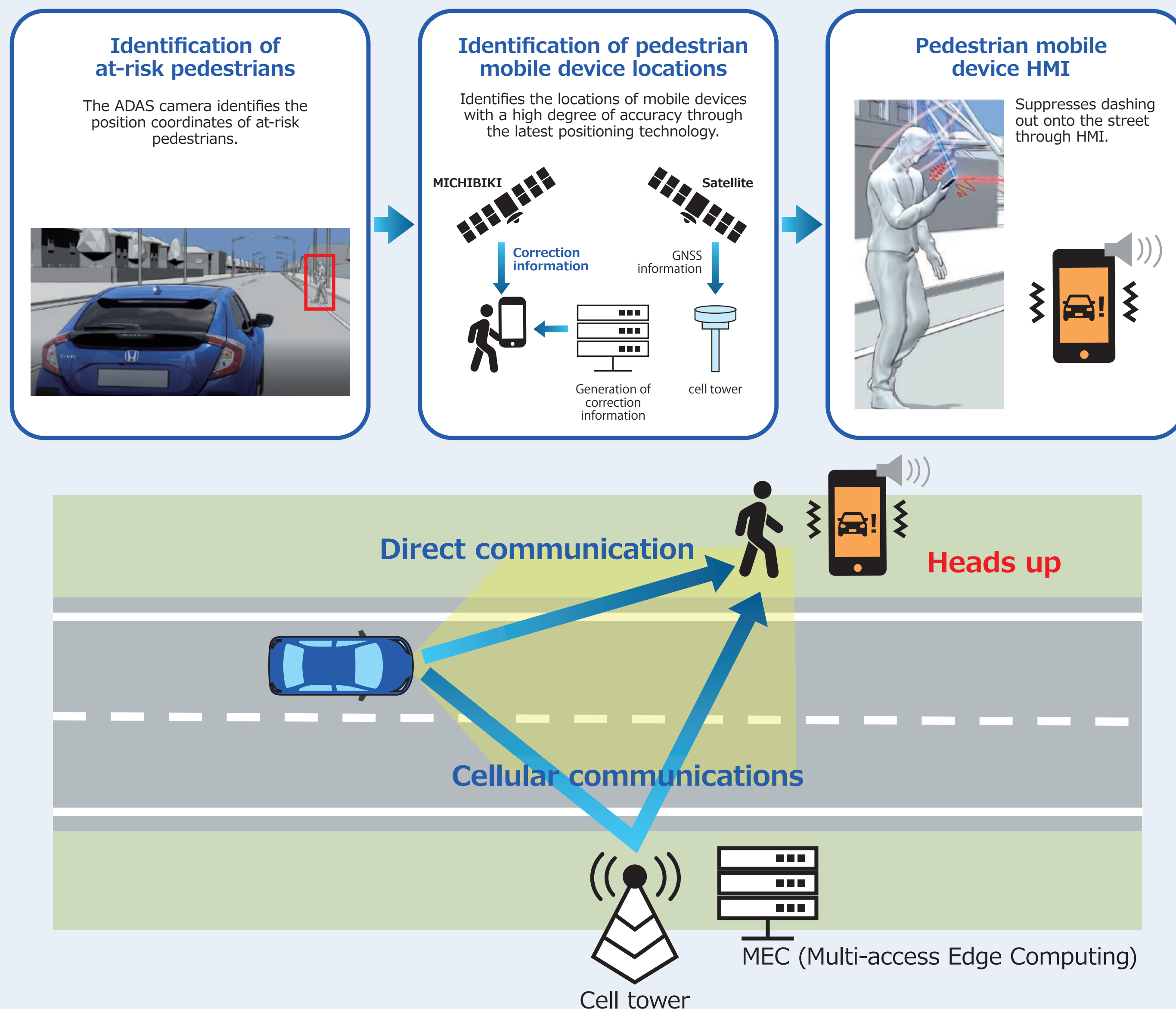
## Objective

- Convey dangers to pedestrians through cooperation between cars and pedestrians to suppress pedestrians from dashing out onto the road.
- Send notification on the presence of pedestrians in the periphery who are hidden in areas with poor visibility due to parked vehicles, etc.

## Technology Content

- Reduces accidents with pedestrians visible from the vehicle.

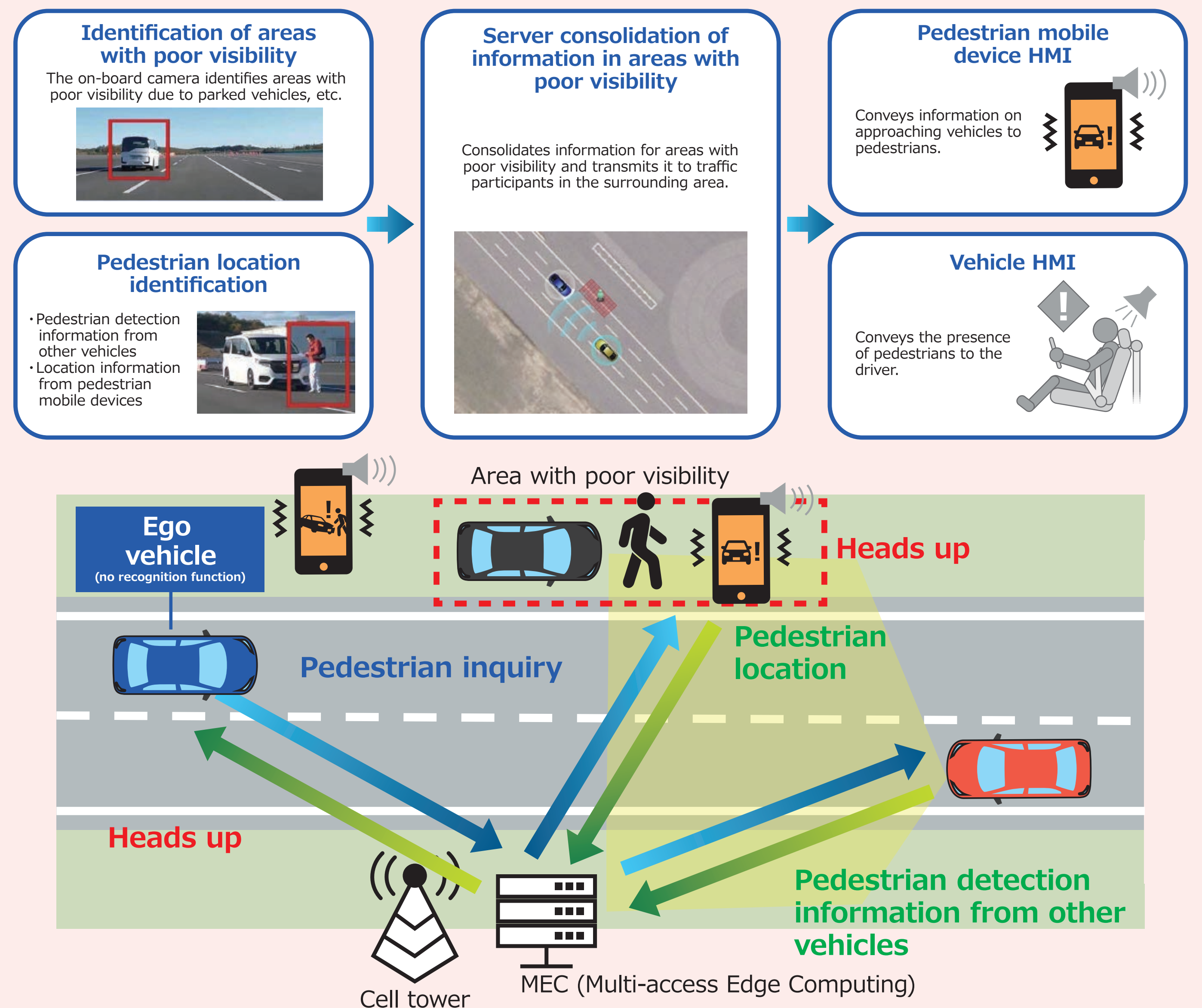
Honda SENSING 360



## Technology Features

- Cooperation between V2P and ADAS: Identifies dangerous pedestrians through ADAS and sends notification to mobile devices through V2P
- Detects areas with poor visibility through on-board cameras, consolidates area information on the server, and shares it with traffic participants in the vicinity to detect pedestrians in the area.

