DENSO
Crafting the Core

Efforts in the Focus Fields (Automated Driving)

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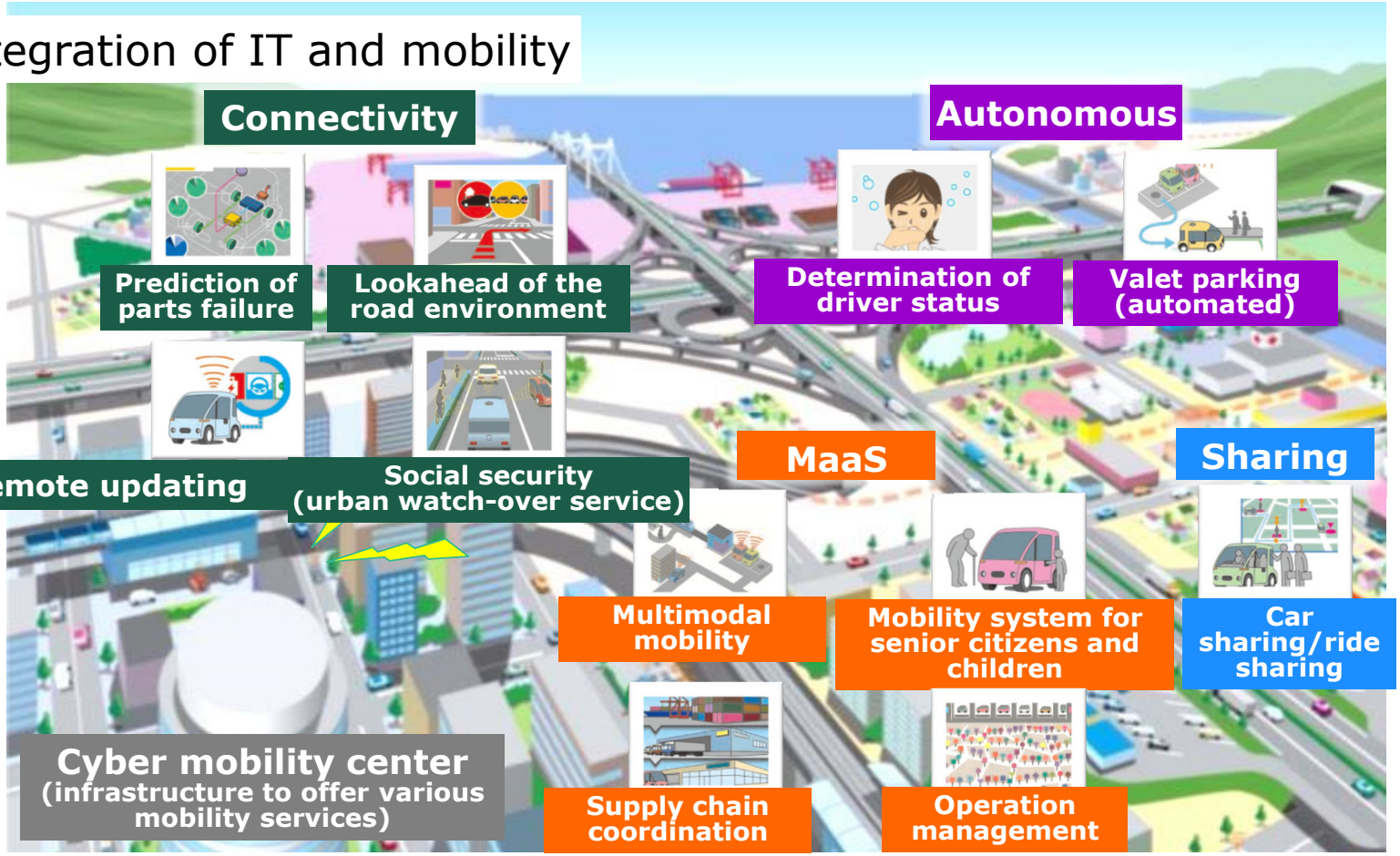
Mobility Systems Business Group

1.

Goal

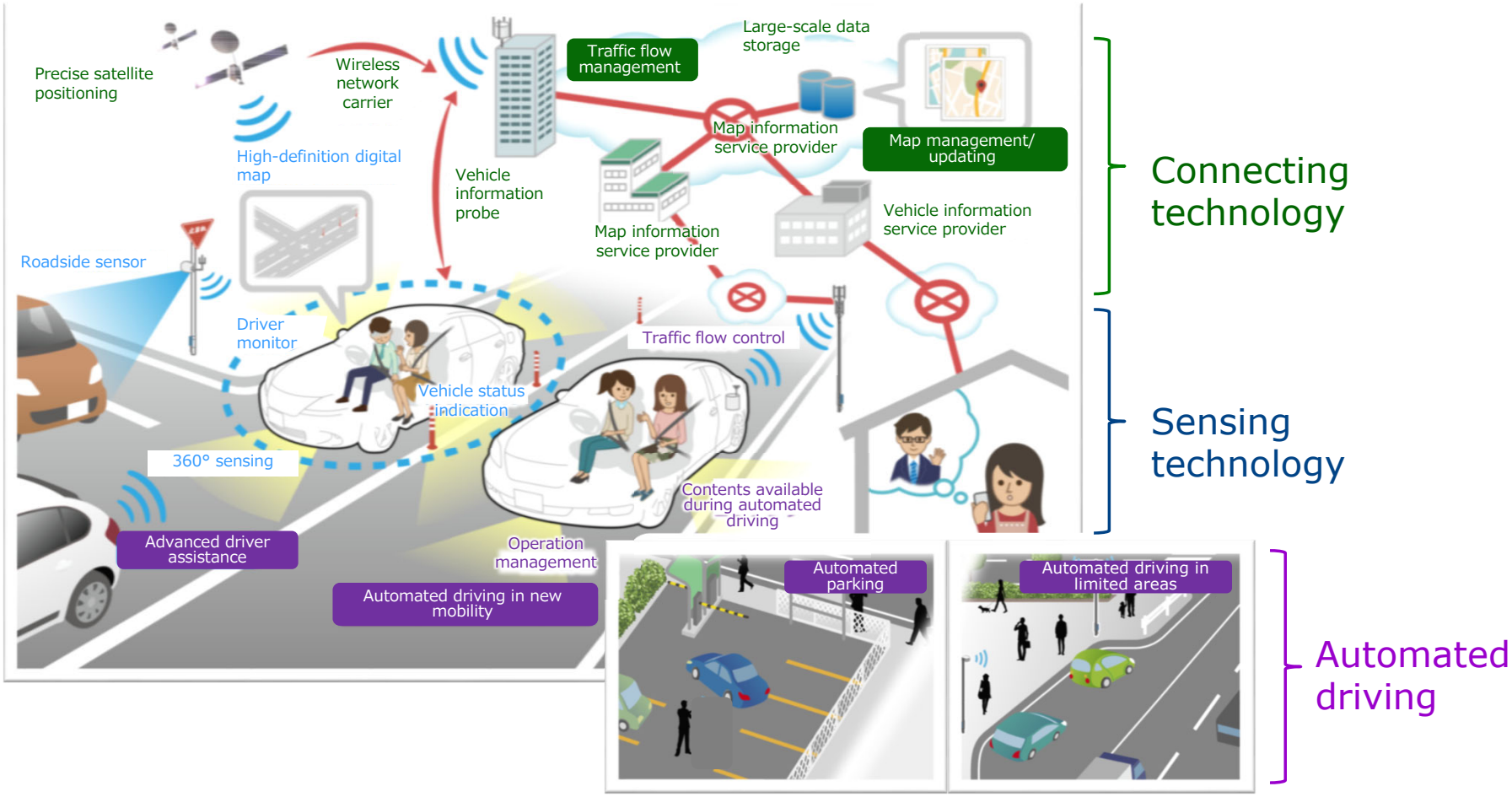
Future vision of mobility

Integration of IT and mobility



Integrate car electronics technology with IT to solve social issues

DENSO's vision of automated driving by 2025



Achieve automated driving by using connecting and sensing technologies to serve as the core of new mobility

2.