- Reduces pedestrian accidents by sharing information in areas that are not visible from the vehicle.



# Safe and Sound Network Technology

## Objective

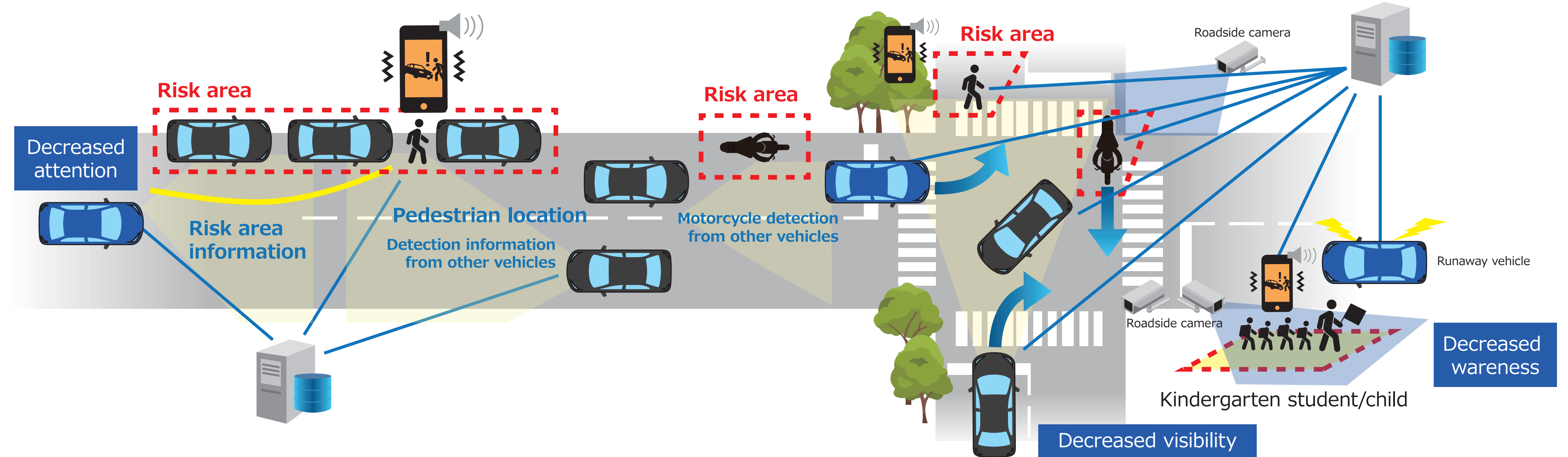
Aim for the achievement of a traffic society where no one collides by providing appropriate information according to the respective conditions of road users and traffic situations by utilizing communication technology.

## Technology Content

Avoids accidents in advance through technology that estimates the behaviors and conditions of all road users and judges them in an integrated manner to predict risks.

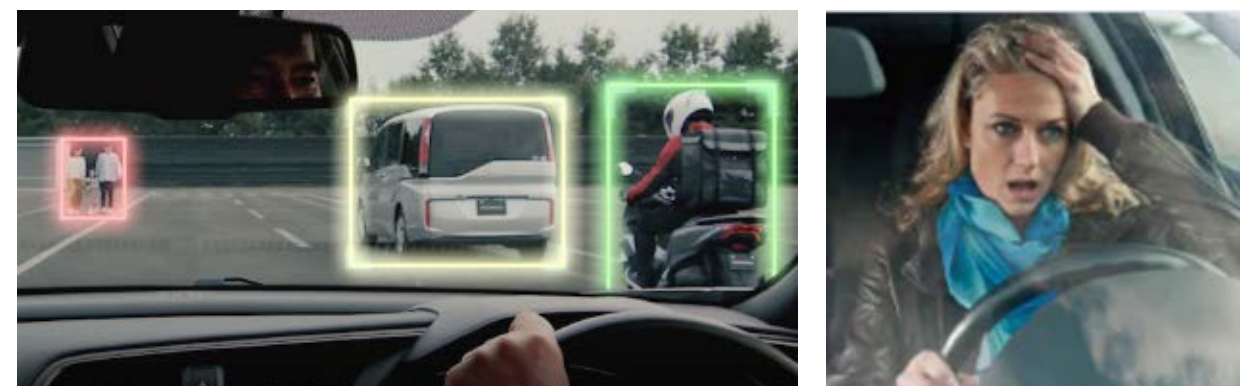
## Technical Features

- Connects with all road users through the utilization of telecommunication
- Consolidates risks hidden in the traffic environment through camera/probe information
- Transmits risk information appropriately in accordance with individual conditions and characteristics



### Environment/Human Sensing

Predicts behavior/Understands the situation



Predicts hidden dangers from vehicle behavior

Predicts hidden dangers from vehicle behavior

Estimates the individual conditions of all road users

### Cooperative Platform

#### Digital Twin

Integrates the information groups consolidated on the server into a map

High	Dynamic	• Road user locations and individual conditions
	Semi-dynamic	• Presence of parked vehicles • Broken-down vehicle/traffic congestion information
	Semi-static	• Personal characteristics of traffic participants • Regulatory information/weather information
Low	Static	• Lane information



#### Integrated Risk Judgment Algorithm

Estimates the behavior and conditions of road users and judges them in an integrated manner to predict risks.



### Cooperative Risk HMI

Vehicle HMI

Pedestrian/motorcycle device HMI



Builds good relationships with the surroundings by sharing effective intentions

Proceed with the standardization of cooperative platforms with industry/public/private sector joint efforts for early social implementation.

# Honda Drive Data Service

## Objective

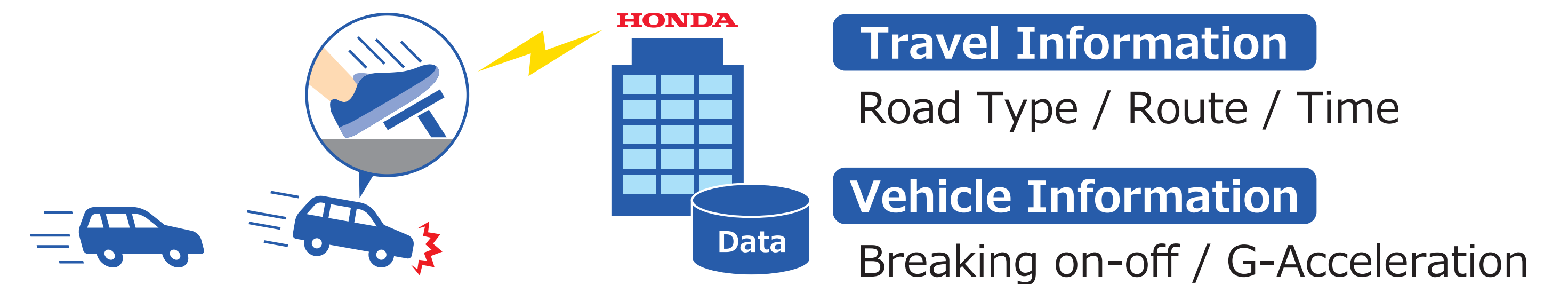
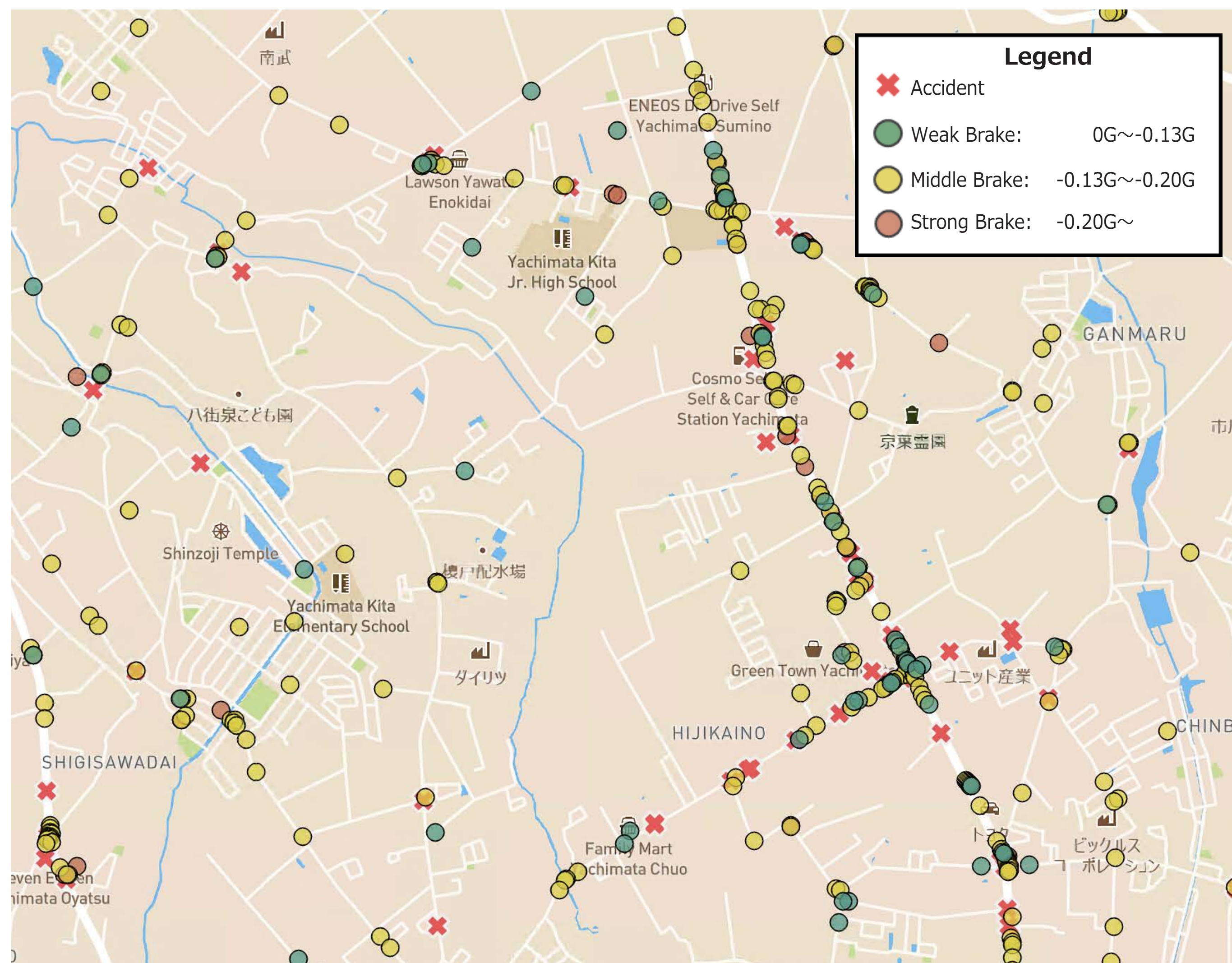
Honda Drive Data Service utilizes vehicle data to analyze vehicle situation and traffic environment to prevent traffic accidents. In addition, combining with other data such as weather or smartphone data, we will expand the potential to resolve various societal issues.

## Technology Content

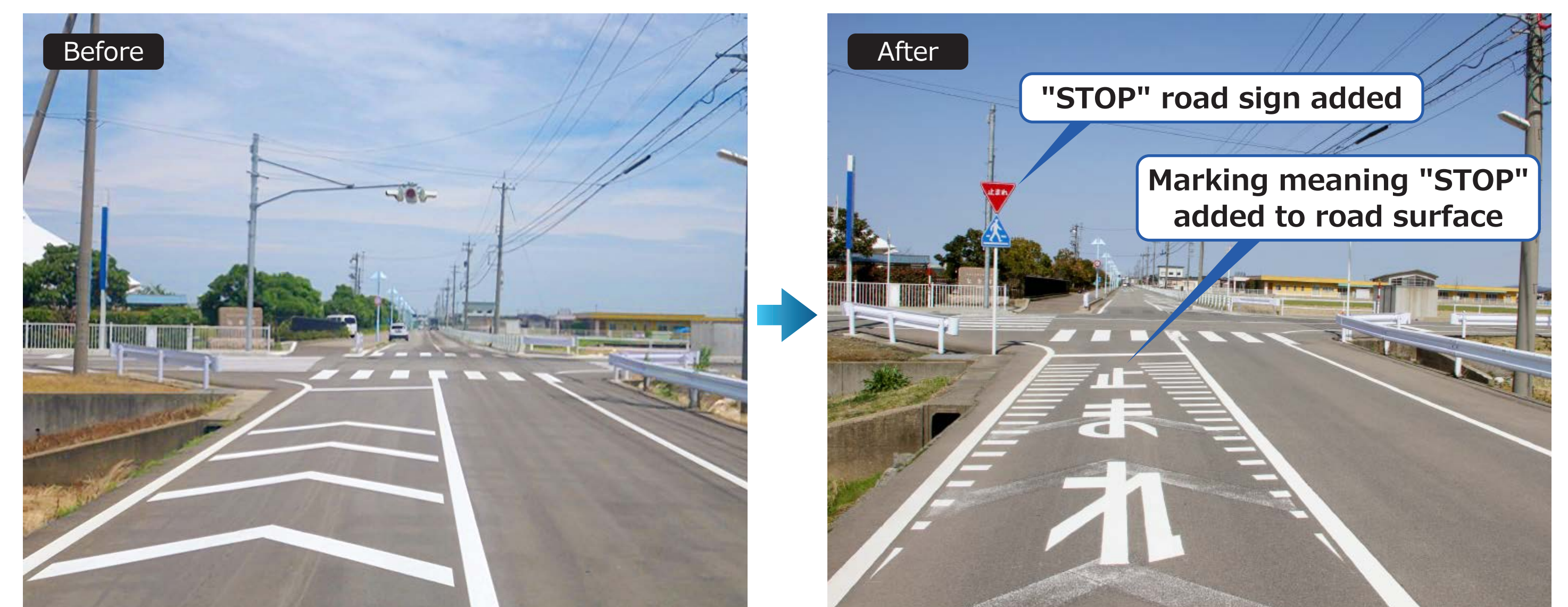
Detects, the behavior, status of the vehicles and analyze the data on the server for various applications to improve society. For example, the new system can detect braking with less than 0.25G which is challenging of some of the existing system. This enables driving-environment-specific risk assessment and countermeasure for low-speed areas such as school zone.

## Technical Features

- Utilizes vehicle braking data to identify the locations where hard braking occurs frequently and apply proactive countermeasures towards accident reduction and traffic safety improvement
- Determine the level of accident risk via segmentation of the braking data
- Potential new business opportunity by using vehicle as probe data source



## Examples of countermeasures for traffic accidents where road markers are added





# Road Hazard Condition Monitoring System

## Objective

Enhance safety by utilizing incident data from the probe car before passing the location in question and transmit information on motorcycles and such around that area to aim at improving total safety for motorcycles and automobiles.