Efforts to achieve the target

- Automated driving
- Cockpit system

Realization capability (individual capability × core technology)

Core technology

Sensing	Prediction	Interactivity	Connectivity	Protected
Perception beyond human visibility	As early and correctly as possible	Communication between driver and vehicle	Communication between vehicles and society	Systems

DENSO's strengths

- Various elemental technologies
- Quality, Reliability
- Capability to meet customers' needs

Enhance cooperation with partners

- J-QuAD DYNAMICS
- TRI-AD
- Uber

Achieve automated driving systems by high-quality and highly-reliable engineering capabilities

Efforts to achieve automated driving systems

	Active safety	ADAS/AD Lv.2/3	AD in limited areas Lv.4	Automated parking
Passenger cars	**Diffusion period** **From 2017**  • Autonomous emergency braking • Adaptive cruise control • Automatic high-beam headlights • Lane departure prevention support • Traffic-sign recognition	 Lv. 2/3 on limited highways **Diffusion period** **From 2020**  Lv. 2/3 on general roads **Diffusion period** **From the first half of 2020s**	———	Fully automated valet parking **Diffusion period** **From 2020** 
Commercial vehicles (trucks)	**Diffusion period** **From 2020** 	Lv. 2/3 on limited highways 	———	———
Shared & services (taxis/small buses)	———	  Lv. 2 to 4 on limited general roads **Introduction period** **From 2018** **Diffusion period** **From 2020s**	  Lv. 4 in limited areas **Introduction period** **From 2020s** **Diffusion period** **From the mid-2020s**	———

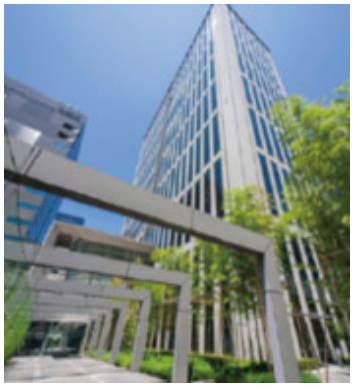
Establishment of an advanced development center in Tokyo

— Taking on challenges to create new value —

Value: Realize a safe society free from traffic accidents and achieve comfortable and flexible mobility

Step 1

Planning, development, and demonstration of advanced technologies and advanced mobility systems will be accelerated through collaboration with customers and partners to release advanced mobility systems early in the market.



April 2018
Global R&D Tokyo opened

Step 2

- Develop test vehicles and conduct field tests on public roads in the Tokyo area
- Cooperate with various companies (e.g., manufacturers) in Ota-ku