## Technology Content

### Detection/Recognition of Incident Information

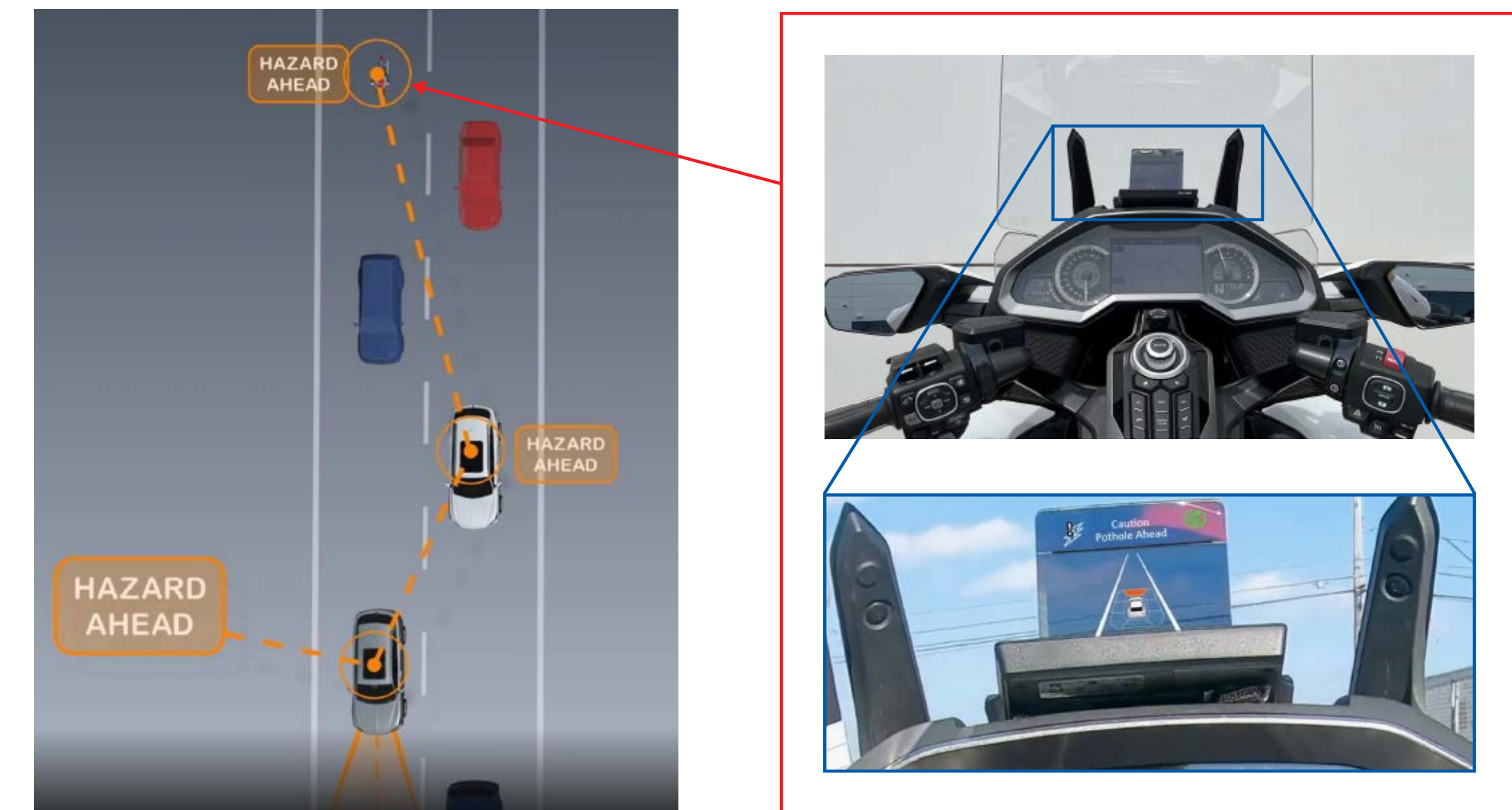
1. Dangerous situations (potholes, animals, bad weather)
2. Lane conditions
3. Construction zones

### IoT

1. 4G/5G: Sending and receiving of incident data between vehicles and the server
2. V2X: Transferring information to surrounding vehicles

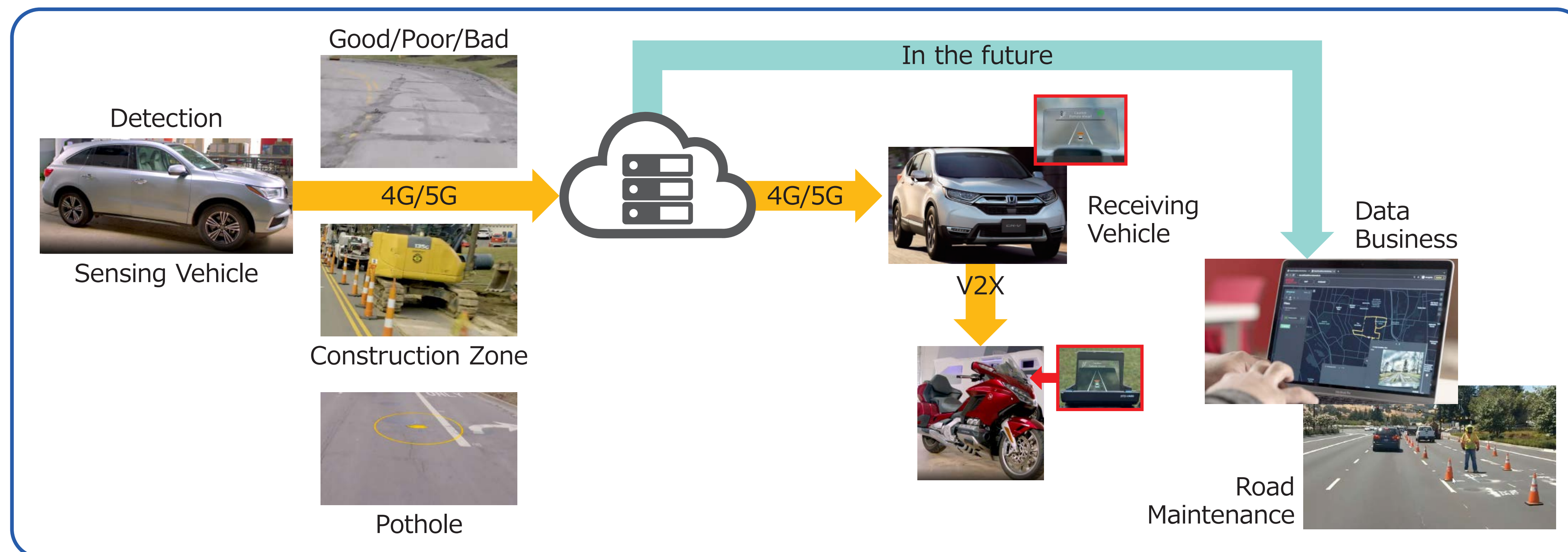
## Technical Features

- Able to attempt to share information with motorcycles and such in the vicinity
- Can be used by road managers for rapid road environment conservation
- Possibility of expansion into new businesses that utilize probe data