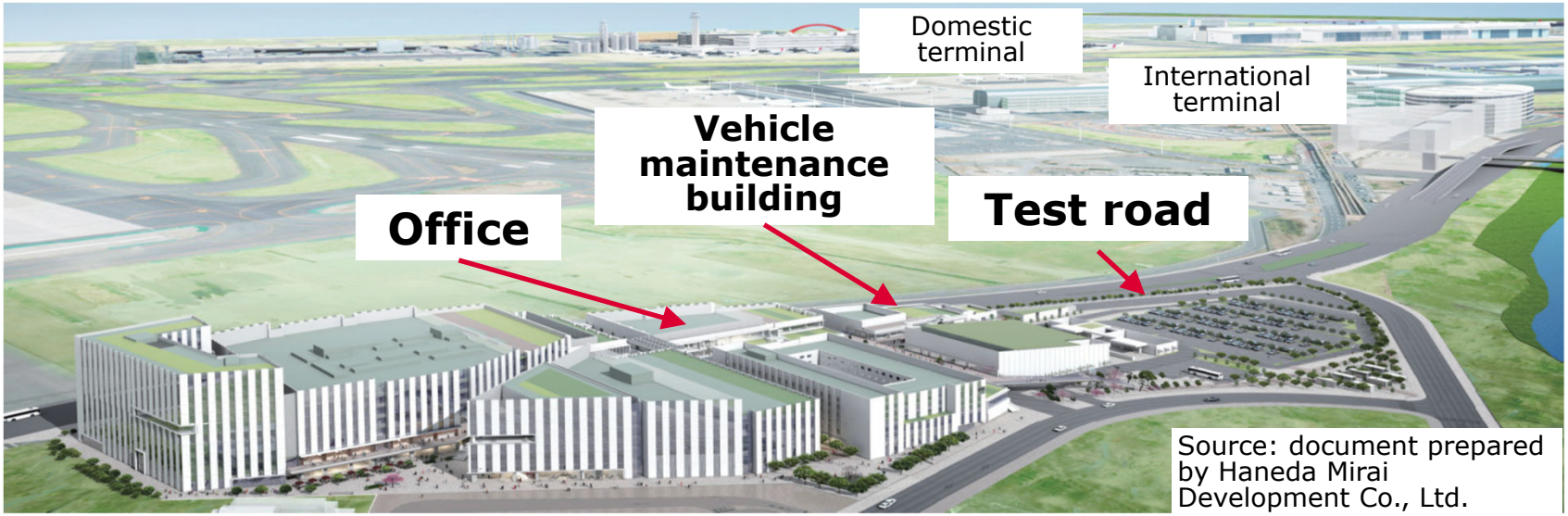
June 2020
A test vehicle development building and office (with a test course) will be opened in zone No. 1 of unused land at Haneda Airport.

Implement the entire process from planning and R&D to prototype production and field tests in the Tokyo area

Profile of Global R&D Tokyo

Opening	April 2018
Location	16F and 17F, W Building, 1-8-15 Konan, Minato-ku, Tokyo
Employees	270 (as of December 2018)
Functions	R&D on advanced driver assistance, automated driving, and connected vehicles

Profile of the test vehicle maintenance building and office in Haneda



Source: document prepared by Haneda Mirai Development Co., Ltd.

Opening	June 2020 (planned)
Location	Part of Hanedakuko 1-chome and 2-chome in Ota-ku, Tokyo
Employees	About 200 (planned for opening)
Functions	Prototype development of automated driving technologies, field tests using vehicles

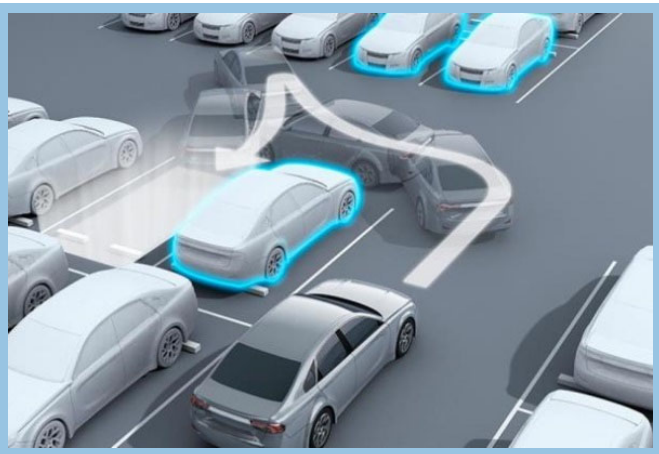
Advanced development of ADAS/AD

Development of AD system packages

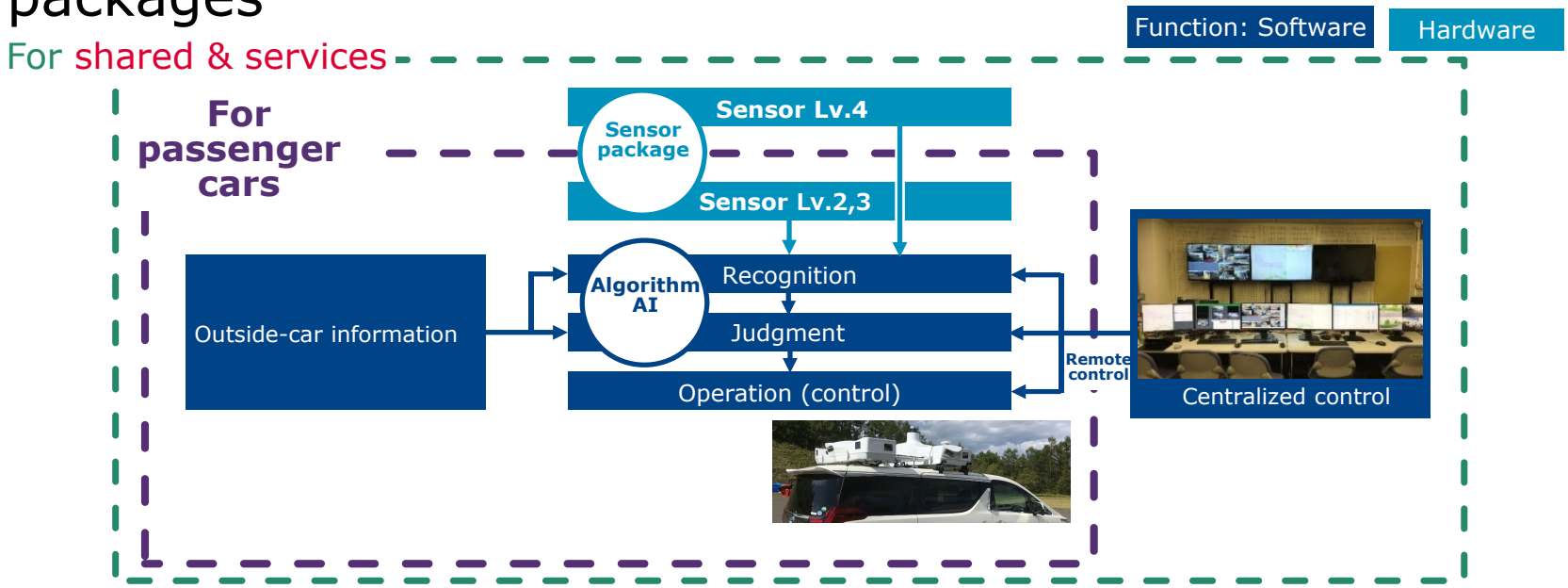
AD center

AD sensor kit

Development of automated parking systems



Advanced development of ADAS/AD: Planning and development of system packages

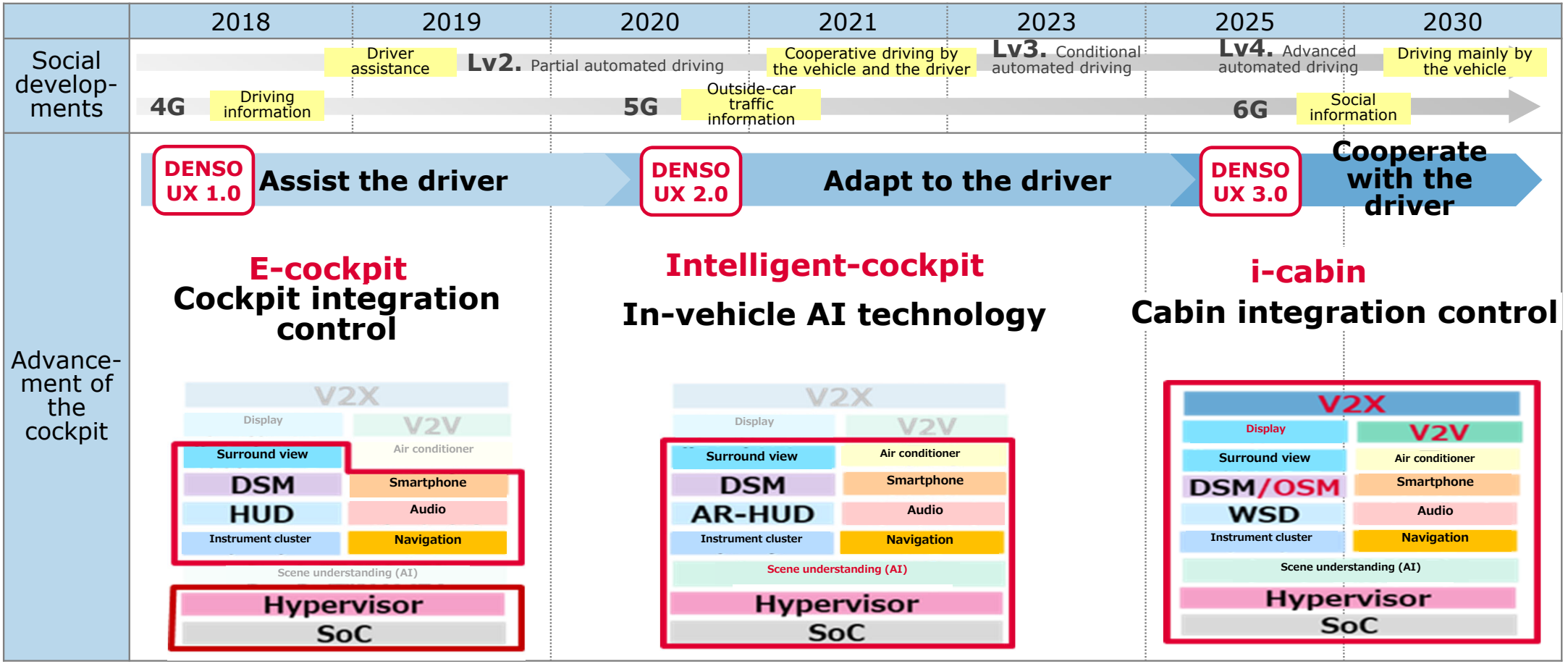


Advanced development of AD system packages

- Development of sensors
- Development of recognition and judgment algorithms
- Development of AI

Accelerate the realization of Lv. 4 for shared & services by using advanced sensors and centralized control

Roadmap for the cockpit system



Offer cockpit systems that support the driver in line with the advancement of vehicles