Sharing information with motorcycles through V2X technology

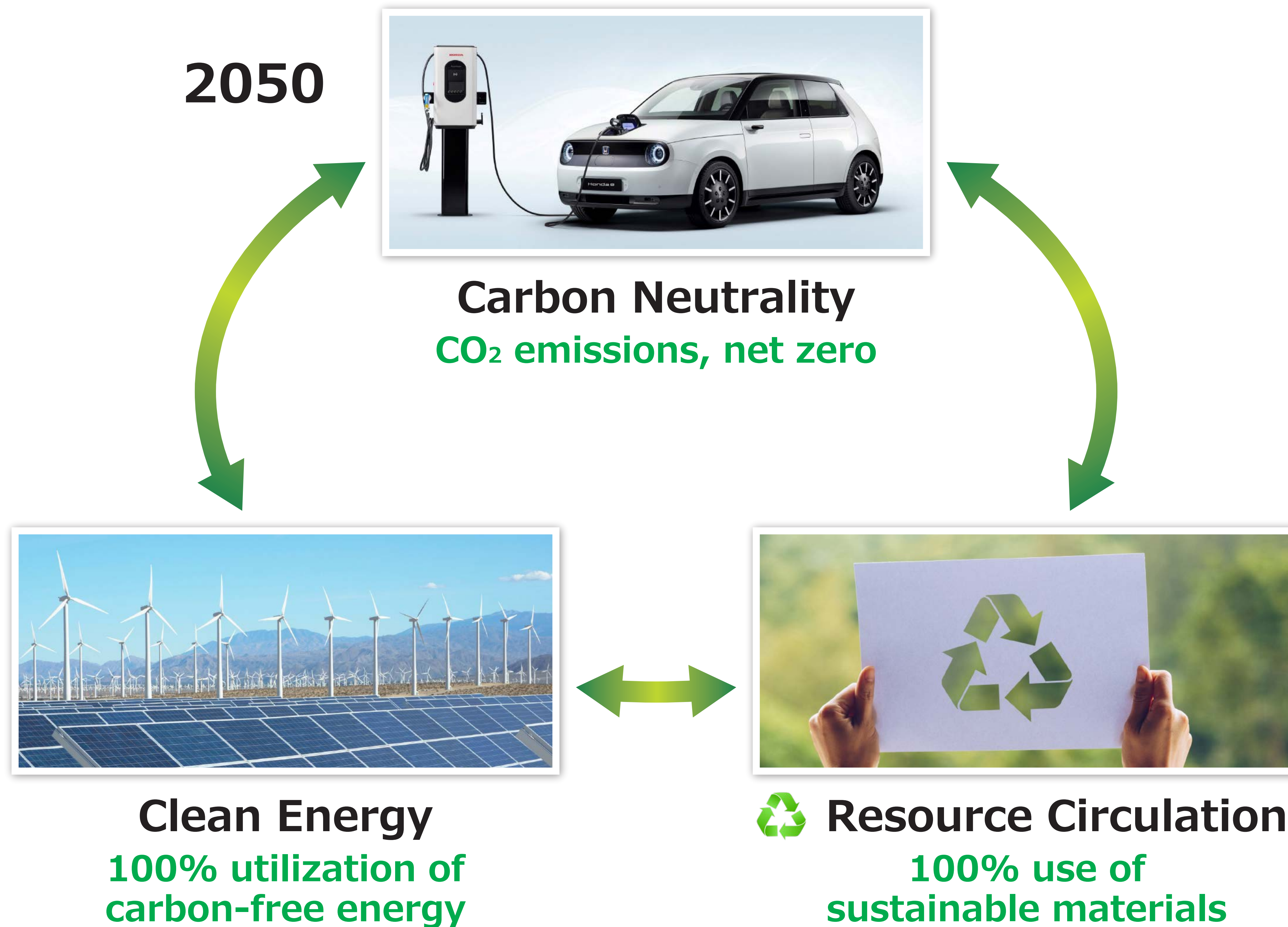
## How it Works



In Collaboration with The  
Japan Ministry of Internal  
Affairs and Communications

# Honda Environmental Concept

Striving for a sustainable and circular society that aims for  
“zero environmental impact”



# Honda Environmental Concept

## ● What We'd Like to Achieve

Realizing "The Joy and Freedom of Mobility" and "A Sustainable Society Where People Can Enjoy Life"

We want to continue to respond to people's eternal need for the "Joy of Mobility"



I want to go to see my loved ones.

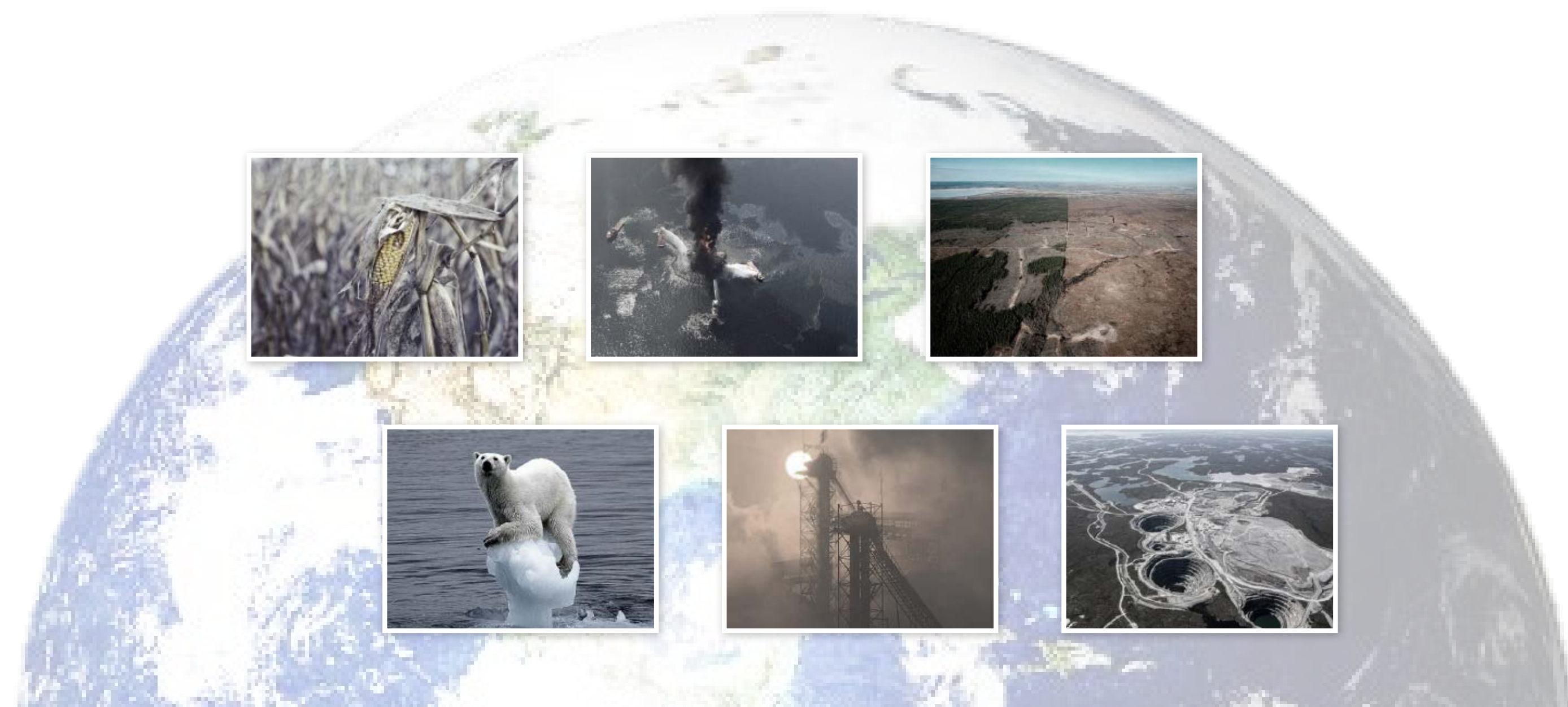


I want to make new discoveries.



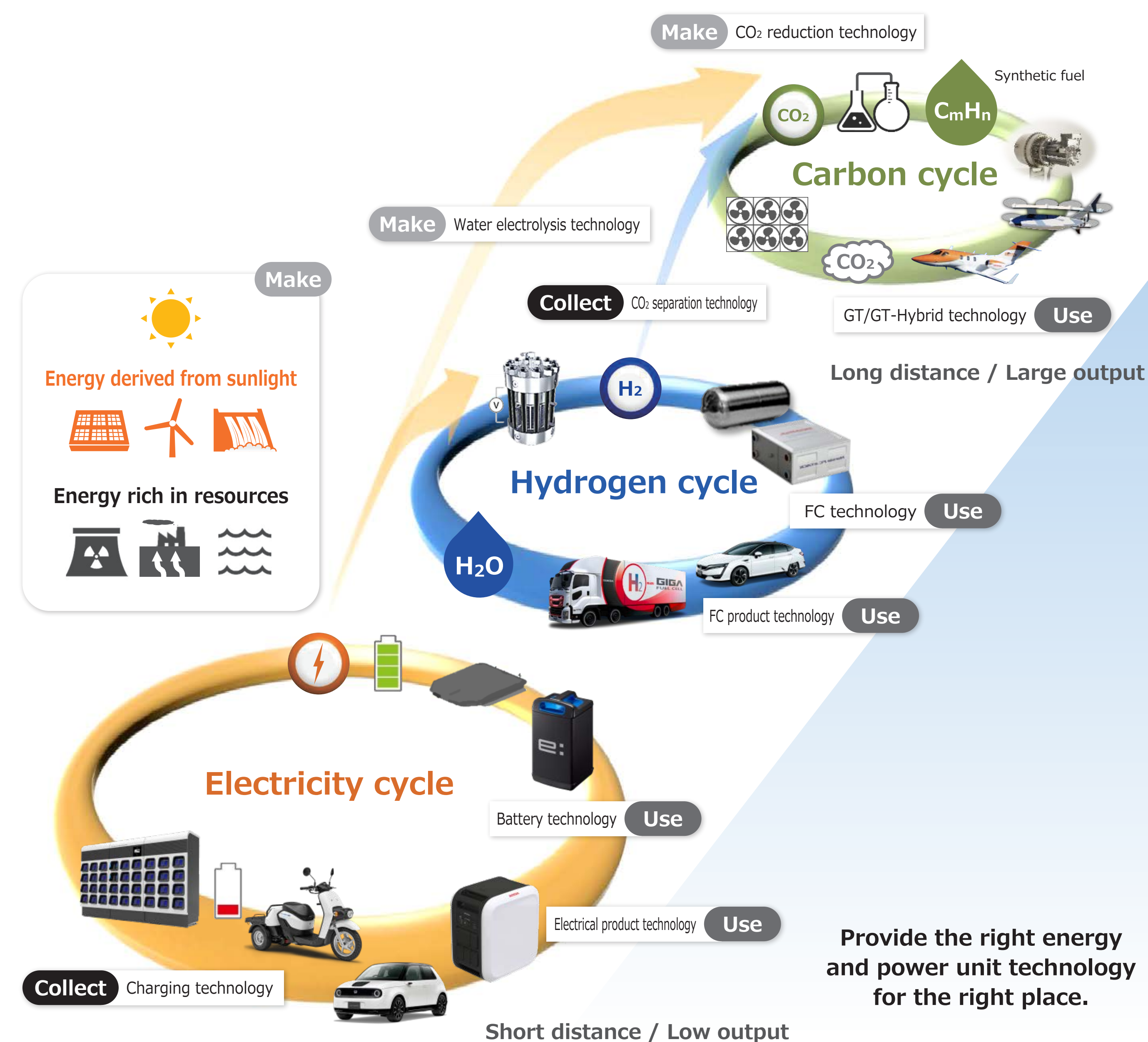
I want to eat delicious food.

We cannot respond to these desires unless we protect the global environment. Therefore, we want to achieve a "Sustainable Society"



## ● Multi-pathway Towards Carbon Neutrality

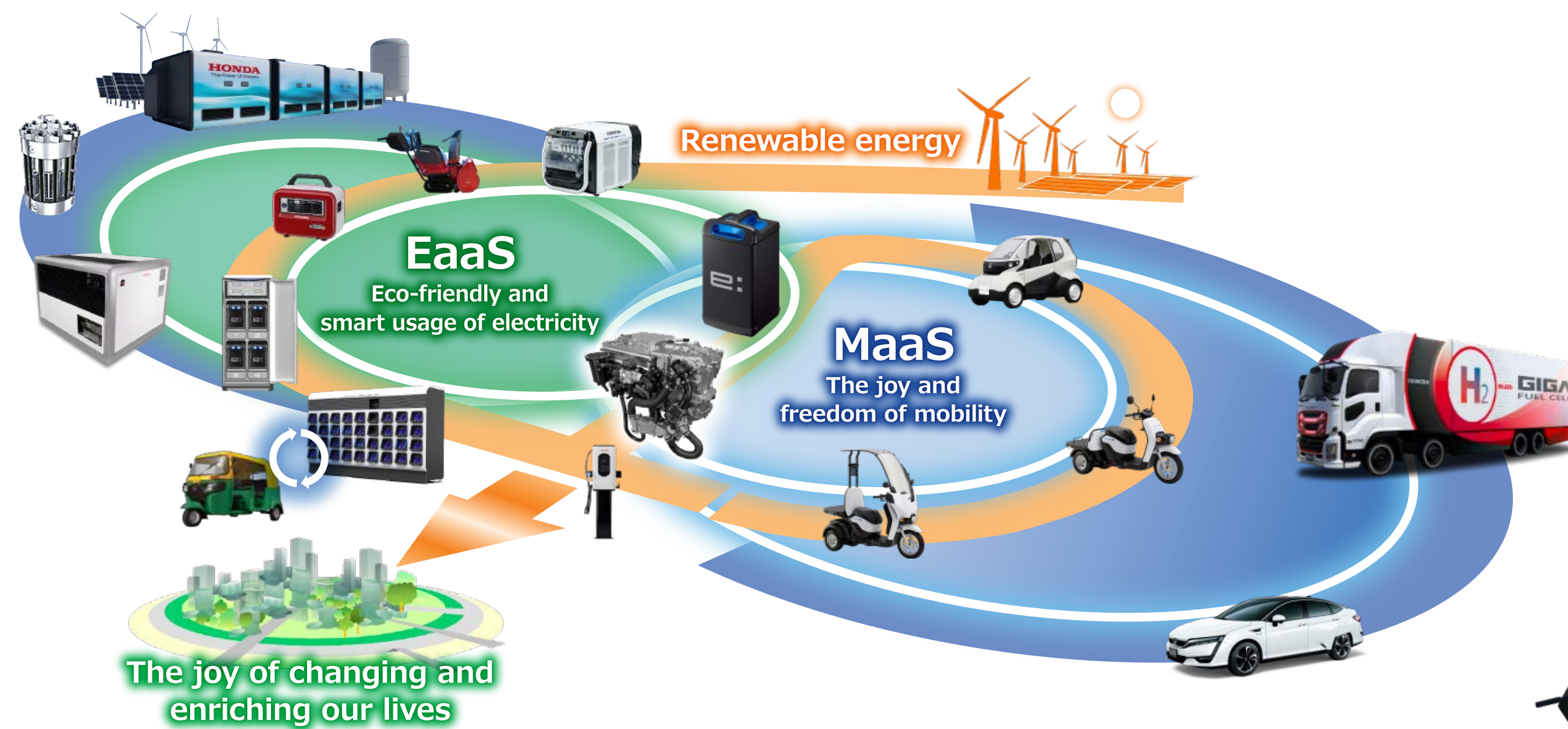
In addition to electricity derived from renewable energy Recycle hydrogen and carbon as energy carriers



# Honda Mobile Power Pack World

## Objective

By supplying power to all kinds of electrical products, Honda Mobile Power Pack e: provides our customers with free and luxurious lives while expanding utilization of renewable energy, contributing to the achievement of carbon neutrality.



## Technical Features

Separating the mobile power pack (battery) from the product enables battery sharing between various Honda products and makes it possible to reduce our battery costs and resources.

Ultra-compact mobility



Mobility for short-distance travel



Note) These include the followings  
 •Japan-only specification  
 •Model under development  
 •Concept model

Mobile Power Pack charging by solar panels

Electric snowblower



Electric scooter



**Honda Mobile Power Pack e:**  
 Easy to use, Robust and Intelligent Battery Pack



- Safe and highly reliable
- High output & high capacity to help expand use
- Compact & lightweight for easy handling
- High durability for long use
- Loss cost for market penetration
- 48V system (UN R136 compliant)

Compact electric outboard motor



Silent and Zero Emission High-Power Portable Power Source



[Sharing battery in society]



Battery Station

Home power storage

- Use of surplus power after FIT ends
- Resilience measures



# Honda Power Pod e: Japan Prototype

## Objective

A portable power supply that can be used in a wide variety of ways by combining it with the Honda Mobile Power Pack e: (detachable portable battery), including as a power supply in your home or outdoors and as an emergency power supply.

## Technical Features

- A charger/power supply device that uses the Honda Mobile Power Pack e:
- A rated output of 1,500 W (VA) equivalent to Residential wall socket can be taken out. Also, it can operate continuously by replacing the detachable portable battery