Coordination between air-conditioning technology and HMI technology (thermal collaboration) — Challenges to create new value —

Example of i-cabin development

Cockpit appropriate for the new era

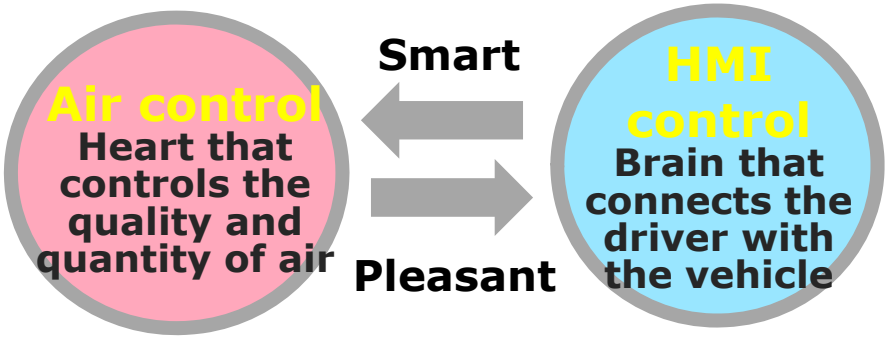
- Wide field of view, large foot space, and a thin instrument panel
- Incorporation of an advanced display device

A space that offers peace of mind appropriate for automated driving

- Driver status (drowsiness, carelessness) determination and awakening systems

Air flow that can be controlled flexibly

- Air flow based on the occupants' positions
- Capable of controlling the air quality at will