### Main Specifications

#### INLET

Honda Mobile Power Pack e: swapping port

#### OUTLET

AC 100V outlet x2

USB connector x 2

AC Changing cable connector



### Features

#### ① Quick Restart of Operation by swapping the battery

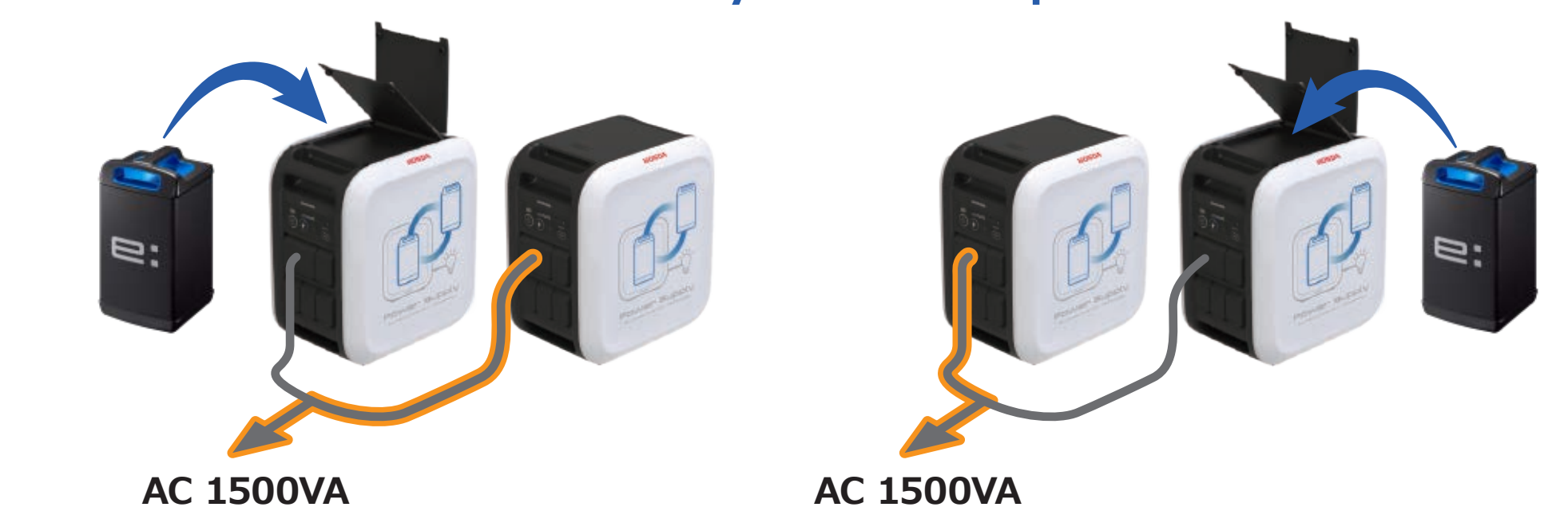
\* Free from long charging wait times



#### ② Continuous AC Power Supply

using parallel operation of two pods and battery swapping  
\* Operation suited to heavy use such as disaster sites, construction sites and events

While swapping one battery, AC power supply continues from the other synchronized pod



Voltage	100V	
Rated output	1500W(VA)	
Mounted battery	Honda Mobile Power pack e:	
Power supply method	AC	2 sockets
	DC	Type-A USB connector: 2
Charging method	AC	AC power cable connector:1
	DC	Solar charging connector: 1
Cooperative operation	AC parallel operation connector	

\*The above specifications may differ from the actual product.

### 1 Rated output of 1500W (VA) equivalent to a residential wall socket

Electrical appliances used in the home can be used indoors and outdoors

Camping (inside a tent)

Staying overnight in a vehicle

#### Main usage

- Use in garages such as DIY
- Use as a power source for outdoors or overnight stays in vehicles

For example, lighting, electric blanket, electric kettle, rice cooker, laptop PC, mobile phone charging, etc.

### 2 High quality power waveform

Low noise waveform quality enables use for live performances, music appreciation and composition

Live performances

Music appreciation and composition

(v) Voltage vs Time (h)

— Honda Power Pod e: — Electricity with distortion

### 3 Detachable battery system

Battery swapping enables to avoid waiting for charging and allows continuous use of electricity

Normal power source (food truck, etc.)

Emergency power source (Evacuation center)

Useful not only in normal times but also in emergencies

**Normal times** Use as a daily power source for outdoor events or food trucks, etc.

**Emergency** Use as a power source in evacuation centers and other indoor spaces and in vehicles during power outages such as in the event of a disaster

# Honda Power Storage e: Concept

## Objective

A concept model of a system which enables the use of Mobile Power Pack as a storage battery for household use. This is one of the proposals for the secondary use of Mobile Power Packs which became unsuitable for use with mobility products.

## Technical Features

- [1] An energy storage system that can contribute to household production and consumption using mobile power packs
- [2] Utilizes a battery-detaching function to enable not only a storage function, but also electric bucket relay in cooperation with the Honda Power Pod e:



## Main Specifications

Compatible Batteries	Honda Mobile Power Pack e:
Output	Approximately 3 kW
Capacity	5.2 kWh MAX (when using 4 batteries)

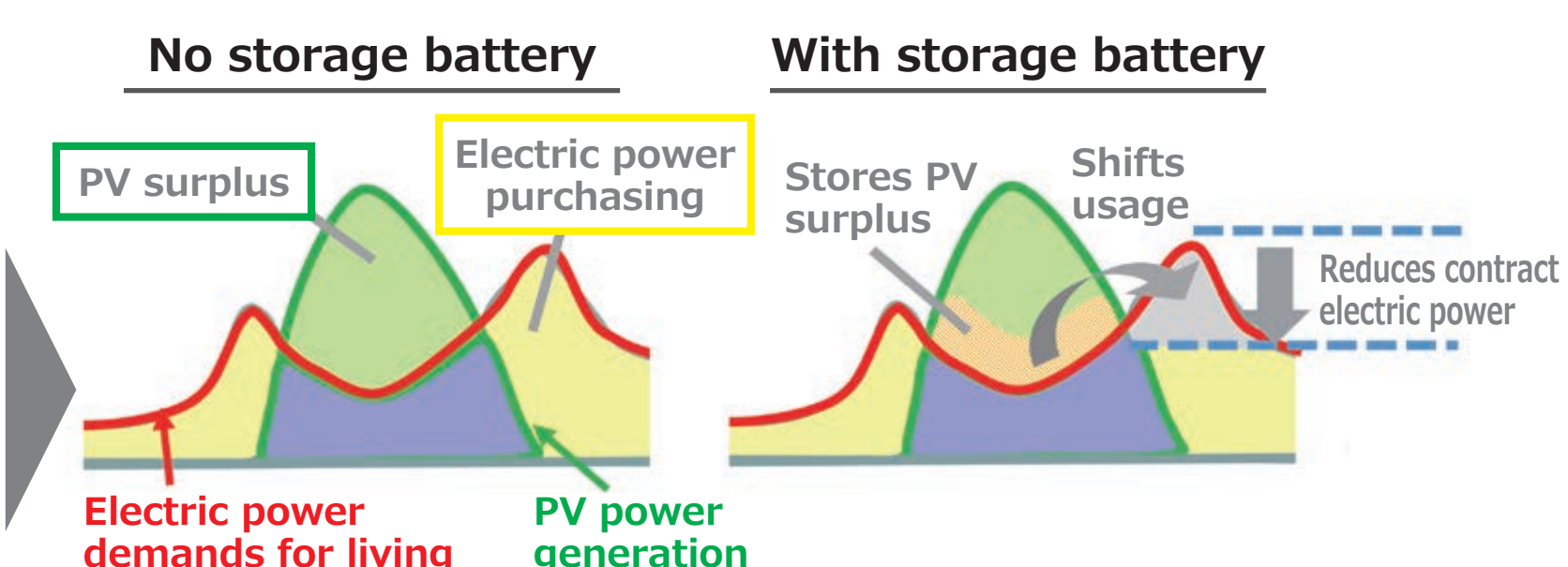
\*The above specifications may vary from those of the actual product.

## Household Production and Consumption of Electricity

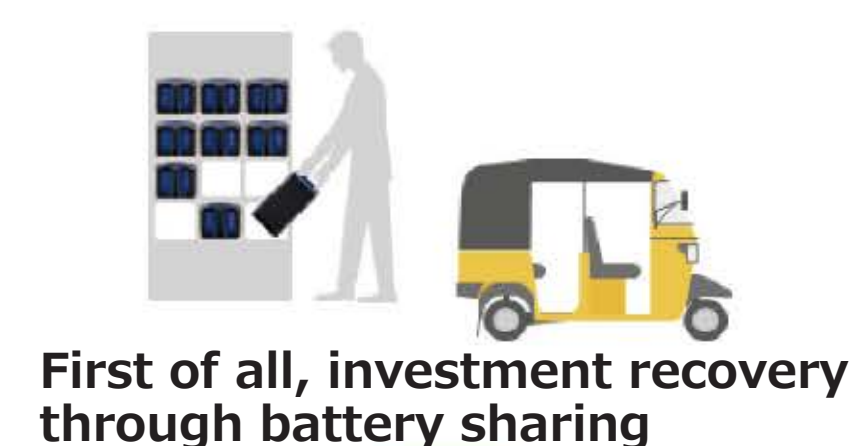
Store it wisely, use it wisely and in a versatile manner, and feel secure in case of emergency

Surplus electricity cannot be sold due to post-FIT, and household consumption of PV electricity is accelerating

Store the surplus portion of renewable energy and use it by shift discharging at night and in the morning → Requires a storage battery



## Secondary Usage of Battery



Differs from automobiles; disassembly cost is unnecessary  
No differences in logistics from a new pack either



**Honda Power Storage e: Concept**  
Reuse the battery as a stationary storage battery



**Honda Power Pod e:**  
Reuse the battery as a portable power supply



\*There are issues in terms of standards with system interconnection using detachable batteries.

# Honda Fuel Cell Systems

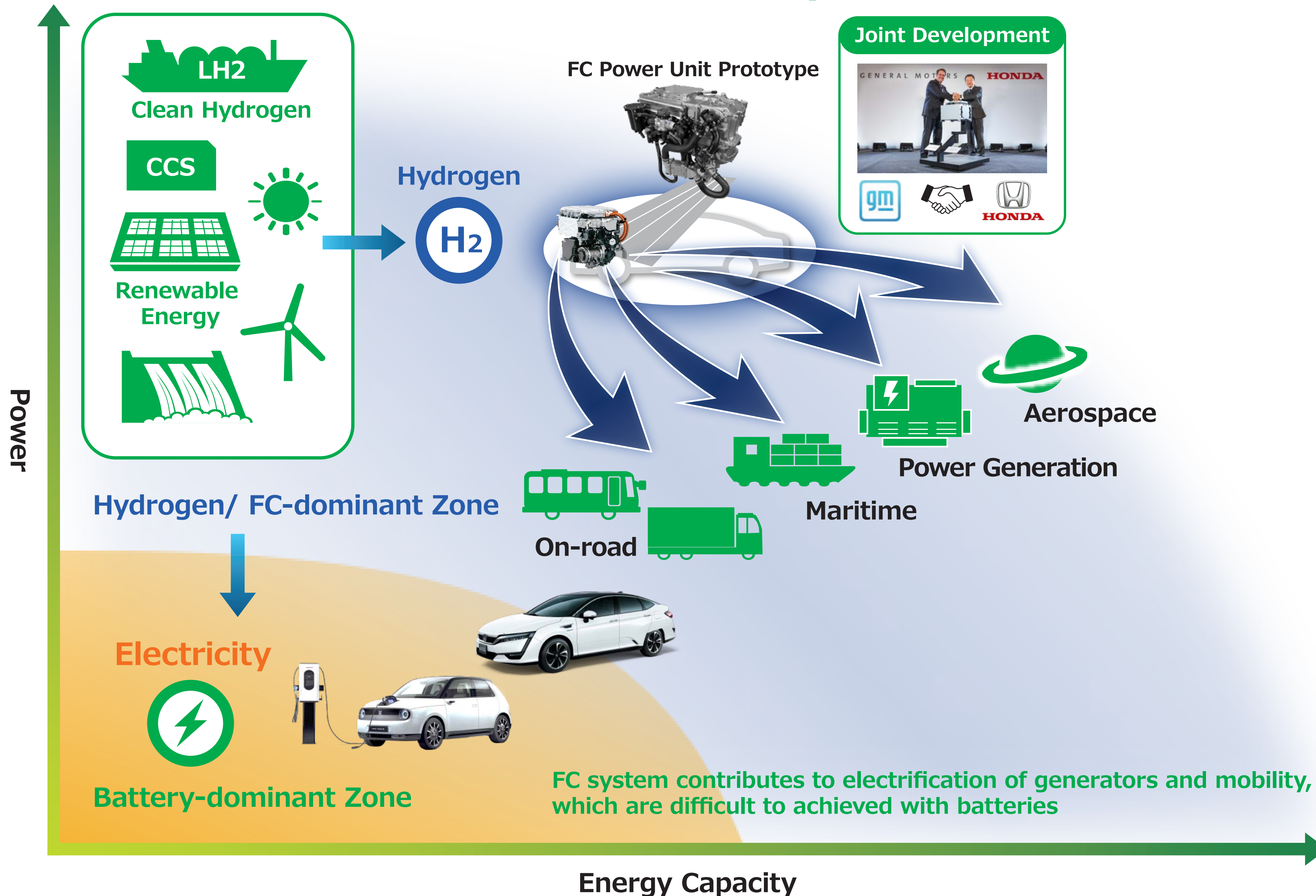
## Objective

Make hydrogen economy a reality by utilizing FC core technology that can provide clean mobility and safe energy.

## Technical Features

- Flexible power output by connecting multiple FC systems
- Available for various mobility/energy applications
- Achieved inexpensive and long-life FC systems through joint development with GM

## Honda Fuel Cell Systems



## Investigate versatile deployment of the FC systems



Commercial Truck



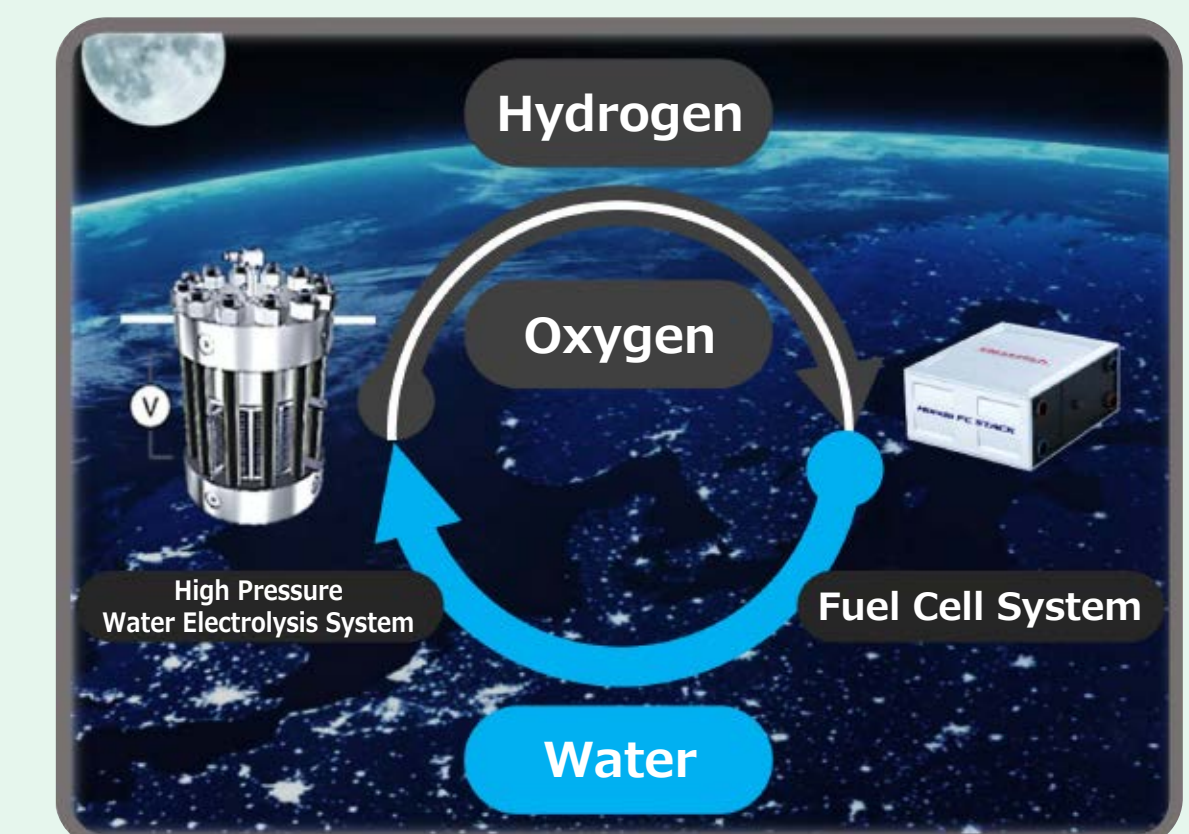
Fuel Cell Backup



Maritime



Portable Power Supply



Aerospace

Exploration of potential of the FC system