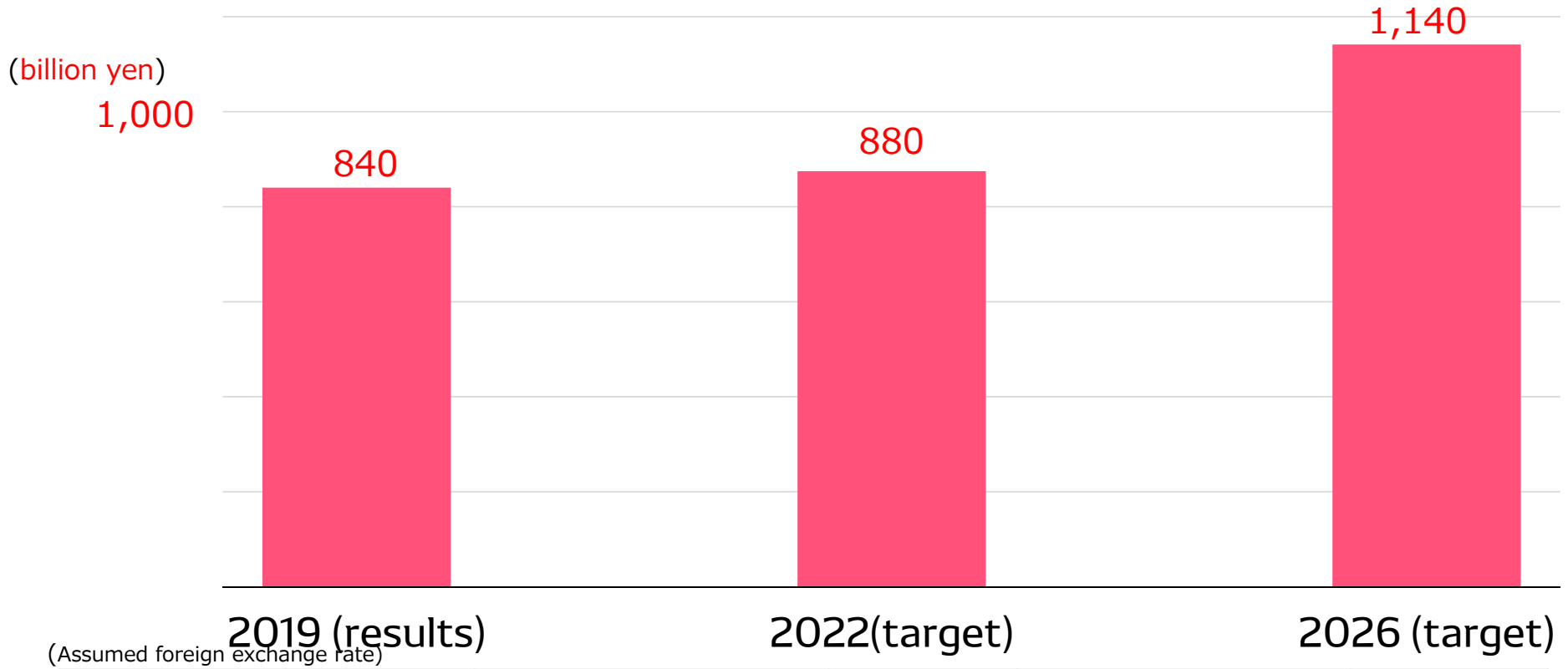
CID: Center Info-Display
HVAC: Heating, Ventilation, & Air-Conditioner
DSM: Driver Status Monitor

Integration of DENSO's air-conditioning technology and HMI technology

3.

Growth target

Mobility Systems Business – Revenue target for FY2026



(Assumed foreign exchange rate)

USD	111		100		100
EUR	128		120		120

Aim to achieve 1.1 trillion yen by FY2026 by contributing to the spread of automated driving (about 1.4 times compared to the results in FY2019)

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